

Appliance Standby Power Consumption Store Survey 2007/2008

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CENTER FOR CLIMATE CHANGE
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CENTRAL EUROPEAN UNIVERSITY

Executive Summary

The project “Appliance Standby Power Consumption – Store Survey in Central Eastern Europe” was initiated as part of the Asia Pacific Partnership on Clean Development and Climate Change (APP).

The purpose of the project was to measure and collect standby power data from a range of common household appliances on display in retail stores in two Central Eastern European countries – Hungary and the Czech Republic. The project was carried out to contribute to the pooling of standby data to assist in international comparisons and to track trends in standby power over time at national level.

In the Hungarian survey, a total of 500 appliances have been measured, resulting in a total of 969 measurements being recorded for all the relevant modes (off, standby and in use) during the survey. The appliances metered in the survey were microwaves, espresso machines, laptops, monitors, computer speakers, Multi Function Devices, printers, stereos, televisions, DVD players and recorders, Hard Disk Recorders, cordless phone base stations, mobile phone chargers, and External Power Supplies. In this report, the collected data are assessed, in order to indicate the characteristics of a cross-section of the current electronic appliance market in Hungary.

Appliances were analyzed in terms of the values metered in each relevant non-functional mode, as well as other characteristics defining the particular product (such as size, existence of different power switches, remote control, electronic display, the type of control and transformer (EPS), where relevant the type of subwoofer, screen resolution, number of tuners, and information on energy labels).

An overview of the type of appliances measured, the number of units in each group with the relevant average powers for three major modes: active standby, passive standby and off is provided in Table 1 below.

Table 1: List of Appliance Types and Average Power in Three Modes in the Hungarian Standby Survey

Appliance	Number of Appliances Metered	Average of Power – Off (W)	Average of Power – Passive (W)	Average of Power – Active (W)
Computers – Laptop	15	27.3 ¹		
Computers – Monitor	14	0.6	0.7	
Computers – Speakers	26	1.5		2.4
Stereo – Integrated	30		2.8	11.1
Stereo – Portable	30	1.3	2.0	4.0
DVD Player	30	0.3	1.2	5.7
DVD Recorder	25		4.2	16.0
Espresso Machine	19	1.8		
Hard Disk Recorder	30		5.2	23.2
Microwave	26	0.2	1.9	
Multi Function Device	30	2.0		8.5
Printer – Inkjet	25	1.4		3.4
Printer – Laser	22	0.1		5.4
TV – CRT	30	0.0	4.5	
TV – LCD	20	0.2	3.3	
TV – Plasma	31	0.6	2.0	
Washing Machine Front Loader	2	0.9		2.5
Cordless Phone Base Station	18		1.4	2.6
Washing Machine Top Loader	27	0.4		3.1
External Power Supplies	30		0.3	
Mobile Phone	20			3.3

¹ Disregarded, because many of the laptops were not charged, thus the measurement resulted in non-reliable data.

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Introduction

The project “**Appliance Standby Power Consumption – Store Survey in Central Eastern Europe**” was initiated as part of the Asia Pacific Partnership on Clean Development and Climate Change (APP).

The purpose of this project was to measure and collect standby power data from a range of common household appliances found on display in retail stores in two Central Eastern European countries. Furthermore, the project aimed at briefly assessing the collected data, in order to indicate the characteristics of a cross-section of the current appliance market. The project was carried out to contribute to the pooling of standby data to assist in international comparisons and to track trends in standby power over time at the national level. The project covered retail outlets in Hungary and the Czech Republic.

The data collection and analysis was done by Center for Climate Change and Sustainable Energy Policy (3CSEP) of the Central European University (CEU) during April-July 2008.

Table 2 below shows the tasks performed as required by the contract:

Table 2: Contract Tasks and Schedule

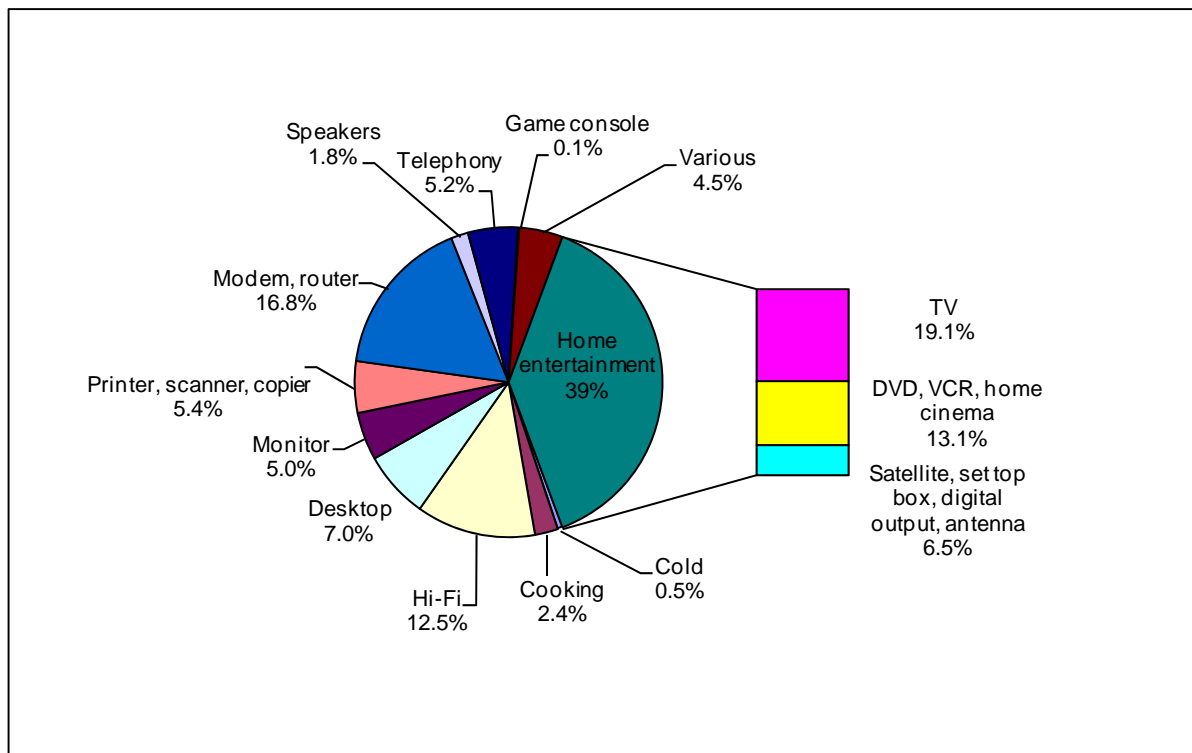
Task	Schedule
Preparation – composing team, contacting shops, purchasing of equipment, practice	1 st April to 3 rd of May 2008
Field work	7 th to 14 th of May 2008
Data check, validation of datafile	18 th of May to 15 th of June 2008
Methodology report	1 st of May to 8 th of July 2008
Report (preparation and reviews)	15 th of June to 8 th September 2008

Project Background

Standby power consumption, which is the power used by appliances when they are not performing their primary function, has been recognised as one of the most cost effective potential end-use energy efficiency measures. While the amount of standby power varies markedly between countries, the global energy consumption from standby has been estimated by the International Energy Agency (IEA) at between 200 TWh and 400 TWh per year.

A rough estimate for the situation in Hungary households has been produced by the REMODECE project under the Intelligent Energy Europe Programme. In the 100 households that were metered under the project, the total standby consumption for a year was found to be 8.2% of total annual electricity consumption. The average installed standby power in the households was 30W (with a maximum power reaching 110W). This corresponds to an average consumption of 0.65 kWh per day, and 236 kWh per year (maximum standby consumption being 933 kWh/year). Figure 1 gives an idea of the importance of various appliances and appliance groups in regards to standby consumption.

Figure 1: Standby Consumption in an Average Hungarian Household per Appliance Category



Source: Valentova et al. 2008 (forthcoming)².

In the 1990s, the IEA encouraged the development of a national 1 Watt standby consumption target culminating in a call to action in 2000³. Although the IEA has enabled and encouraged members to combat excessive standby consumption, there is no general global consensus on a uniform approach at this stage. At the International Standby Conference in Canberra, government, industry and efficiency advocates agreed that international cooperation, data sharing and early communication with stakeholders are essential to overcome excessive standby power.

² Valentova, M, Boza-Kiss, B., Urge-Vorsatz, D. Forthcoming. Low power mode electricity consumption in Hungarian households: how big is the problem and what is the potential to mitigate it?

³ International Energy Agency (IEA). 2001. Things that go blip in the night: standby power and how to reduce it. Paris: IEA/OECD

Standby power is now used by a myriad of electronic products. Most people will be familiar with a television with a remote control. When the remote control is used to turn the television off, the television still uses some power to keep the remote control circuit active so that the remote control can be used to turn the TV on again. This is one form of standby power.

Some 20 years ago, almost no product used any power when not performing its main function. Now, “standby power” is present on a huge range of products and used to power a wide range of modes and functions. The many small lights emanating from appliances seen at night is a demonstration of the pervasiveness of standby power. Standby power can deliver a range of functions desired by the end-user (clocks, remote controls, communications, sensors, controllers) but it can also be due to poor design and through the use of inefficient components.

While global understanding of standby power is growing rapidly within governments and efficiency advocate circles, there is still little comparative data available which indicates the range of standby levels found in typical products and whether these power levels are improving or deteriorating over time. The level of information currently varies substantially by country and no simple metric exists to compare data between even those countries that collect data. Moreover, the availability of data on standby consumption is especially scarce in the region of Central and Eastern Europe. In these circumstances, the value of the current project is fundamental. By the inception of this project, it is hoped that a tradition of annual or other regular standby data collection activity will commence. This will significantly improve the basis for evidence based policy making in the region, and have an important potential consequences for national or EU level regulations.

There is growing international pressure from governments for manufacturers to reduce standby levels on new products so that they still deliver the same or improved functions, but use much lower levels of power than are delivered to the market today. Various studies have estimated that global standby power levels could be reduced to less than 30% of current levels using existing technology with little additional manufacturing cost. To facilitate this though, information is needed to track what is happening in the global market, to help inform all market players and to track the effectiveness of standby reduction policies.

Definition of “Standby” in this Report

Appliances and equipment with a “standby mode” may include any household product that consumes power while not performing its primary function. A simple definition of “standby” is when an appliance is at its lowest power consumption when connected to mains power, even if the appliance is turned off (lowest power mode that can be influenced by the user). However, “standby” is better defined under various modes and for the purpose of this research, standby modes were defined as set out below. These definitions and names below have been devised for the purpose of facilitating field data collections and are not intended to form an international mode naming system.

Off:

When a product or appliance is connected to a power source but does not produce any sound or picture, transmit or receive information or is waiting to be switched “on” by the consumer. If the product has a remote control, it cannot be activated by the remote control from off mode. While the product may be doing some internal functions in off mode (e.g. memory functions, EMC filters) these are not obvious to the user.

Passive Standby:

When a product or appliance is not performing its main function but it is ready to be switched on (in most cases with a remote control) or is performing some secondary function (e.g. has a display or clock). This mode also applies to power supplies for battery operated equipment (portable appliances which are intended to be used when disconnected from the base station) when the appliance is not being charged.

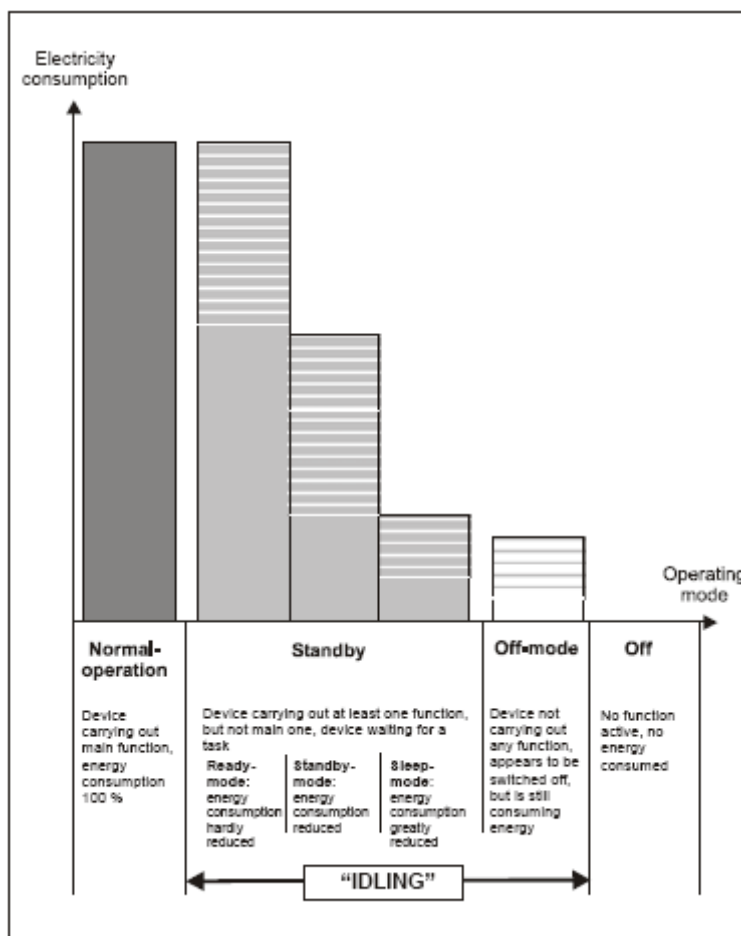
Active Standby:

Active standby is mostly applicable to VCRs and some stereo equipment where operating involves some mechanical drive (including appliances like DVD and CD players). Active standby is when the appliance is on but not performing its main function. For example, a VCR may be on but not playing or recording. This mode also applies to power supplies for battery operated equipment (portable appliances) when the appliance is being charged (various sub-modes).

Delay Start:

Delay start mode is fast becoming common place in many major appliances. Essentially the appliance can be programmed to begin functioning at a later time, in some cases up to 24 hours later. Appliances left in this mode are in neither active nor passive standby and therefore it was decided to measure this mode as a separate category. The effect this mode will have on consumption will largely be determined by consumer behaviour.

Figure 2: Different Modes of Appliances



Source: Schlomann et al. 2005.⁴

⁴ Source: Schlomann, B. Cremer, C., Friedewald, M., Georgieff, P., Gruber, E., Corradini, R., Kraus, D., Arndt, U., Mauch, W., Schaefer, H., Schulte, M. and Schröder, R. 2005. *Technical and legal application possibilities of the compulsory labelling of the standby consumption of electrical household and office appliances*. Summary of the final report for the Federal Ministry of Economics and Labour. Project no. 53/03. Karlsruhe: Fraunhofer-Institute for Systems and Innovation Research

Methodology

Data in this Report

Data in this report were collected in Hungary during May 2008. Field data collection was undertaken on contract by the Center for Climate Change and Sustainable Energy of the Central European University as part of the international “basket of products” standby project. The data collection was funded by Australian Government’s Department of the Environment, Water, Heritage, and the Arts as part of the *Alignment of National Standby Power Approaches Project* under the *Asia Pacific Partnership on Clean Development and Climate*.

A standard “basket of products” is being measured in many countries in order to allow international comparison of standby power. The purpose of these standby measurements on a common set of products is to allow quantitative national and international comparison of like products across different countries and regions. Such measurement will heighten the awareness of stakeholders of the magnitude of standby power and will provide a focal point to highlight differences across regions. Such measurement will demonstrate the effectiveness of the policy mix used in individual countries and promote products that meet the standby power challenge. See Appendix A for more details on the “basket of products”.

The following 19 appliance types were tested during the 2007/2008 in store survey in Hungary:

- Computers - Laptop
- Computers - Monitor
- Computers - Speakers
- Multi Function Devices
- Printers - Inkjet
- Printers - Laser
- Stereos - Integrated
- Stereos - Portable
- Microwaves
- Espresso Machines
- Televisions - CRT
- Televisions - LCD
- Televisions - Plasma
- DVD Players
- DVD Recorders
- Hard Disk Recorders
- Cordless Phone Base Stations
- Mobile Phones
- External Power Supplies

Data was collected using a standard data collection instrument provided by Australia. The standard expected modes are described above (Definition of “standby”) and in the appendices.

Equipment and Preparation

The approach used for this study was to measure data on new appliances and equipment on display in retail outlets. Permission to undertake these measurements was obtained in advance from the store managers.

For each appliance, power was measured while the appliance was in use, in standby (passive and/or active) and off, where applicable. Clearly for many appliances such as washing machines and dishwashers, it was impractical to measure the appliance in use. For most of these products there is a performance standard that adequately covers the 'in use' mode consumption. Information on the relevant modes is found in Appendix B. The data were collected using the metering equipment **Voltcraft Energy Logger 3500**. The logger has a resolution of 0.1W, and a precision of $\pm 1\%$ with 1 digital place.

In total, 500 products were measured, resulting in 869 measurements being recorded for all the relevant modes during the survey. The shops where the data collection took place belong to two major retail chains in Budapest, Hungary: **Media Markt** and **Electroworld**. The main incentive for companies to allow the metering exercise in their shops was the possibility to get the data later, as well as appear as collaborators in the reports and the webpage that is to be published on the website of CEU-3CSEP. The shops in Hungary were relatively easy to get to participate, and were particularly helpful. It was a perfect basis for the data metering, and with the helpfulness of the retail staff the metering group was able to overcome a number of difficulties (for instance meter appliances normally displayed without cables or battery or meter certain modes not readily available on the appliances as they are in the shops).

When working in shops, there are a number of difficulties, organization, technical and personal that can affect the ability to meter some appliances or certain modes. It was a priority in this project to successfully overcome these, and if necessary make compromises that still allow for gathering meaningful data. The helpfulness of the retail shop management and staff was crucial for this. Sometimes, it would have been necessary to repeat some measurements, but due to constraints (time, disturbance to customers) this was not possible. In spite of the efforts and helpfulness, some units could not be metered due to barriers at the spot of metering, such as:

- appliance power cord missing or damaged;
- wrong or no power cord;
- appliance difficult to access without disturbing the store display (placed very close to each other, locked up or too high to reach);
- shop fixture design does not allow access to power cords without removing shelving and panels;
- no display model available at the time or only appliance casing displayed (not a working model);
- batteries are store separately.

Limitations of the Data

The following limitations apply to data measured as a part of this survey:

- Simple meters have been used - while these usually have good accuracy, there may be some exceptions for products with highly distorted current waveforms.
- Regulation of voltage or test conditions is not possible during measurements.
- Product stability cannot be guaranteed during field measurements.
- Products with short duration modes or with power management may give a false short term reading if this is not obvious during the measurement process.
- Sometimes remote controls are not available so some modes cannot be activated for some products.
- Some products or product parts, such as batteries, remain in their packaging and cannot be opened for measurement in the retail outlet.

These limitations apply to data in this report.

Acknowledgements

The data in this report was collected by the Center for Climate Change and Sustainable Energy Policy of the Central European University and its staff. The researchers that carried out the data collection and the analysis were:

- Diana Ürge-Vorsatz (project leader)
- Tibor Schwarz (overall coordination and data collection in CZ)
- Yulia Barabanova (communication and data collection in HU)
- Vilmos Takacs (coordination of data collection in HU)
- Vijayakumar Kuttappan (data collection in HU)
- Benigna Boza-Kiss (preparation of project, consultation, contribution to project report)

The project team would like to express their gratitude to the research support unit of the Central European University, who had a crucial role in realizing this project, through the overcoming of certain major difficulties. In particular we would like to thank Vanda Mohacsi and Zsuzsanna Gabor.

Furthermore, CEU would like to thank Lloyd Harrington and Jack Brown from Energy Efficient Strategies Pty Ltd (EES), and Melissa Damnic from EnergyConsult, for their extra efforts and help in this project. They have been particularly supportive in setting up the proper and professional circumstances at CEU for such a metering exercise, and provided crucial help in understanding the common methodology, and clarifying ambiguities. They also helped in the writing and finalization of this report and its content.

Last, but not least, CEU team would like to thank particularly the participation of the retail shops of Media Markt and Electroworld, and will always be specially grateful for the helpfulness and cooperation of the management and staff.



Notwithstanding the many individuals and organisations that have assisted during this project, the content and form of this report, and all of the views, conclusions and recommendations expressed in it, are those of CEU.

While the authors have taken every care to accurately report and analyse the data, the authors are not responsible for any use or misuse of data or information provided in this report nor for any loss arising from the use of this data.

Results

The following section provides a brief overview of general and overall results. It is then followed with sections that detail the test results by appliance type. The analysis is divided according to appliance category: major appliances, office equipment, home entertainment, small appliances and other.

The primary results of the measurements were the power readings in various modes, such as “off”, “passive standby” and “active standby”. In addition, some basic information was collected for every appliance, which either identify the appliance and type (brand, model, price), is relevant to the level of standby (remote control, power switch, screen resolution, and so on), or that has significance in communicating energy features of the appliances (labels).

Overview

In off mode, most of the appliance types had a relatively low average power. Nine out of the 13 appliance types had an average off mode power lower than 1 W⁵. CRT televisions all featured 0W in off mode. There were 4 products that had an average off mode power over 1W, but still under 2W (computer speakers, MFD, portable stereos, and inkjet printers). There is no average off mode power available for HDR because the HDRs in the survey had no on/off button. This was also found to be the case for DVD recorders and integrated stereos.

The highest off mode power in the total sample was 7.5W, which was found for a multi function device (MFD). On the other hand, about one third (79 out of 287) of the products, where off mode power was relevant to measure, had 0W, and 182 units had maximum 1W. It is notable that almost all washing machines were drawing power when switched off, with values ranging from 0.1W to 3.5W.

The power in passive standby mode was metered in 227 cases, and was found to be 0W in case of 22 units, while 116 units had not more than 1W. All appliance types, with the exception of external power supplies and monitors drew more (up to 5.2W, see Table 3) power than 1W on average in passive standby mode. Passive standby average ranged between 0.3W and 5.2W.

Active standby mode was relevant for 297 units. 0W was measured for only two units, and only 5 had maximum 1W power. 43 had 2W or less. One sixth of the products (48) had a power above 10W. The highest average value was found in HDRs, with 23.2W, the lowest was 2.4W for computer speakers. All of the average active standby power values are above 2.0W.

⁵ Excluding data for laptops, which could not be evaluated due to a methodological shortfall; the units' batteries started charging when they were plugged in to be measured, thus giving possibly misleading readings.

Table 3: List of Appliance Types and Average Power in Three Modes in the Hungarian Standby Survey

Appliance	Number of Appliances Metered	Average of Power – Off (W)	Average of Power – Passive (W)	Average of Power – Active (W)
Computers - Laptop	15	27.3 ⁶		
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Microwave	26	0.2	1.9	
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Printer - Laser	22	0.1		5.4
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TV - LCD	20	0.2	3.3	
TV - Plasma	31	0.6	2.0	
Washing Machine Front Loader	2	0.9		2.5
Cordless Phone Base Station	18		1.4	2.6
Washing Machine Top Loader	27	0.4		3.1
External Power Supplies	30		0.3	
Mobile Phone	20			3.3

Note: The number of products measured for this exercise is listed in the table. Appliances of the core basket are in normal font and italicised appliances belong to the secondary products.

Notable technological barriers to using the lower energy standby:

- It was rather common that appliances had no on/off switch, therefore could not be put in off mode even if the user would like to. This is true for most home entertainment products: most of integrated stereos, most DVD players and recorders, all HDR, most LCD and plasma televisions. In these cases, the button on the appliance or on the remote can turn the unit into standby only. In the case of some kitchen appliances, such as microwaves, espresso machines, the most typical was the lack of any switch, resulting mostly in at least the display being on all the time.
- A special barrier to switching televisions off was found in the form of hidden off switch typical of LCD televisions. The button on the front of the television is a standby switch; and even though the products feature a main switch, it is difficult to reach, as it is placed in the back of the product.
- LCD monitors had typically very low off mode and passive standby power. In fact, the power did not change significantly (usually 0.0-0.1W difference was found), when switched from standby to off mode.
- Electronic programming is a feature of LCD and plasma televisions, which means that the products can still be operating for a short period after the TV has been set into passive standby, therefore powering off to standby is shorter than normal.

⁶ Disregarded. See previous footnote.

- Many of the products in the survey had active standby modes, offering delayed start (washing machines), ready to use mode (speakers, DVD player, VCR, MFD), charging the appliance (cordless phone, mobile phone). These modes usually offer an additional comfort feature, while drawing significant amounts of energy.

Non-technological factors: Information to customers via labels

The exhibition of energy labels was surveyed. Comparative labels (the EU label) were present only in case of washing machines, and these were never missing, and all washing machines were in the best category, category “A”.

Endorsement labels included the Energy Star, the TCO labels (a combined energy usage and ergonomics rating from the Swedish Confederation of Professional Employees (TCO), which is targeted at the European markets instead of Energy Star), and some special labels indicating ecomode, standby energy use and intelligent power saving mode availability. Energy Star label was displayed for most of MFD and most of printers, and monitors, a few LCD and plasma televisions, 1 laptop (of 26), 1 (out of 31) DVD players, and a few integrated stereos. 40% of the monitors were displayed with a TCO (with 26% displayed with both energy star and TCO).

These findings indicate that the Hungarian electronic appliances market has quite a way to meet the IEA recommended 1W standby target. The following sections show the above figures and information in greater detail.

Product Profiles

Major Appliances

In the Hungarian standby power store survey in 2007/2008, clothes washing appliances were measured as major appliance, 29 appliances were included from two stores.

Clothes Washing Machines

In the appliance standby power consumption store survey in Hungary, 29 clothes washing machine units in total were measured. Following the “basket of products” methodology, clothes washing machines were divided into two categories; 14 top loading washing machines and 15 front loading washing machines were included. The machines varied in their rated capacity between 4.5 kg and 7 kg, with about half of the machines equal or below 5 kg in capacity. Front loading washing machines were smaller: the ratio of small (≤ 5 kg) and large ones was 10:5, while for top loading machines this ratio was 5:9.

All models displayed an energy label, and in particular, comparative EU energy labels. Interestingly, all products were A category. All models were found to have an on/off switch. A large number of the washing machines appeared to have a display or electric clock; out of 29 products, only 5 were without a display, it is believed that this feature has increased significantly during recent years.

In active standby mode, none of the units were below 1W, and 7 models out of 29 were above 4W. Displays probably contribute notably to this measured standby usage. In the sample, the power both in the off mode, and the active standby mode, was higher in the case of products with displays (0.2W and 1.3W difference respectively), when compared to models without displays.

For a summary of clothes washing machine results, see Table 4 below. Table 5 and Table 6 contain specific information on front and top loading washing machines respectively.

Table 4: Hungarian Survey 2007/2008 - Clothes Washing Machine Results

Appliance	Clothes Washing Machine			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Delay start	23	4.6	8.2	1.3
Active standby	29	2.8	5.8	1.2
Passive standby	NA	NA	NA	NA
Off	29	0.6	3.5	0
Total Number of Units	29			

Front Loading Washing Machines

Table 5 below shows the standby measurement results for front loading washing machines.

Table 5: Hungarian Survey 2007/2008 - Front Loading Washing Machine Results

Appliance	Front Loading Washing Machine			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Delay start	13	4.8	8.2	1.3
Active standby	15	2.5	5.0	1.2
Passive standby	NA	NA	NA	NA
Off	15	0.9	3.5	0
Total Number of Units	15			

Only one front loading washing machine had no consumption in off mode, and while the average power was 3.5W and still a relatively low value, it is nevertheless above the 1W and 2W thresholds. Most appliances were drawing a very low level of off mode power (0.1W), and there were only 5 products that featured off mode power over 1W (see Figure 3).

For active standby power, no front loading washing machine was below 1W, while only 6 out of 15 were equal or less than 2W (see Figure 4). In delayed start mode, there was one front loading washing machine with 1.3W power, but most (9 out of 13 products) were over 4.5W, with one product metered at 8.2W.

Figure 3: Hungarian Survey 2007/2008 - Front Loading Washing Machines; Off Mode

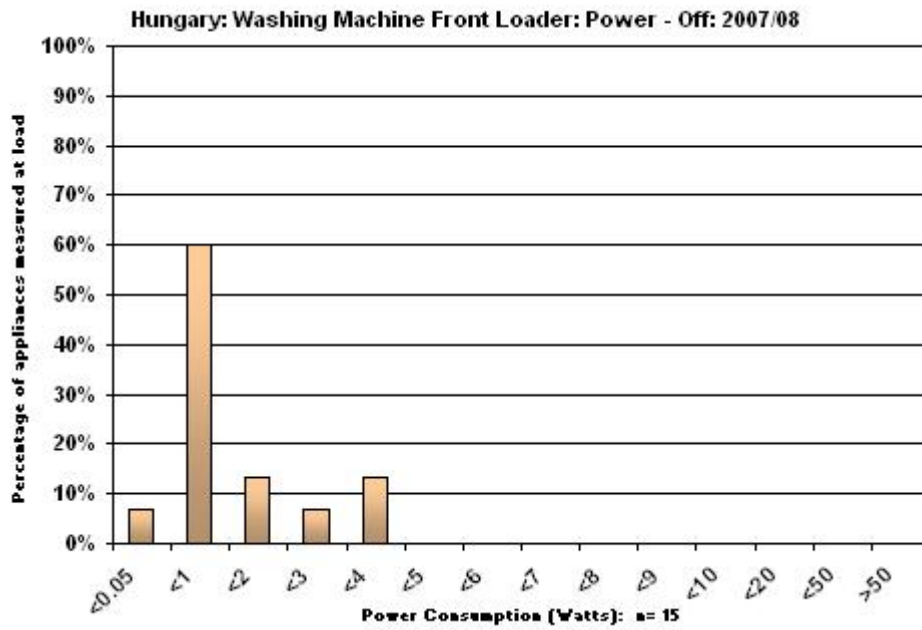
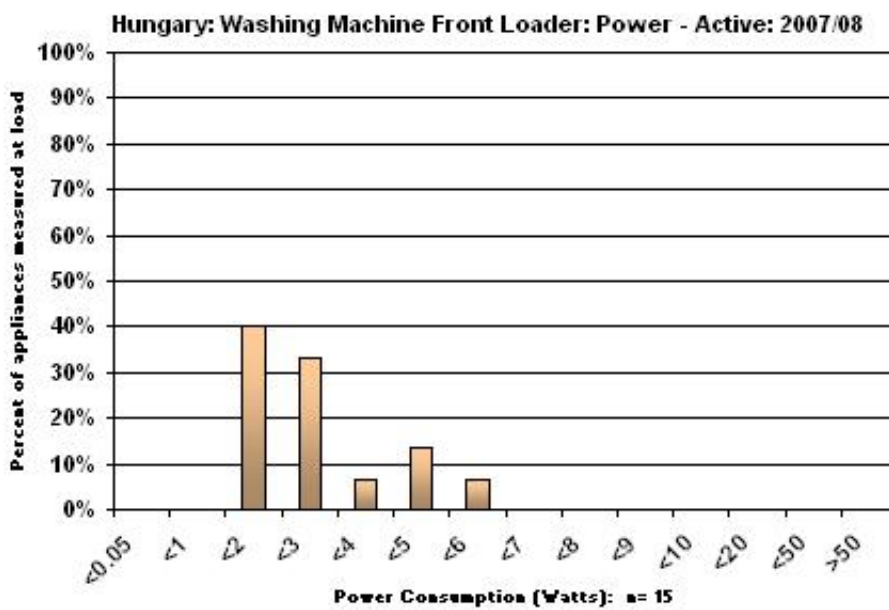


Figure 4: Hungarian Survey 2007/2008 - Front Loading Washing Machines; Active Standby Mode



Top Loading Washing Machines

Table 6 below shows the basic standby powers metered for Top loading washing machines in the 2007/2008 Hungarian standby power store survey.

Table 6: Hungarian Survey 2007/2008 - Top Loading Washing Machine Results

Appliance	Top Loading Washing Machine			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Delay start	10	4.35	5.8	2.4
Active standby	14	3.1	5.8	1.9
Passive standby	NA	NA	NA	NA
Off	14	0.4	2.4	0.1
Total Number of Units	14			

Of the 14 top loading washing machines, 12 used only 0.1W power in off mode, and there were only 2 products that featured off mode power over 1W; 2.2W and 2.4W (see Figure 5).

In relation to active standby power, no front loading washing machine was below 1W, and only 2 out of 14 were less than 2W (1.9W in fact, see Figure 6), and 4 products were above 4.5W.

Figure 5: Hungarian Survey 2007/2008 - Top Loading Washing Machines; Off Mode

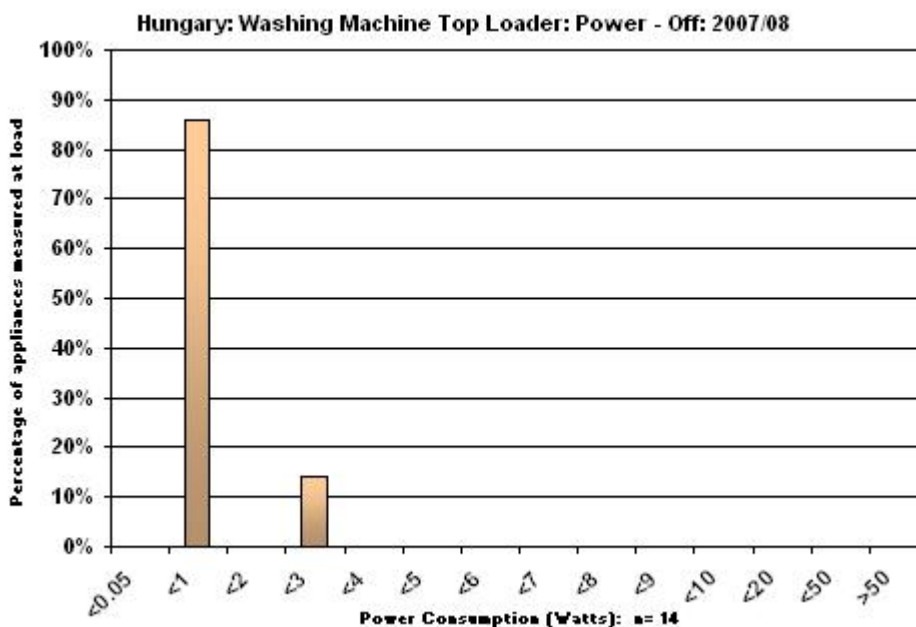


Figure 6: Hungarian Survey 2007/2008 - Top Loading Washing Machines; Active Standby Mode

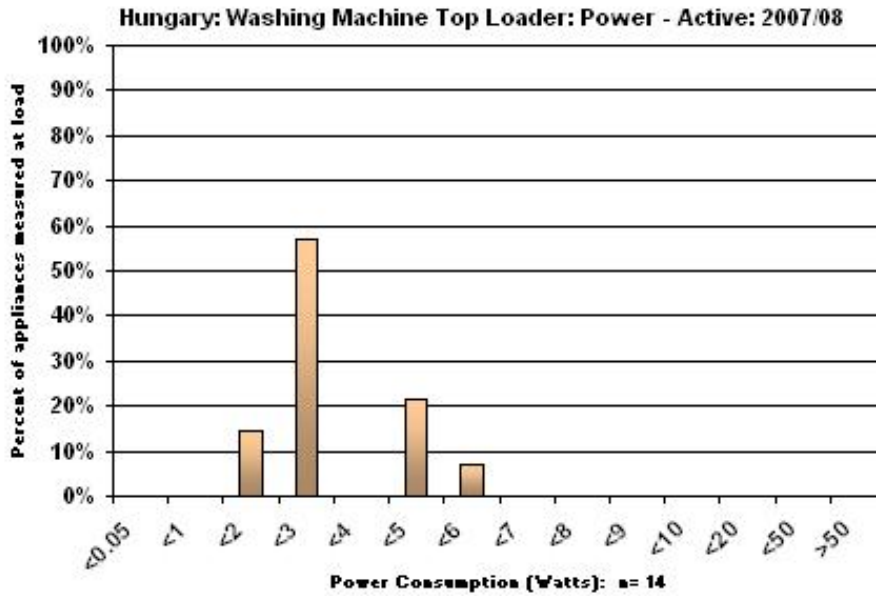
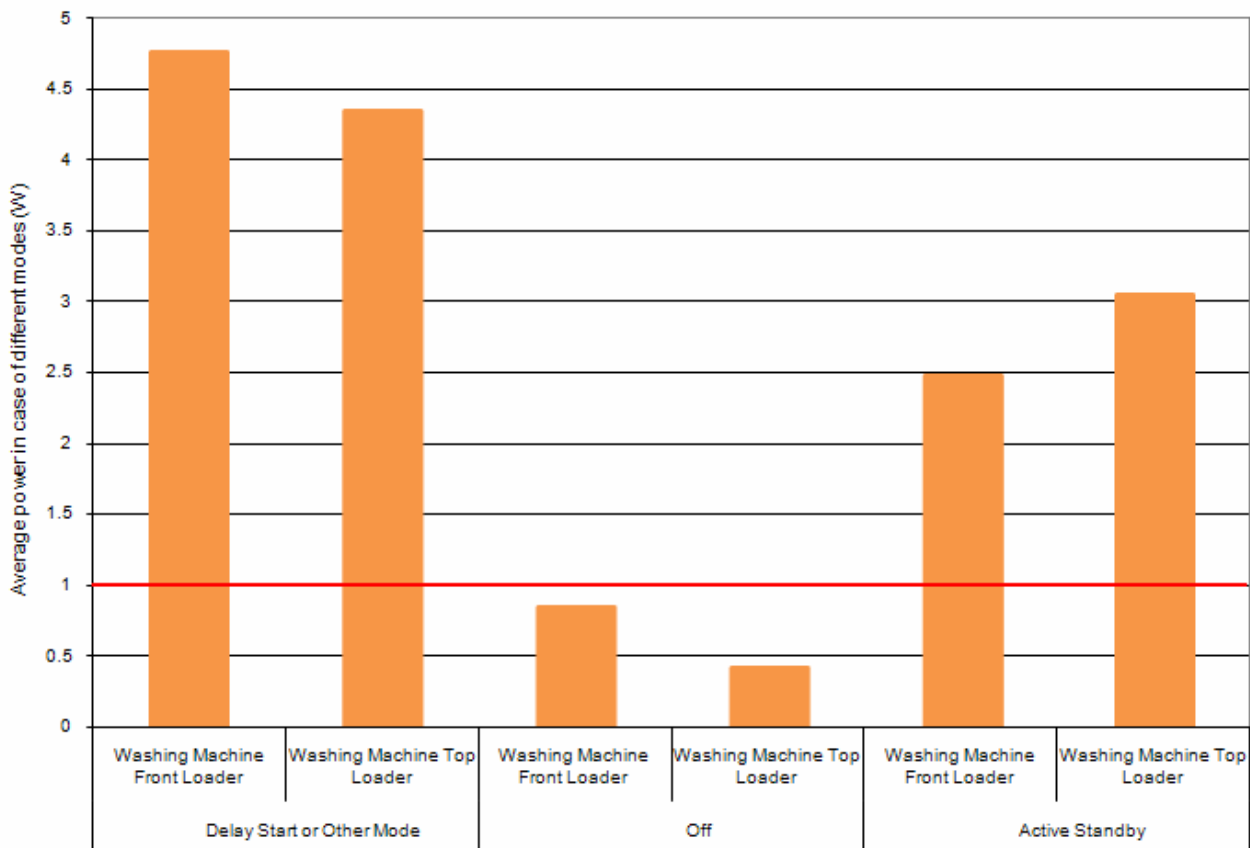


Figure 7: Hungarian Survey 2007/2008 - Front Loading and Top Loading Washing Machine Modes



Note: The IEA call for action in 2000 for maximum 1W standby power threshold is indicated for reference as a red line.

Small Appliances

Five types of small appliances were included in the 2007/2008 Hungarian standby power consumption store survey, and 132 products were measured in total. Two of these categories (microwave ovens and external power supplies) belonged to the core set of products, while the others were chosen by the Hungarian project team. The penetration of mobile and cordless phones is increasing in Hungary, though data is not available. Their rechargers or the bases (respectively) may represent relatively small power consumption per piece, however, with the increasing penetration, their standby power consumption can have an important role.

Microwave Ovens

In the Hungarian standby power store survey, 30 microwave ovens were metered. Most of the products (83%) were found to have an electronic display or clock, in which case, passive standby was present but no off mode. Twenty-five units had manual controls exclusively, and 3 units had both manual and electronic controls. The microwaves varied in their rated power, between 700W and 1250W. The products in the sample included mostly standard microwave models, with 6 combined convection/microwave units.

The models with electronic display or digital clocks were measured in passive mode only, while those without a display were measured in off mode. Table 7 below indicates the results of the metering. The average of the power in non-functional modes (regardless of the mode, off and standby) of all 30 models was 1.5W, with a minimum of 0W and a maximum of 3.6W. Figure 8 depicts the distribution of passive standby mode power of the 25 products featuring display/clock. Figure 9 shows the standby and off mode values of all microwaves measured in the metering project in Hungary. In all cases the microwaves did not have a display, the off mode value was 0W.

Table 7: Hungarian Survey 2007/2008 - Microwave Oven Results

Appliance	Microwave Oven			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Active standby	NA	NA	NA	NA
Passive standby	25	1.9	3.6	0
Off	6	0.2	1.0	0
Total Number of Units	30			

Figure 8: Hungarian Survey 2007/2008 - Microwave Ovens; Passive Standby Mode

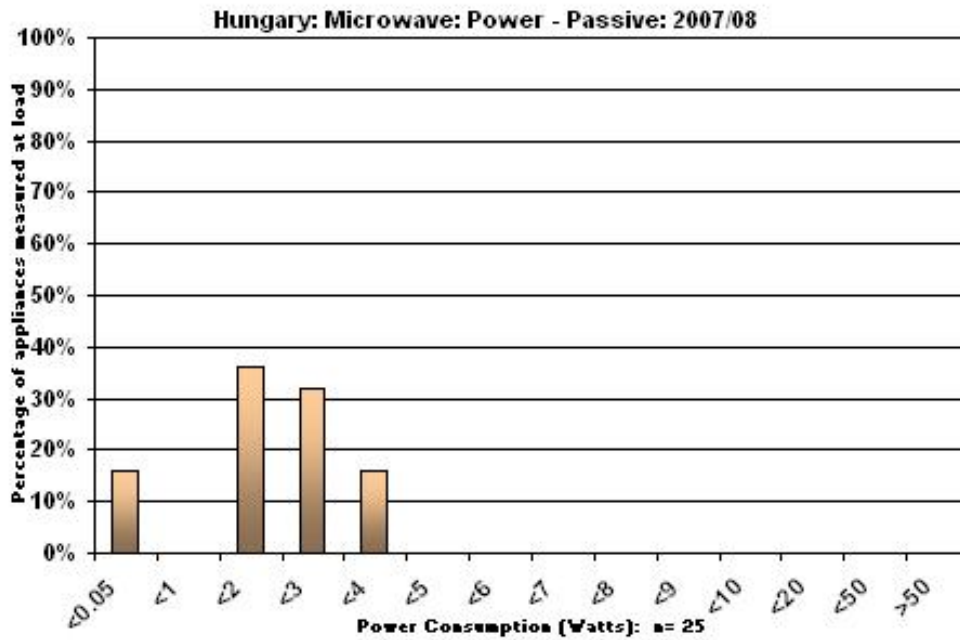
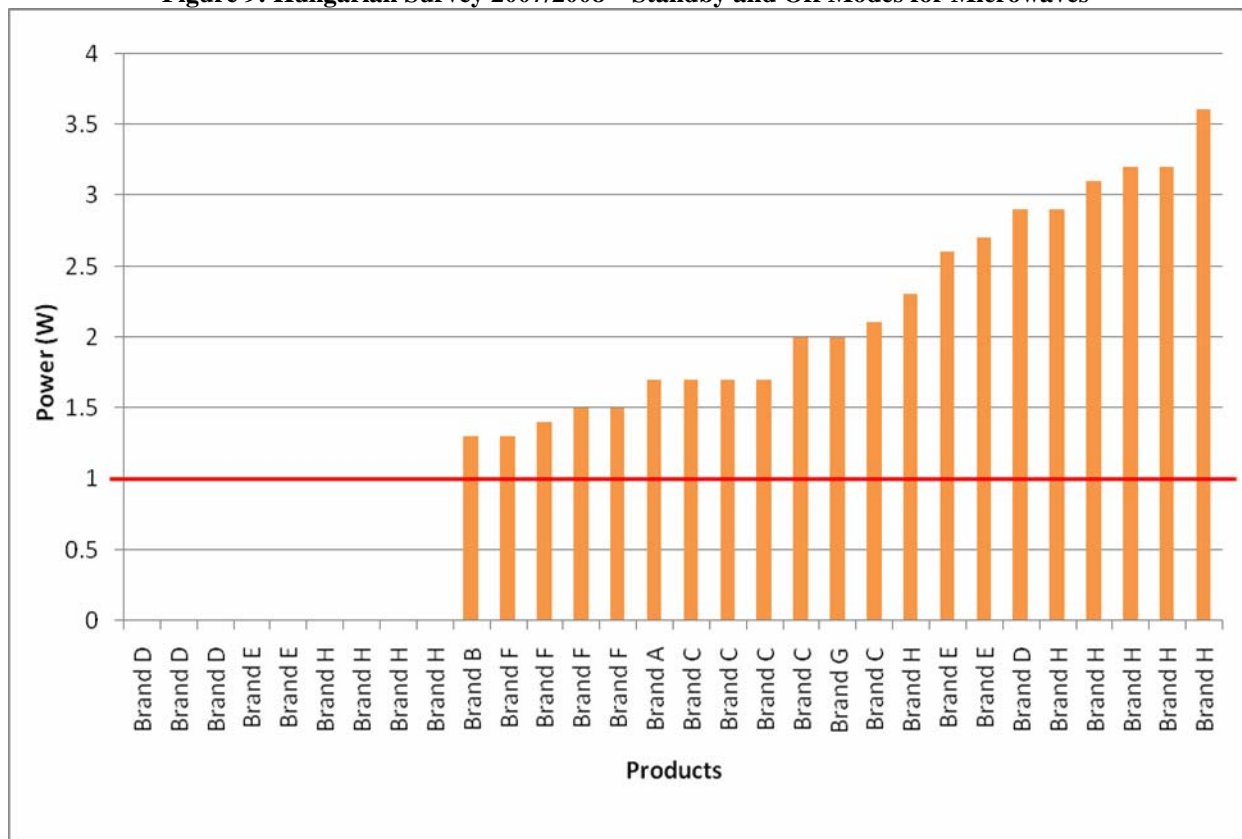


Figure 9: Hungarian Survey 2007/2008 – Standby and Off Modes for Microwaves



Note 1.: Models with electronic display or digital clocks were measured in passive mode only, while those without a display were measured in off mode, since it is assumed that in both cases the given mode is the one generally used by the users.

Note 2.: The IEA call for action in 2000 for maximum 1W standby power threshold is indicated for reference as a red line.

Espresso Machines

A total of 25 espresso machines were metered in the Hungarian survey. It should be noted that the metered products were variable in price, and about half of the machines were of the high level category (prices above 120.000 HUF, i.e. 500 EUR in case of 12 out of 25 products). Of the products, 15 (60%) had electronic display or clock. All the units were metered in an off mode. In 9 cases “other mode” was also metered, which referred to the power metered when the espresso machine had an additional “hard off” switch, usually at the rear, which was switched off.

Table 8 summarizes the recordings. The average off mode power was 1.8W, with only 5 units having 0W power, and one with 0.1W. Around 68% of the units had off mode power above 1W. Figure 10 displays the distribution of off mode powers of all 25 machines metered.

Figure 11 indicates the off mode powers per product. Nine products had an additional switch at the rear, and by using this, the power dropped to almost 0W (between 0 and 0.1W).

Table 8: Hungarian Survey 2007/2008 – Espresso Machine Metering Results

Appliance	Espresso Machine			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Other mode (rear switch)	9	0.05	0.1	0
Active standby	0	NA	NA	NA
Passive standby	0	NA	NA	NA
Off	25	1.8	4.1	0
Total Number of Units	25			

Figure 10: Hungarian Survey 2007/2008 - Espresso Machines; Off Mode

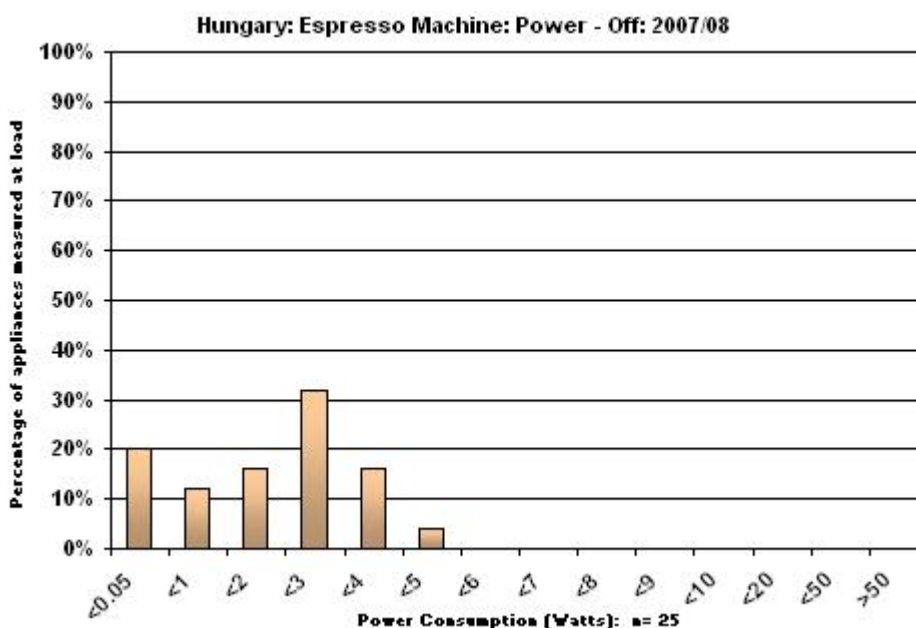
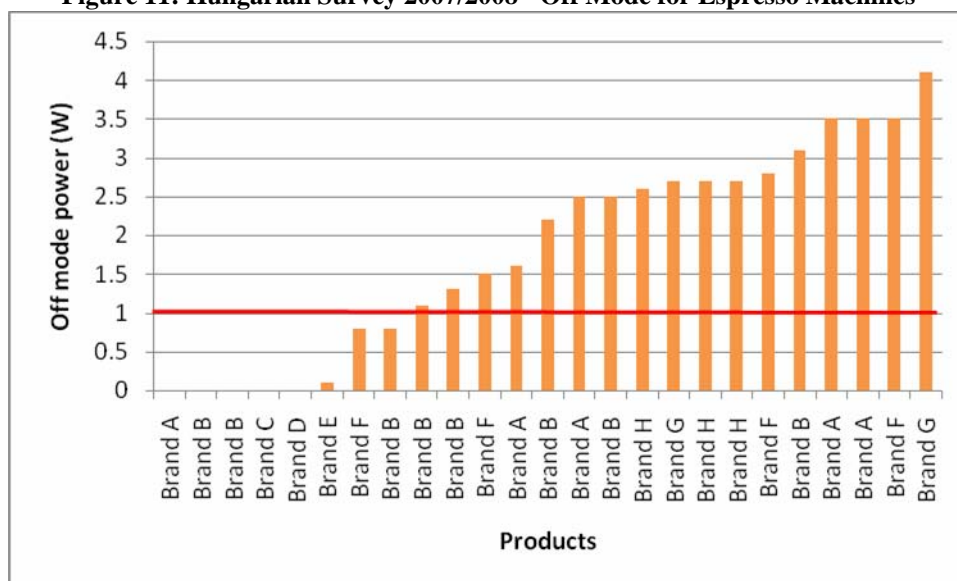


Figure 11: Hungarian Survey 2007/2008 - Off Mode for Espresso Machines



Note: The IEA call for action in 2000 for maximum 1W standby power threshold is indicated for reference as a red line.

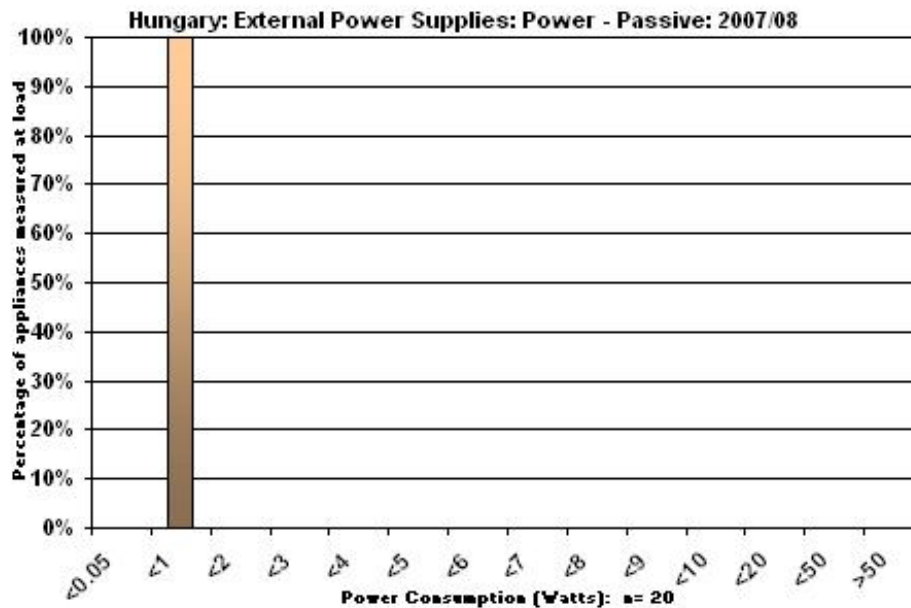
External Power Supplies (EPS)

A total of 20 external power supplies (EPS) were metered. The EPS units were measured only in passive standby mode, when only the EPS was plugged in without any appliances connected, and according to the “basket of products” methodology. Most of the EPS units belonged to laptops (19), and one to inkjet printer. Values are indicated in Table 9, with the standby power of all EPS below 1W, and an average power for the 20 units of approximately 0.3W. The maximum metered standby power was 0.9W, and the minimum was 0.1W. The distribution of the values (all between 0.05W and 1W) is shown in Figure 12.

Table 9: Hungarian Survey 2007/2008 – External Power Supply Metering Results

Appliance	External Power Supply			
	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Active standby	0	NA	NA	NA
Passive standby	0	NA	NA	NA
Off	20	0.3	0.9	0.1
Total Number of Units	20			

Figure 12: Hungarian Survey 2007/2008 - External Power Supplies; Passive Standby Mode



Cordless Phone Base Stations

The store survey included the measurement of 27 cordless phone base stations. The appliances were metered in two modes: with the phone in the charger (active standby) and just the charger itself (passive standby). The phones are displayed in the shop without being used, and therefore were not plugged in before metering. As a result, all units were charging when metered.

As seen in Table 10, the cordless phones drew 2.6W on average in active standby, that is when the phone is placed on the base and it is being recharged. Highest values of 4.4W and minimum power 0.6W were found. In passive standby (only the charger) the average power recorded was 1.4W. The values varied between 0W and 3.2W. Distribution of metered values in active mode and in passive standby mode are illustrated in Figure 13 and Figure 14 respectively.

Figure 15 shows the active and passive standby mode powers besides each other.

Table 10: Hungarian Survey 2007/2008 - Cordless Phone Base Station Metering Results

Appliance	Cordless phone base station			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Active standby	27	2.6	4.4	0.6
Passive standby	27	1.4	3.2	0
Off	0	NA	NA	NA
Total Number of Units	27			

Figure 13: Hungarian Survey 2007/2008 - Cordless Phones; Active Standby Mode

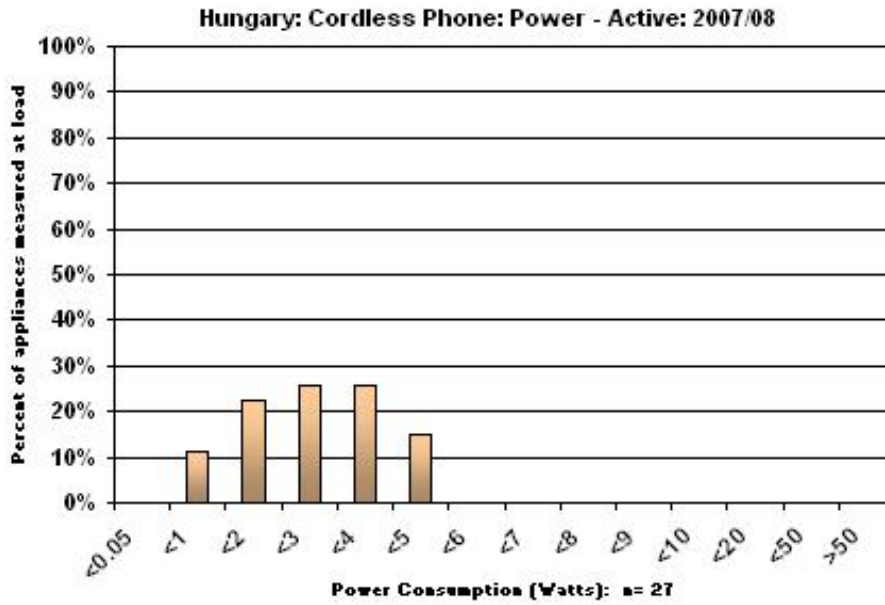


Figure 14: Hungarian Survey 2007/2008 - Cordless Phones; Passive Standby Mode

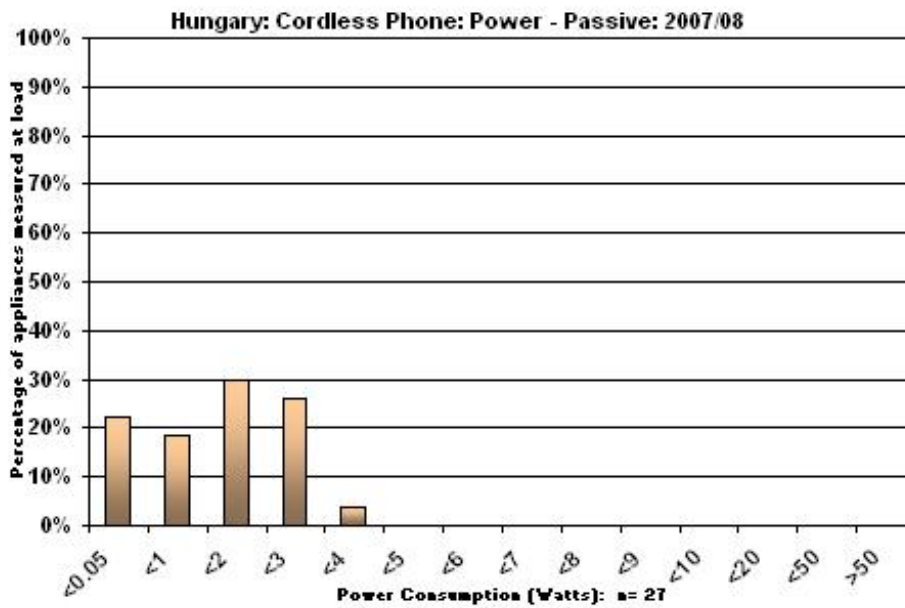
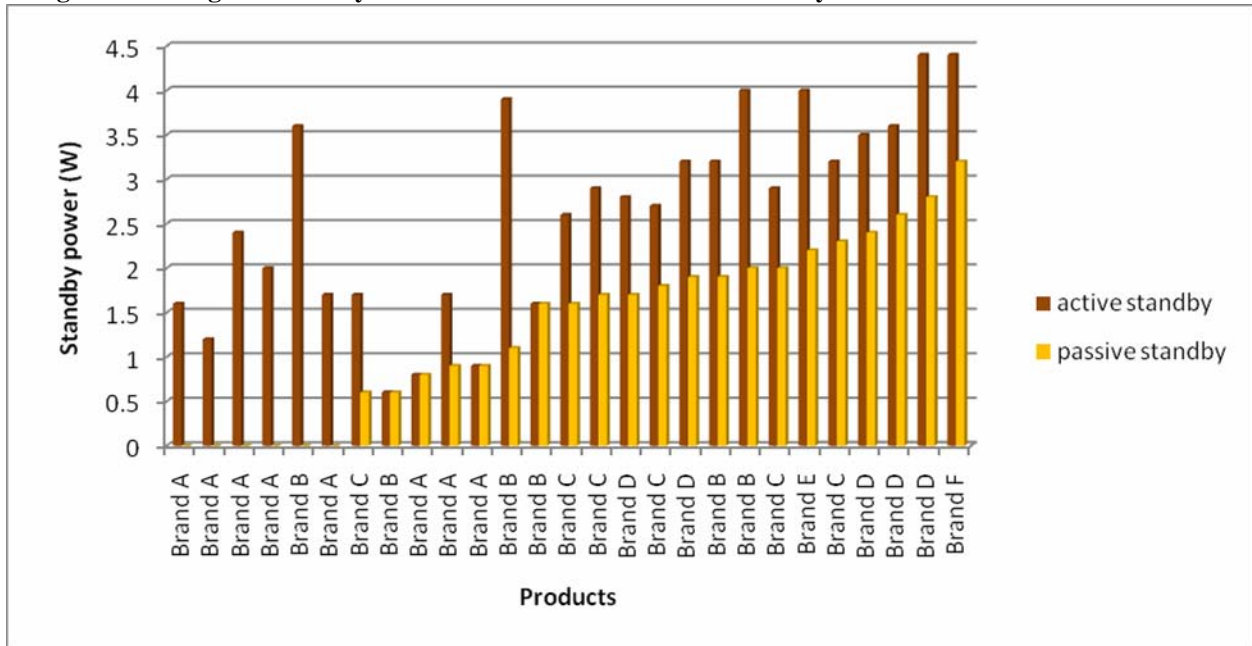


Figure 15: Hungarian Survey 2007/2008 – Active and Passive Standby Power Modes for Cordless Phones



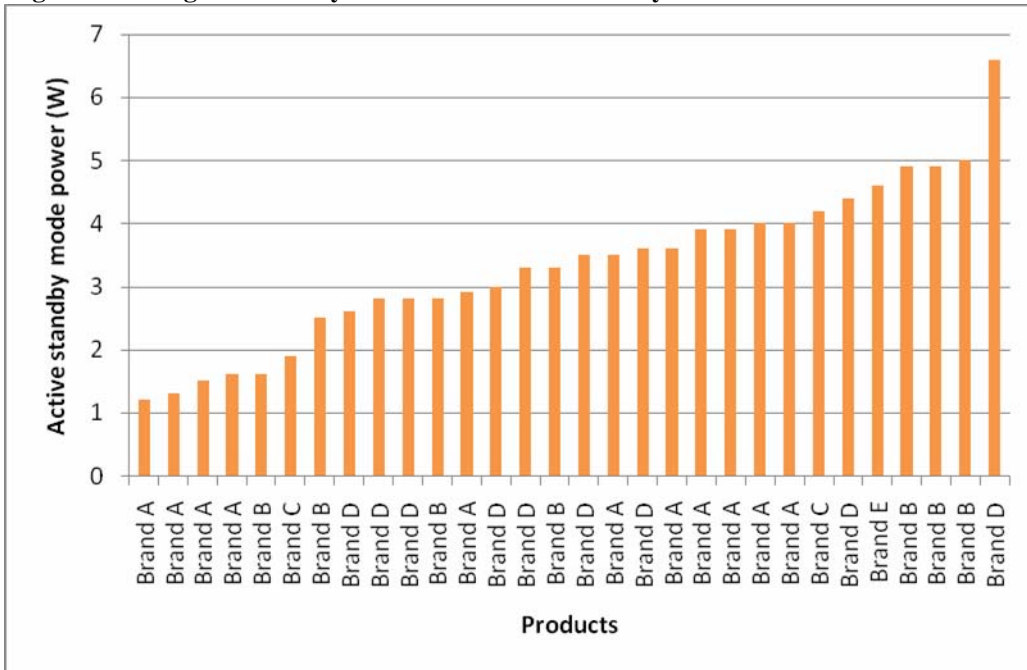
Mobile Phones

The store survey for 2007/2008 did not find any mobile phone with 0 power. All mobiles were above 1.2W in the sample, when charging, even though most of the 30 appliances were either half charged or fully charged already. The average active standby power was found to be around 3.3W, and in the range of 1.2W-6.6W (see Table 11). The exact values of individual products are indicated in Figure 16.

Table 11: Hungarian Survey 2007/2008 – Mobile Phone Metering Results

Appliance	Mobile phone			
	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Active standby	30	3.3	6.6	1.2
Passive standby	Not relevant	Not relevant	Not relevant	Not relevant
Off	0	NA	NA	NA
Total Number of Units	30			

Figure 16: Hungarian Survey 2007/2008 – Active Standby Power Mode for Mobile Phones



Office Equipment, Computers and Peripherals

Multifunction Devices

Multifunction devices (MFD) are a piece of equipment that can perform a variety of office tasks. MFDs were chosen to be metered because office equipment is increasing in penetration in Hungarian households. Thirty units were metered within the scope of the Hungarian store survey. The MFD appliances were measured in active standby mode and in off mode (where applicable). One unit (out of 30) had no on/off switch, therefore only active standby could be measured. The active standby mode is often the actual lowest possible state, because the appliance has to be able to receive faxes or phone calls (if applicable). Of the units, 21 out of 30 included an inkjet printer, 7 units had black and white laser printer, and two colour printer. Most of the products (24 units, which represents 80%) had an energy label (Energy Star).

Table 12: Hungarian Survey 2007/2008 – Multifunction Device Metering Results

Appliance	Multifunction Device			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Active standby	30	8.5	27.6	2.9
Passive standby	0	NA	NA	NA
Off	29	2.0	7.5	0
Total Number of Units	30			

As seen in Table 12, the average active standby power of the 30 units was 8.5W, with large variations, ranging from 2.9W to 27.6W (see Figure 18). The average of off mode power for the 29 relevant units was 2W, ranging from 0W to 7.5W (Figure 17). Almost two-thirds of the devices had below 1W off mode power (18 out of 30).

Figure 17: Hungarian Survey 2007/2008 - Multifunction Devices; Off Mode

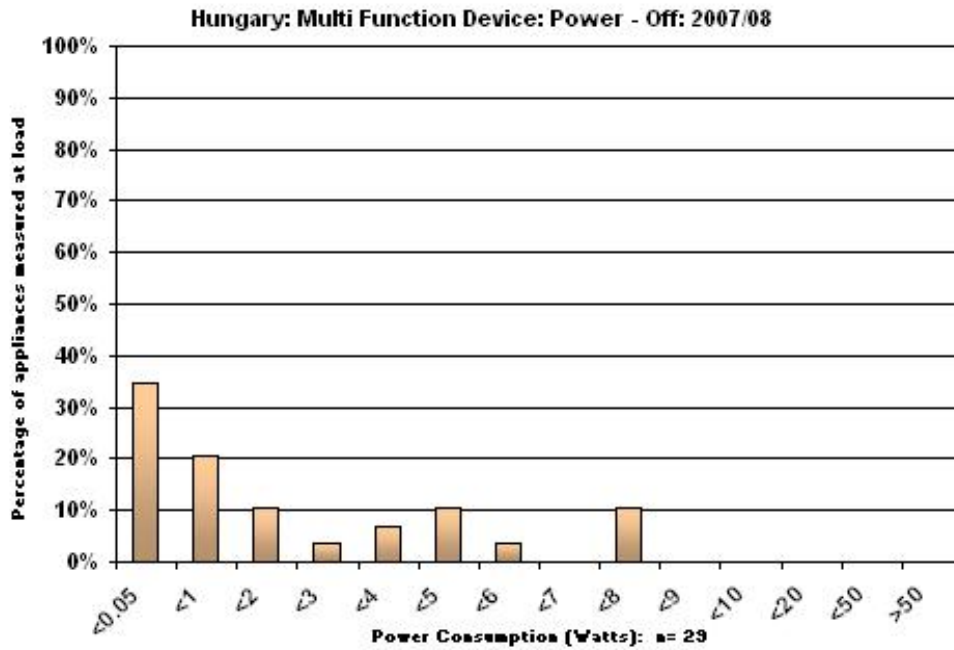
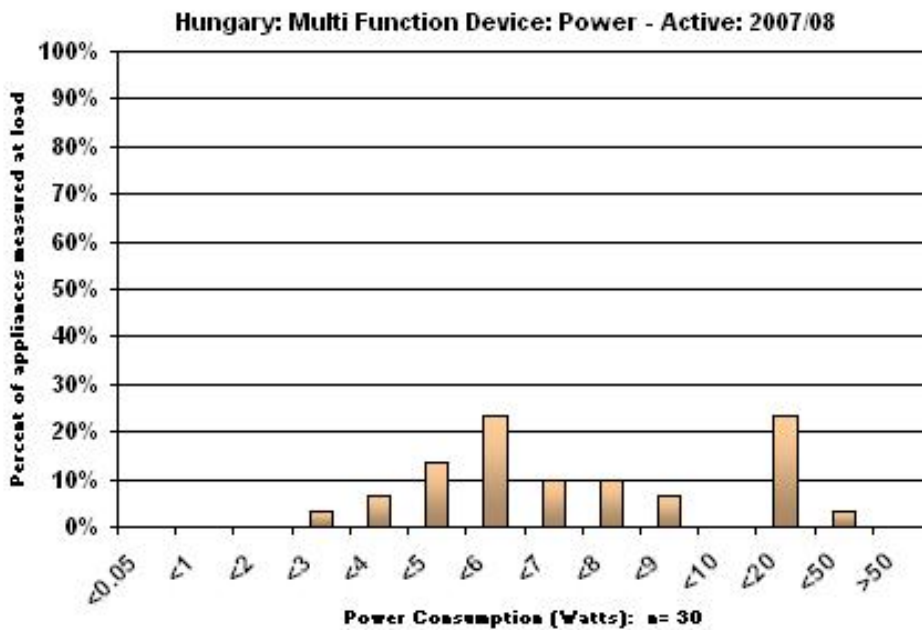


Figure 18: Hungarian Survey 2007/2008 - Multifunction Devices; Active Standby Mode



Computers – Laptop

Twenty six laptops (portable computers) were measured in the Hungarian standby store survey 2007/2008. Laptops should be metered in off mode, when the batteries are charged and the operating system is switched off. Unfortunately, due to the nature of the project, 21 of the 26 appliances had to be metered with the battery being charged. Laptops are displayed without charged batteries, therefore the off mode powers are not true values. The average of the off mode power for the 5 laptops that were metered in charged mode was 2.6W, with the maximum value of 4.7, and minimum of 1.1. The results are summarized in Table 13. The average value of the off power under charging battery for the

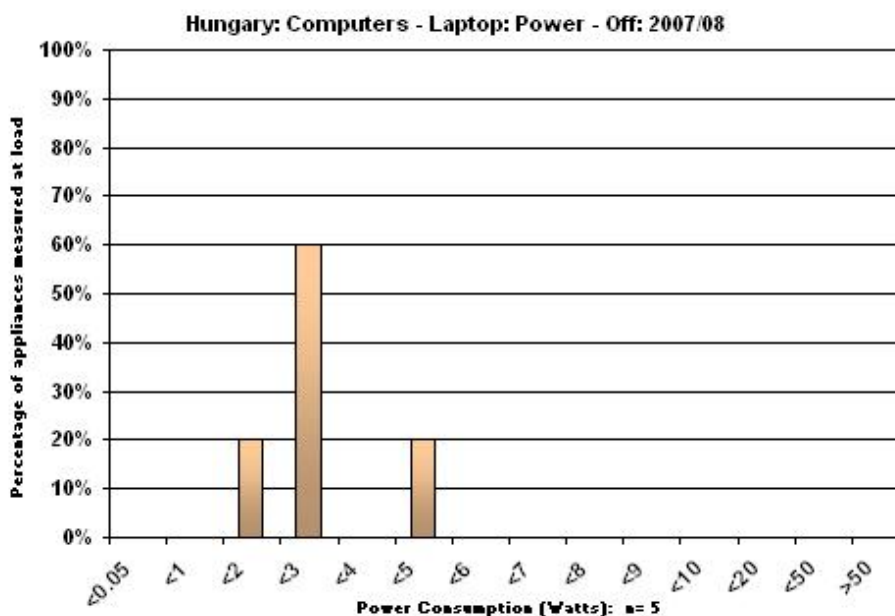
21 units that were uncharged was 33.2W, with as high values as over 50W. None of the products had a “hard off” switch, therefore no data is available for the other mode as described in the “basket of products” methodology.

Only one unit had an energy label displayed on it (Energy Star). All of the units were powered by external power supply units. The EPS which were metered (19 units) had an average power of 0.3W, and only one of them used more than 0.5W (0.9W). Figure 19 shows the distribution of the 5 appliances according to the off mode power (batteries charged).

Table 13: Hungarian Survey 2007/2008 – Laptop Metering Results

Appliance	Laptop			
	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Other mode: Off, with battery charging	21	33.2	55.9	6.1
Active standby	0	NA	NA	NA
Passive standby	0	NA	NA	NA
True Off mode	5	2.6	4.7	1.1
Total Number of Units	26			

Figure 19: Hungarian Survey 2007/2008 – Laptops; Off Mode



Computers – Monitor

Only LCD monitors were metered in the 2007/2008 Hungarian store survey, as CRT monitors are not available in stores anymore. The sizes of the screens ran from 17” to 22”. One model had an EPS and another model had a remote control. A total of 30 monitors were metered in the survey, and 25 of these displayed an endorsement label; 15 had Energy Star label, 2 had TCO'03 label, while 7 units were displayed with both. All units had an off switch.

Off mode, passive standby mode and in-use mode were metered in case of monitors. The results are indicated in Table 14. The monitors could be switched off with a “hard off” switch, which resulted in an average power of 0.6W. The average power of passive standby modes of the units was 0.7W. A set of units were measured with high passive standby power values, but these may have been taken before the monitor really shut down to passive mode. These values were virtually identical to the in-use figures and therefore were decided to be cut. As a result, the minimum value for passive standby power was 0.5W, and the maximum 1.4W. Passive standby powers were very similar to the off mode powers, or usually with a difference of 0.1W. In-use consumption by monitors was quite varied, with average in-use power found to be 31.4W, with a range between 19.2W to 55.8W.

In Figure 20 and in Figure 21, the distribution of the off mode measurements and of the passive standby measurements are illustrated, respectively.

Table 14: Hungarian Survey 2007/2008 – Monitors Metering Results

Appliance	Monitor			
	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
In-use mode	30	31.4	55.8	19.2
Active standby	0	NA	NA	NA
Passive standby	13	0.7	1.4	0.5
Off mode	30	0.6	1.0	0.2
Total Number of Units				

Figure 20: Hungarian Survey 2007/2008 – Monitors; Off Mode

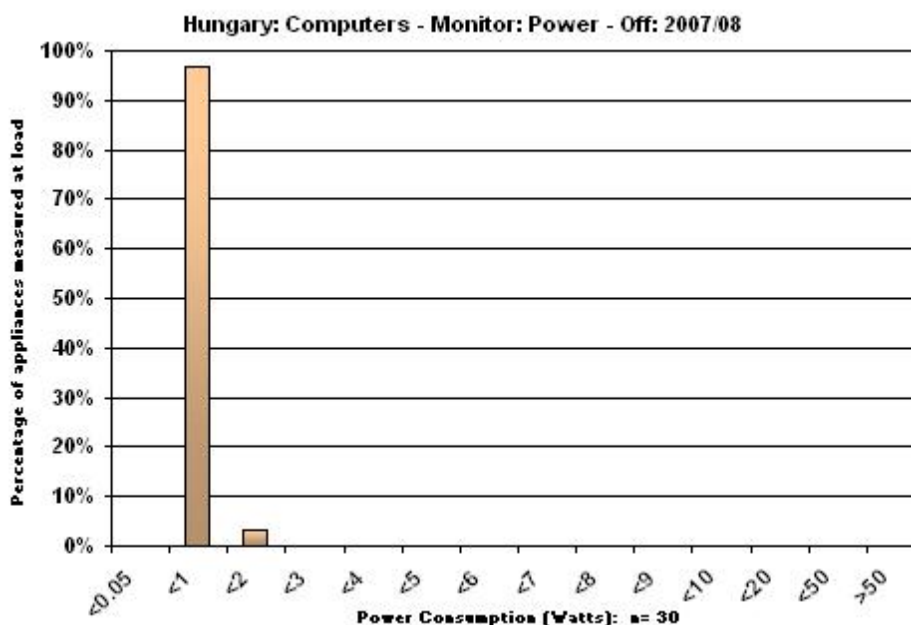
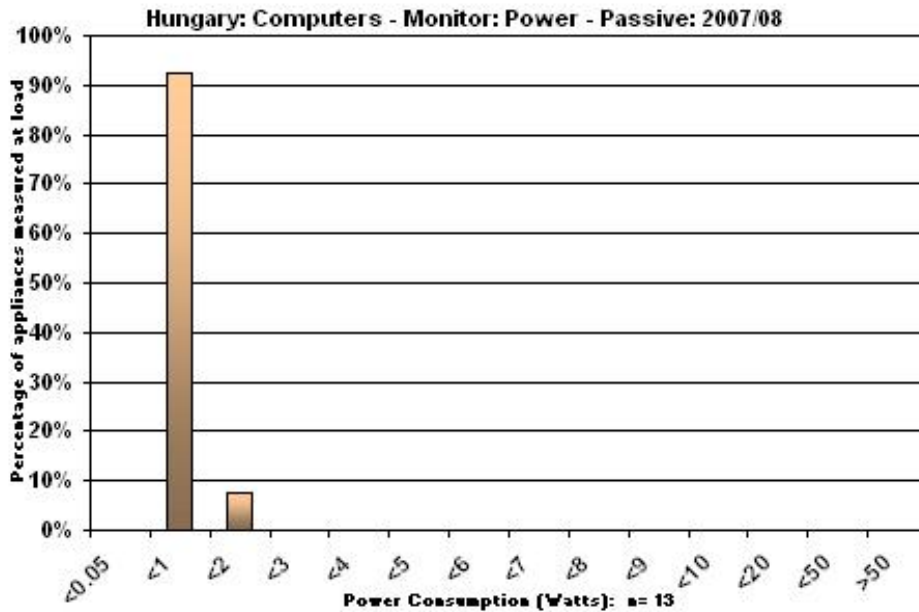


Figure 21: Hungarian Survey 2007/2008 - Monitors; Passive Standby Mode



Computer Speakers

Computer speakers were chosen from the secondary products and were included into the survey, because they are integral part to household PC sets. In total, 30 speaker sets were metered in active standby and off mode. Passive standby mode was not relevant mode because none of the speaker devices had a remote control. One speaker set had no on/off button at all.

A summary of the findings is shown in Table 15. For active standby mode (when switched on, but not producing any sound), the average power of the metered speakers was 2.4 (maximum 4.5, minimum 1.4W). When switched off, all but one of the speakers still drew power; 1.5W on average (maximum 4.0W, minimum 0W). Figure 22 and Figure 23 illustrate the distribution of the metered values. Three units had a subwoofer.

Table 15: Hungarian Survey 2007/2008 – Computer Speakers Metering Results

Appliance	Computer Speakers			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Active standby	30	2.4	4.5	1.4
Passive standby	0	NA	NA	NA
Off	29	1.5	4.0	0
Total Number of Units	30			

Figure 22: Hungarian Survey 2007/2008 – Computer Speakers; Off Mode

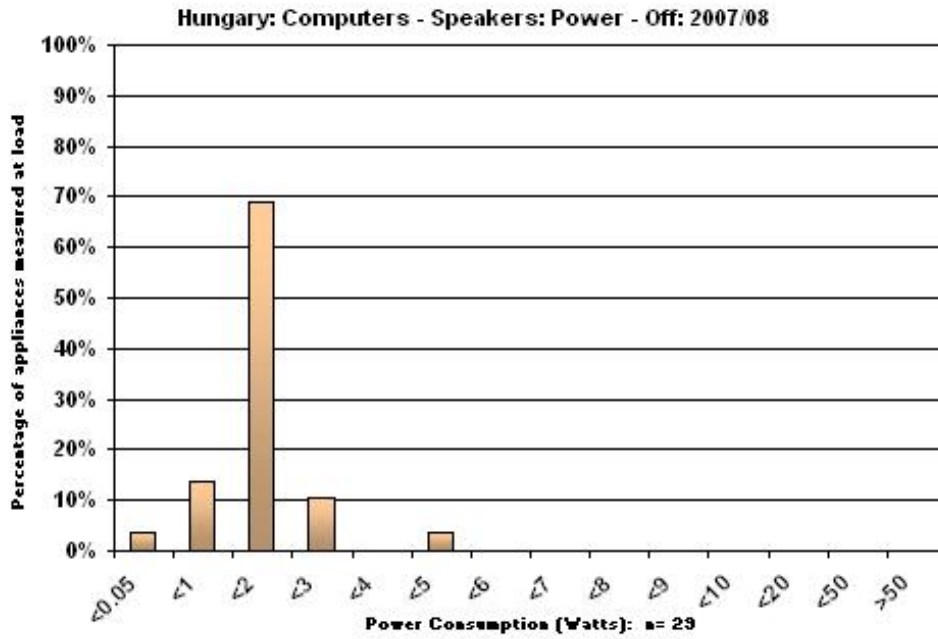
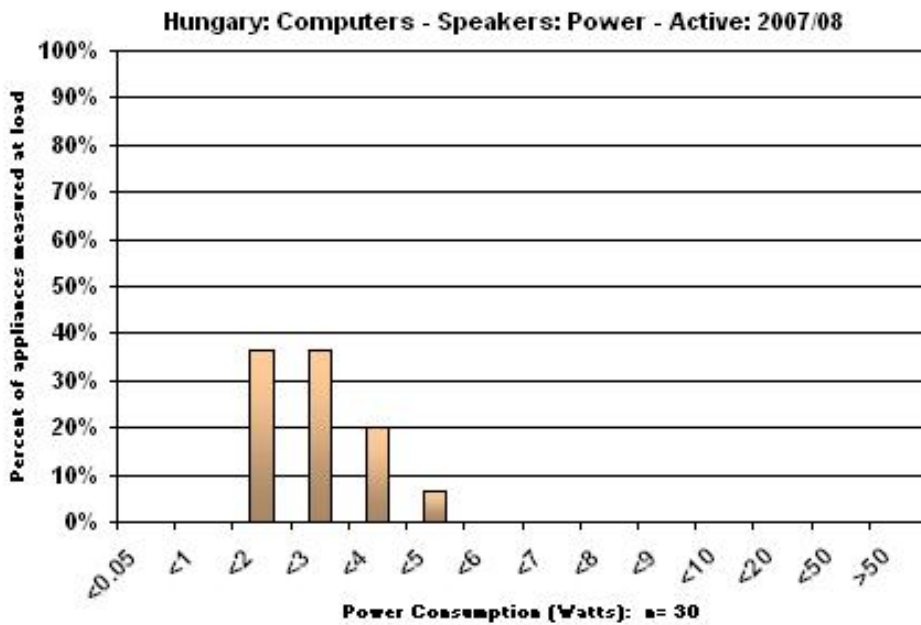


Figure 23: Hungarian Survey 2007/2008 - Computer Speakers; Active Standby Mode



Inkjet Printers

There were 25 inkjet printers metered in the Hungarian survey. About half of them (12) had an external power supply (EPS), and three units had an electric clock/display. All of them were normal printers, with the exception of one, which was a camera printer. One of the units had no on/off button. Around 28% of the units had no energy label displayed on them, the majority (19) of the printers though did display an Energy Star label. Off mode and active standby mode were recorded. Average value of the off mode was 1.4W with the extreme values of 0W and 4.4W. In active standby, the appliances drew 3.4W on average, with a maximum value of 9.2W and a minimum of 0W. The results are show in Table 16, Figure 24 and Figure 25.

Table 16: Hungarian Survey 2007/2008 – Inkjet Printer Metering Results

Appliance	Inkjet Printer			
	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Active standby	25	3.4	9.2	0
Passive standby	0	NA	NA	NA
Off	25	1.4	4.4	0
Total Number of Units	30			

Figure 24: Hungarian Survey 2007/2008 - Inkjet Printer; Off Mode

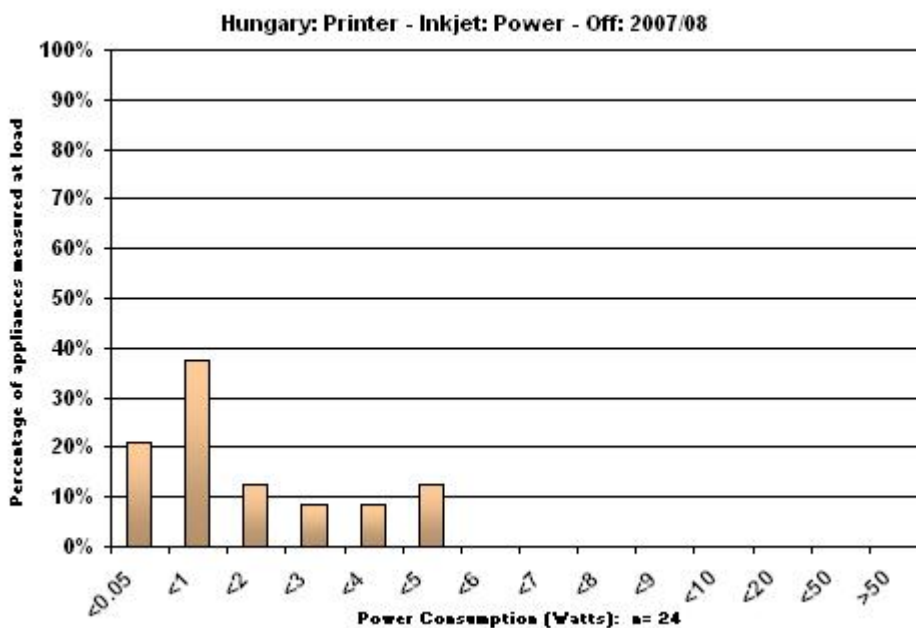
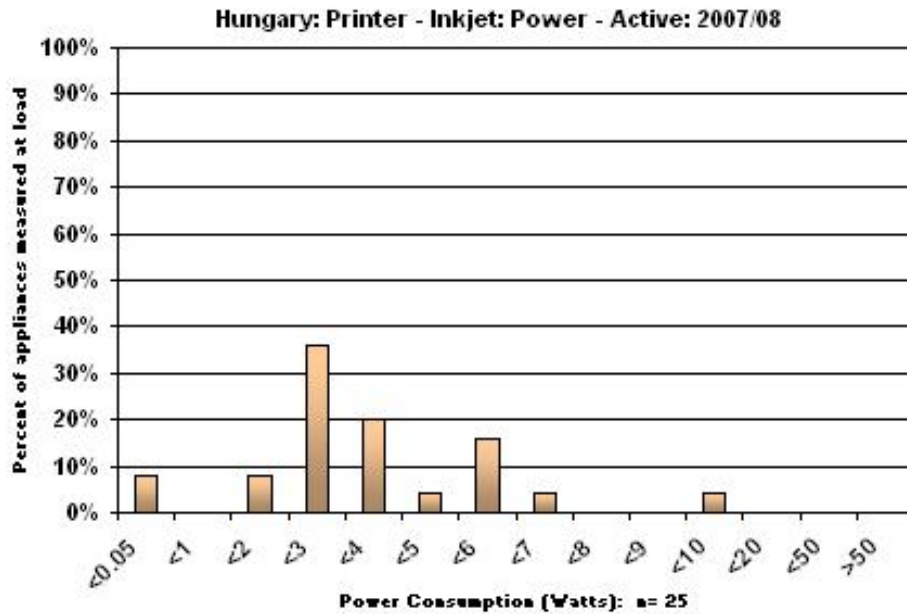


Figure 25: Hungarian Survey 2007/2008 - Inkjet Printers; Active Standby Mode



Laser Printers

There were 19 laser printers included in the Hungarian survey. Values in active standby and off mode were recorded and are shown in Table 17. In off mode, the average power drawn by 19 appliances was 0.1W, 16 of them actually featured 0W off mode power. In active standby mode (when the printer is switched on, but not performing any task), the average power was 5.4W. Minimum power was 2.4W. Maximum power in this mode was drawn at 12.8W. Distributions of both modes are illustrated in Figure 26 (off mode) and in Figure 27 (active standby mode).

Table 17: Hungarian Survey 2007/2008 – Laser Printer Metering Results

Appliance	Laser Printer			
	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Active standby	19	5.4	12.8	2.4
Passive standby	0	NA	NA	NA
Off	19	0.1	0.6	0
Total Number of Units	19			

Figure 26: Hungarian Survey 2007/2008 - Laser Printers; Off Mode

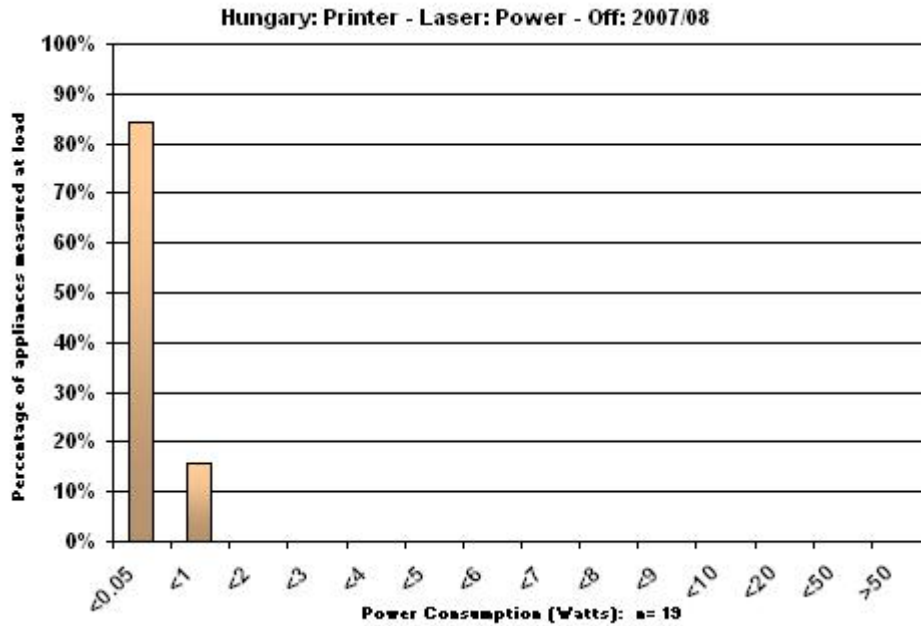
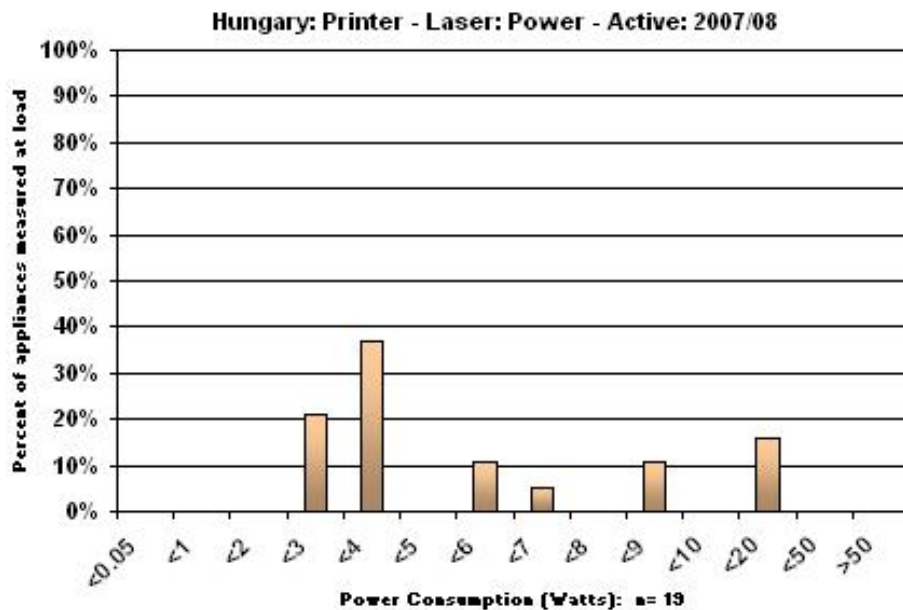


Figure 27: Hungarian Survey 2007/2008 – Laser Printers; Active Standby Mode



Home Entertainment Equipment

Home entertainment products are probably the most significant set of equipment in the Hungarian domestic sector. On one hand, they are responsible for almost half of the electricity consumption of an average household (Valentova *et al.* (forthcoming)), and on the other hand the penetration rate of the already common appliances (TV, DVD) is continuously increasing while new, high energy demanding products are emerging and infiltrating into the homes (set-top-box, home theatre systems). Products tested in this group included TVs with different technologies (22 CRT TVs, 30 LCD TVs,

and 20 plasma televisions), stereos (30 integrated and 26 portable ones), 31 DVD players, 2 DVD recorders, and 18 hard disc recorders (HDR).

These products pose difficulty when measuring certain modes. TVs were measured in passive standby and off mode. On mode measurements were optional and were carried out in only a simple way in this survey. Measuring in-use power consumption of televisions in a simple way gives varying results dependent upon screen settings and the image being displayed on the set, therefore having taken this measurement could only provide indicative results. More accurate results could be gained by conducting tests in accordance with the IEC test method applied to the store environment. For DVD players, recorders and HDR off mode and passive standby were taken, as well as active standby. It is typical that these devices lack an on/off switch and come only with the possibility to switch on standby.

Televisions

Televisions are found in practically every household, the penetration rate was 1.44 (for 100 households) in 2006⁷, and only 0.8% of the households had no television at all⁸. Accordingly, a large selection of these has been made in the survey, resulting in the measurement of 72 units: 22 standard cathode-ray-tube (CRT) TVs, 30 LCD TVs, and 20 plasma televisions. It was noted that most of the TVs displayed in the shops are LCD technology, while CRT are already rare, but not missing. Measurements were taken in off mode (when switched off with the “hard on/off switch” usually on the appliance itself), in passive standby mode (when switched off in an alternative way, mostly placed in sleep mode with the remote control or a standby switch) and in on mode.

Passive standby metering was tricky in some cases, because while the power dropped significantly compared to on mode power, the appliances remained in a pre-standby mode. Looking at the specifics afterwards confirmed that these TVs (LCD and plasma), had electronic programming which can still be operating for a short period after TV has been set into passive standby.

All the LCD TVs were wide screen, while this was true for none of the CRT TVs. In case of the plasma TVs the proportion of normal and wide-screen units was 10 to 9. All TVs came with remote control, and had either both on/off and standby switch or only a standby switch. Most of the units were displayed without any energy label, and only 8 TVs had an endorsement label (3 of them LCD and 5 were plasma TVs). The 3 LCD TVs came with energy star label, while the plasma sets included one energy star label, one intelligent power label, and one with a label indicating possibility for eco mode.

The actual values of standby modes are discussed below separately for the three technologies.

CRT Televisions

There were 22 CRT TVs found and metered in the shops visited during the Hungarian standby survey. The size of the TVs bridged from 35.6 cm to 73.7 cm, with an average value of 53.6 cm. As already mentioned above, all specific modes, but active standby were available on these models. The average, minimum and maximum power values are indicated in Table 18. The extreme values for on-mode (24.9W and 99.6W) are evidence for the fact that on mode varies due to the measurement

⁷ Central Statistical Office [Központi Statisztikai Hivatal]. 2008. Stadat database. www.ksh.hu

⁸ Central Statistical Office [Központi Statisztikai Hivatal]. 2007. A magyarországi háztartások infokommunikációs (IKT) eszközellátottsága és az egyéni használat jellemzői, 2006 [Penetration rate of info-communication appliances in Hungarian households and the characteristics of personal use, 2006]. Central Statistical Office, Budapest.

method, and does not necessarily indicate the difference between the products. As seen in Figure 28, all the 22 CRT TVs drew 0 power, when switched off, while passive standby power varied largely (Figure 29), with an average of 4.5W. No energy labels were displayed.

Table 18: Hungarian Survey 2007/2008 –CRT Television Metering Results

Appliance	(standard) CRT Television			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
On mode	22	59.8	99.6	24.9
Active standby	0	NA	NA	NA
Passive standby	22	4.5	11.4	1.4
Off	22	0	0	0
Total Number of Units	22			

Figure 28: Hungarian Survey 2007/2008 - CRT Television; Off Mode

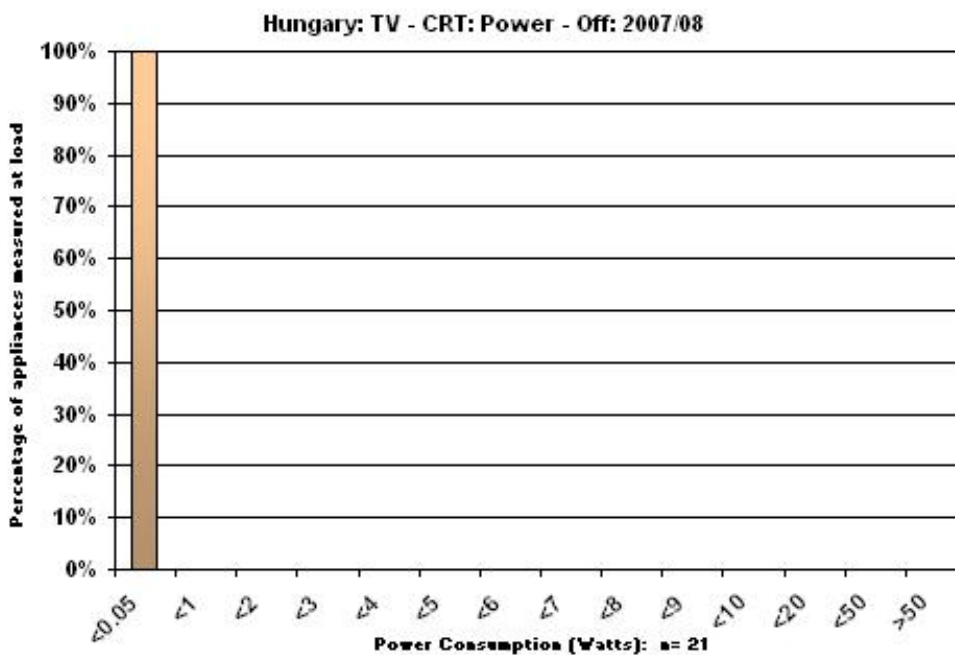
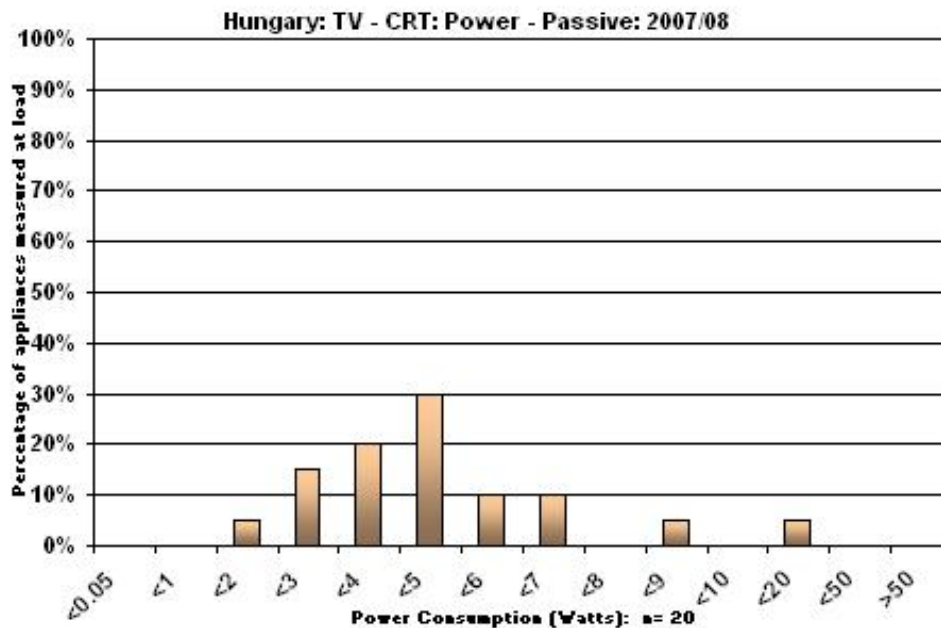


Figure 29: Hungarian Survey 2007/2008 - CRT Television; Passive Standby Mode



LCD Televisions

There were 30 LCD (liquid crystal display) TVs were tested as part of the Hungarian shop standby survey in 2008. LCD TVs made up the largest proportion of appliances among TVs, which can be the indication of their lately increased popularity.

The average size of these TVs (91.8 cm) was twice that of the metered CRT TVs, and ranged from 81.3 cm to 106.7 cm. They were all wide screen. As in case of CRTs, off mode, passive standby and on mode powers were measured in case of these models. Off mode was not available in most of the cases, because LCD TVs popularly come without an on/off switch (if they have one, it is often hidden way back on the appliance).

The average, minimum and maximum power values are indicated in Table 19. The values for on-mode are diverse, going from 52.8W to 213.9W with an average of 136W, however this does not unambiguously indicate the energy demand quality, because this mode was not measured with a proper testing method. Therefore, the data should be regarded with care and used only as approximation. The energy demand differences depend greatly on the actual picture projected at the time of metering, and not only on the difference between models. As seen in Figure 30, all the 7 LCD TVs, which had a power off switch, drew below 1W power when switched off. On the other hand, little difference was noted between respective off mode and passive standby mode. The maximum difference was 0.7W. The distribution of off mode power and passive standby power is shown in Figure 30 and Figure 31 respectively. Energy Star label was attached to three models. The powers in passive standby mode were below 1W for these models, as required to receive the label.

All models had both digital and analogue tuner, but 3, which had only digital. None of the appliances in this category had an EPS.

Table 19: Hungarian Survey 2007/2008 –LCD Television Metering Results

Appliance	LCD Television			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
On mode	30	136.3	213.9	52.8
Active standby	0	NA	NA	NA
Passive standby	26	0.7	1.9	0.1
Off	7	0.2	0.8	0
Total Number of Units	30			

Figure 30: Hungarian Survey 2007/2008 - LCD Television; Off Mode

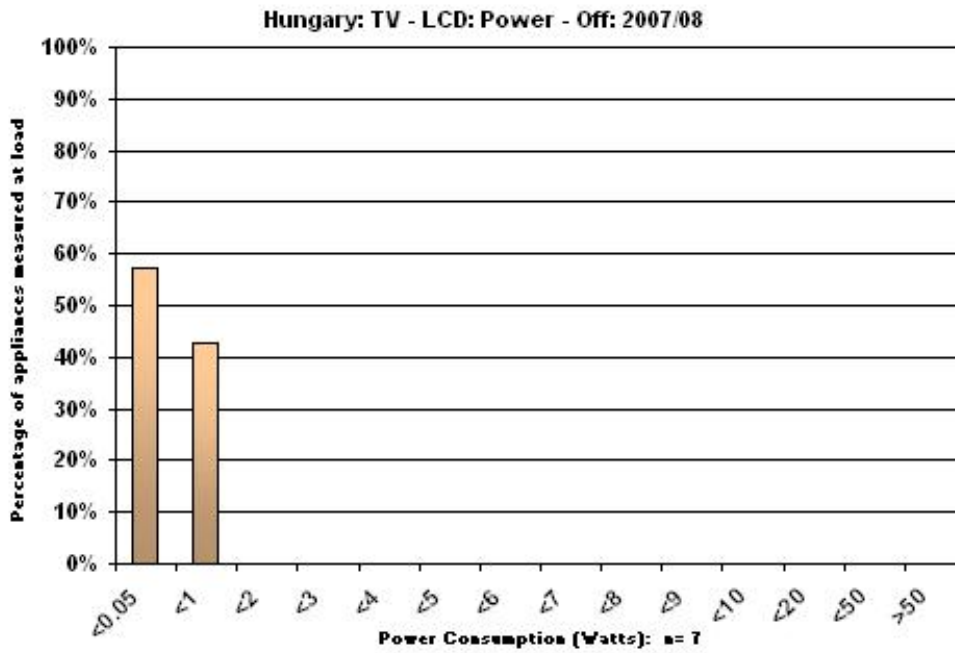
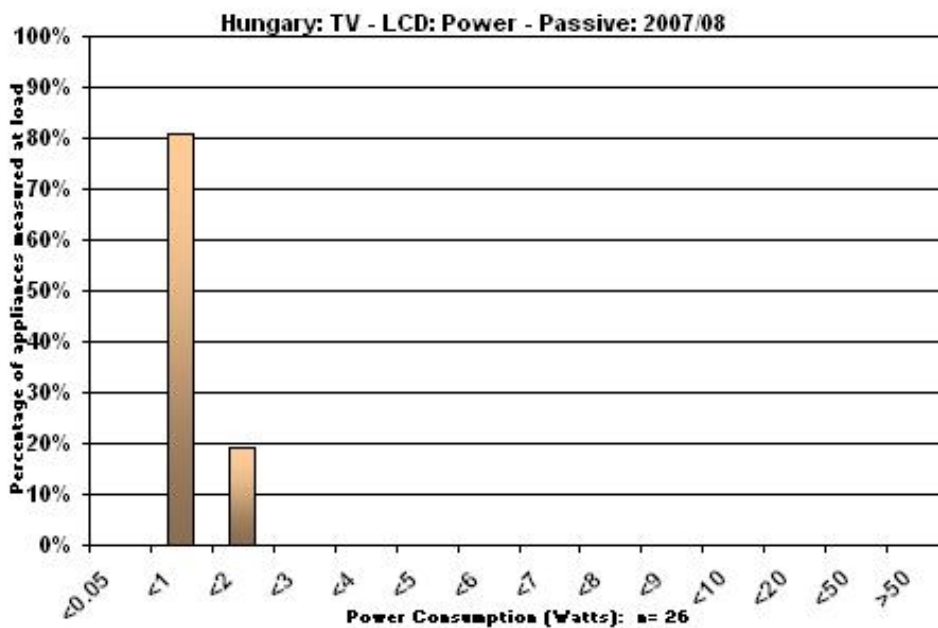


Figure 31: Hungarian Survey 2007/2008 - LCD Television; Passive Standby Mode



Plasma TVs

There were 20 plasma TVs measured for the survey. Plasma TVs were found in a higher abundance than one would expect on display in stores, showing that these products have been on the rise in the last few years. Nevertheless, they were not able to gain all the market from LCDs.

The average of the TV sizes was 113 cm, even surpassing those of LCDs, mainly due to the extreme large screens (maximum size was 152.4 cm). Little over half of the models were wide screen. 15 of the metered models had both digital and analogue tuner, while 5 only had analogue, but all were high standard definition. All of the plasma TVs had a remote control, 8 units had proper two switches, one for on/off function and another for standby. Four of the units had no label at all displayed on them, two came with energy star, one with “intelligent power saving” option, finally one which said ecomode.

Similarly to CRTs and LCDs, off mode, passive standby and on mode powers were measured. Off mode was not available in most of the cases, because plasma TVs (just like LCD ones) often come without an on/off switch.

The average, minimum and maximum power values are indicated in Table 20. The distribution of power values are demonstrated in Figure 32 and Figure 33. The 8 TVs that had a power off switch drew below 2W power, when switched off (compare to 1W in case of LCDs).

Table 20: Hungarian Survey 2007/2008 – Plasma Television Metering Results

Appliance	Plasma Television			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
On mode	20	316.6	573	96.1
Active standby	0	NA	NA	NA
Passive standby	19	0.5	1.6	0.1
Off	8	0.6	1.6	0.3
Total Number of Units	20			

Figure 32: Hungarian Survey 2007/2008 - Plasma Television; Off Mode

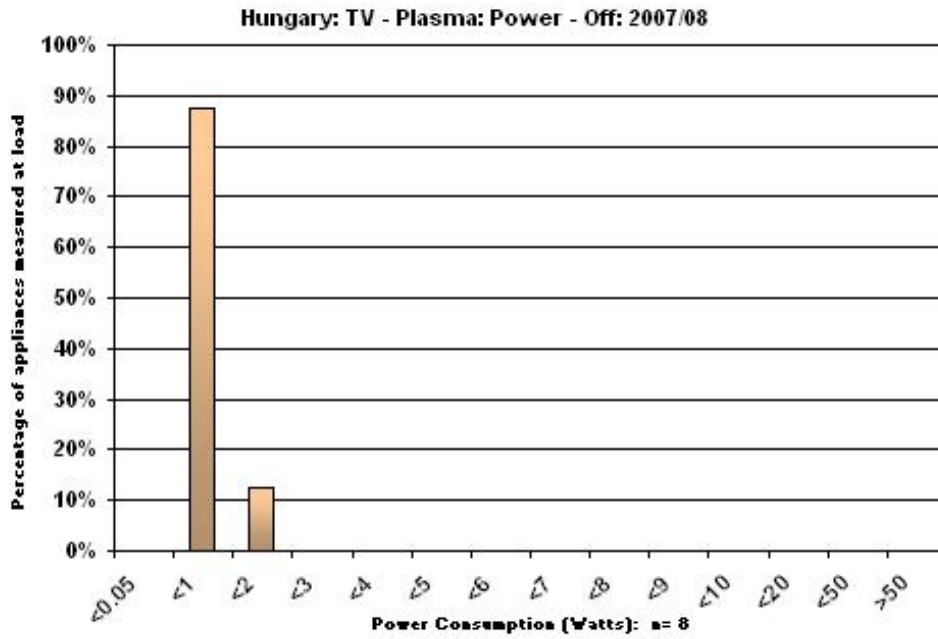
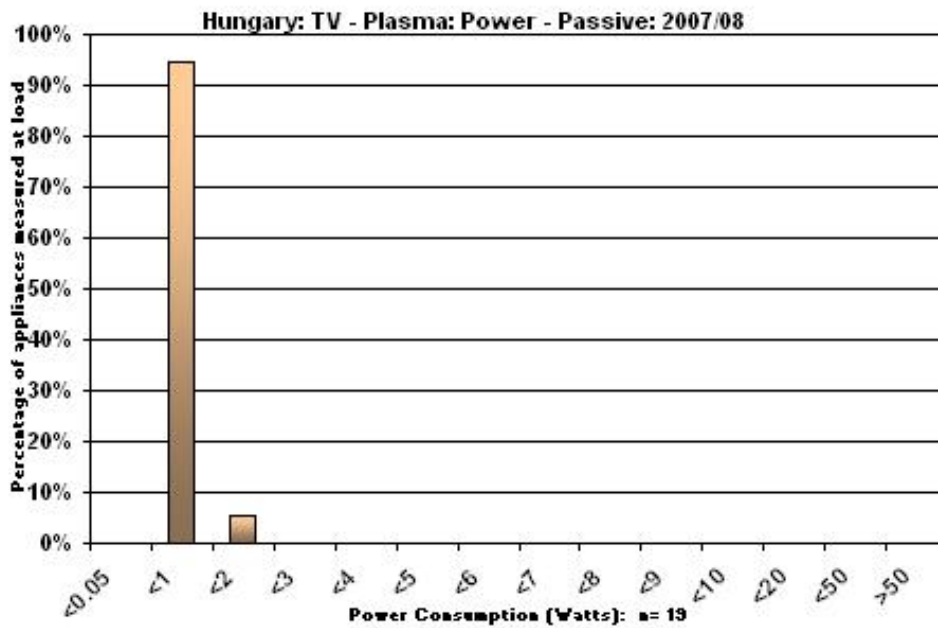


Figure 33: Hungarian Survey 2007/2008 - Plasma Television; Passive Standby Mode



DVD Player

Digital Video Disk (DVD) players are found in increasing numbers in the shops and in households, replacing and/or supplementing video players. In this study DVD players are understood as a unit that plays DVDs. It may have a VCR and/or tuner built in but performs no other functions (such as recording). Portable DVDs have their own screen (no such product has been included).

In the 2007/2008 Hungarian store survey, 31 DVD players were metered, all of which were standard players, with only DVD playing function, and all of them had electronic display, and all had a remote control. Seventeen units were installed with only a standby switch, 10 had only an on/off switch, and only 4 had both. Accordingly, off mode could be measured for 14 units. The average power in off mode was 0.3W, ranging from 0W to 3.5W, but only 3 units had over 0W power, and only 1 unit had over 1W (Table 21 and Figure 34). Passive standby power was metered in case of 21 units, because only in these cases was standby button present either on the remote control or on the equipment. The average power was 1.2W, with minimum power of 0W and a maximum of 3.6W. The passive standby power was above 1W in case of half of the units (Figure 35). Active standby power was metered for all 31 units. This mode means that the product is ready to play a disc, and this is indicated on the display. The average active standby power was 5.7W, and the distribution of data is rather even, and range between 3.8W to 8.3W (Figure 36).

Table 21: Hungarian Survey 2007/2008 – DVD Player Metering Results

Appliance	DVD player			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Delay start	0	NA	NA	NA
On mode	0	NA	NA	NA
Active	31	5.7	8.3	3.8
Passive	21	1.2	3.6	0
Off	14	0.3	3.5	0
Total Number of Units	31			

Figure 34: Hungarian Survey 2007/2008 – DVD Players; Off Mode

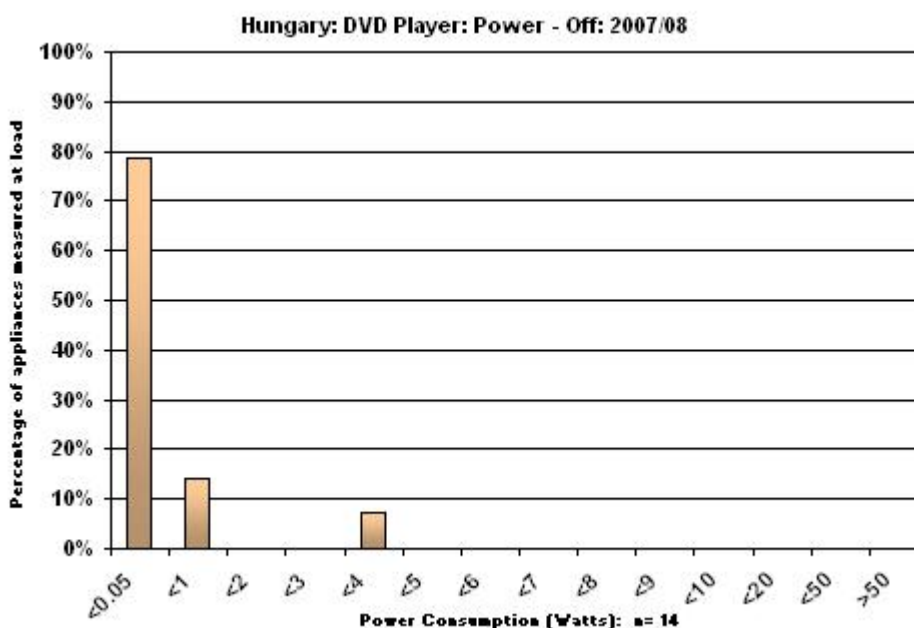


Figure 35: Hungarian Survey 2007/2008 – DVD Players; Passive Standby Mode

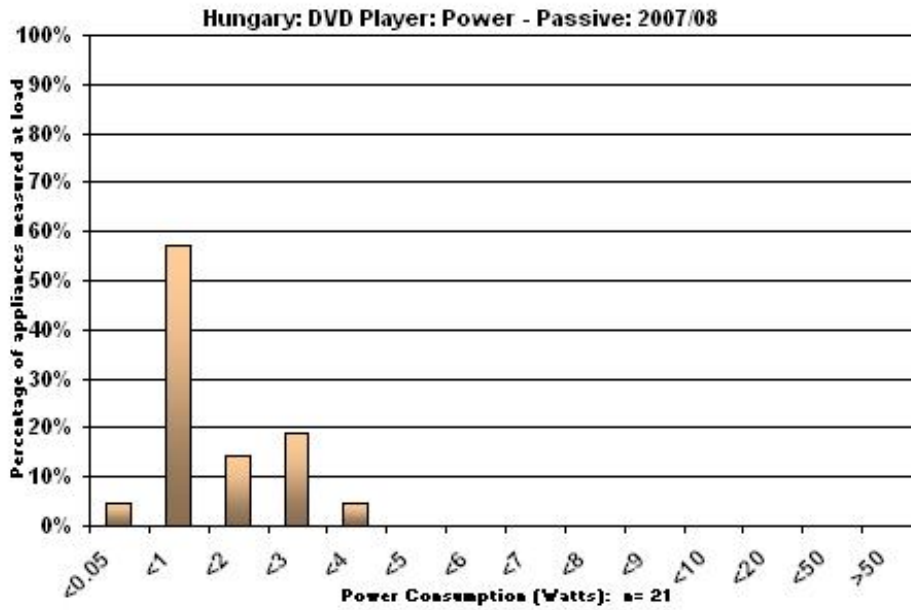
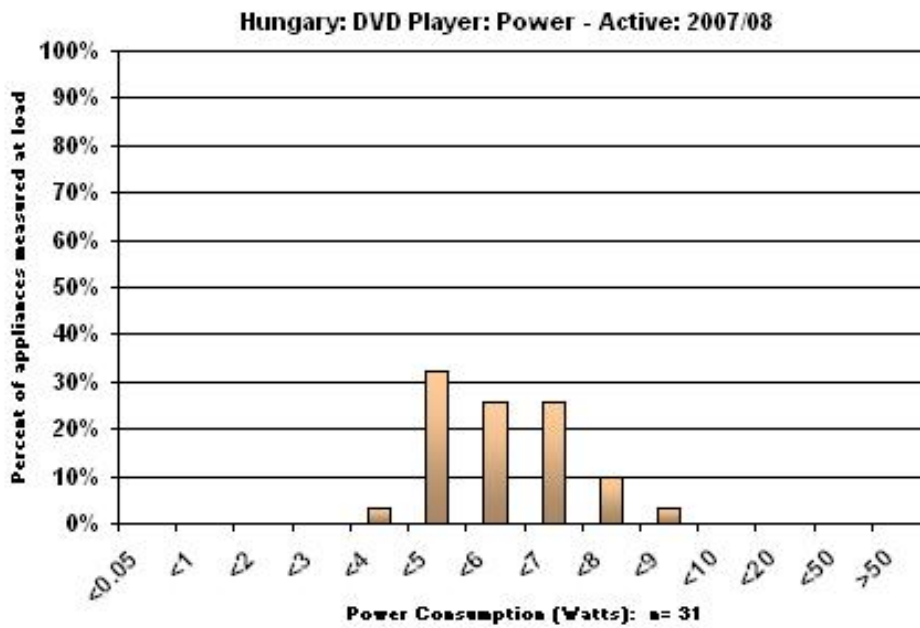


Figure 36: Hungarian Survey 2007/2008 – DVD Players; Active Standby Mode



The number of DVD recorders were so low that their analysis is statistically not possible. There were only 2 units metered.

Hard Disc Recorders

Hard disc recorders (HDR) are used to record video images onto a hard disc from an external source, such a television. A HDR is different from a PC in that it can record and replay TV. The units can look very similar to a DVD or VCR player, and might actually be combined with DVD player/recorder, VCR, or with a decoder (set-top-box). In the survey 18 units were measured, and the passive standby mode was metered for 17 units, while active standby was noted for all 18 ones. None of the units featured an on/off power switch; therefore no measurement of off mode was possible. Table 22 shows that the average passive standby was 5.2W, and active standby was 23.2W. In case of passive standby, the metered values range widely between 2.0W to 18.0W (Figure 37). On the other hand, the active standby power of the units are very close to each other and reach from 19.3W to 27.2W (Figure 38).

Table 22: Hungarian Survey 2007/2008 – HD Recorder Metering Results

Appliance	HD recorder			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Delay start	0	NA	NA	NA
Active	18	23.2	27.2	19.3
Passive	17	5.2	18.0	2.0
Off	0	Not relevant	Not relevant	Not relevant
Total Number of Units	18			

Figure 37: Hungarian Survey 2007/2008 – Hard Disc Recorder; Passive Standby Mode

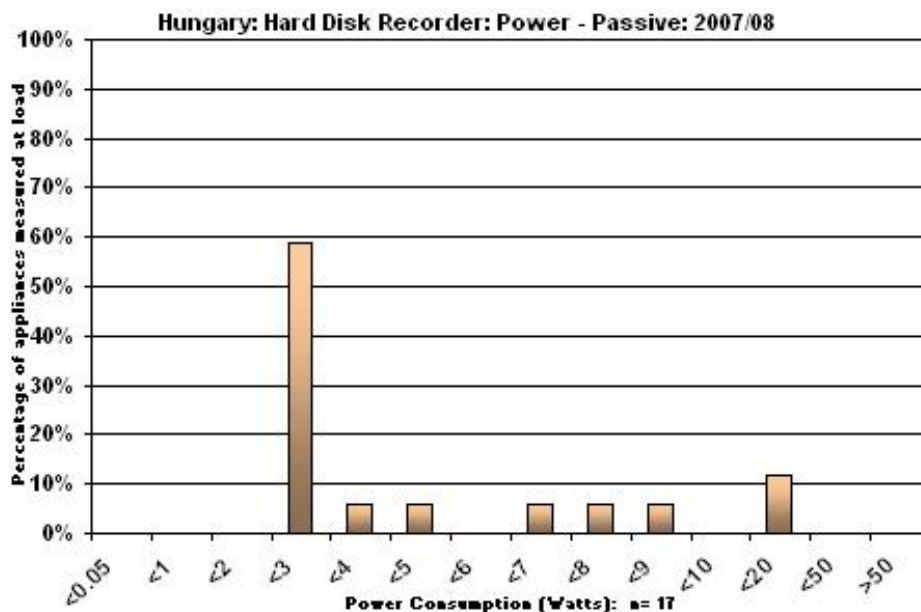
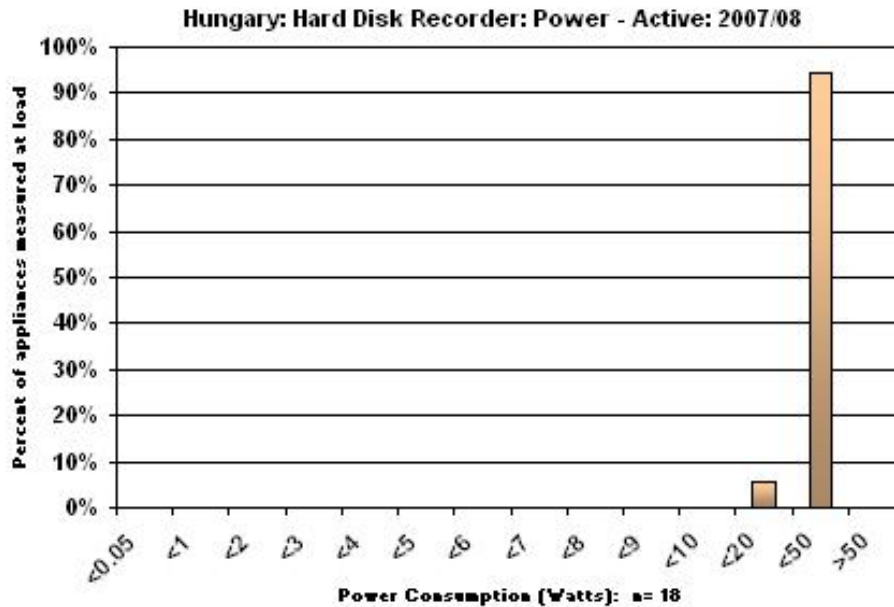


Figure 38: Hungarian Survey 2007/2008 – Hard Disc Recorder; Passive Standby Mode



Stereos

Integrated Stereos

There were 30 integrated stereos metered in the Hungarian store survey. Active and passive standby modes were noted down. The off mode was irrelevant because the units had no on/off switch. The average passive standby power of integrated stereos in passive standby was found 2.8W, and 11.1W for active standby. The variance between the measured values was large, ranging between 0W and 16W for passive standby mode, and 2.8-21.3W for active standby mode (Figure 39, Figure 40, Table 23). However, no major difference in the characteristics of the products was observed, which would explain such a difference in values. There were 4 products with an Energy Star label, and 3 units were labeled “energy saving” with an indication of 0.5W, 0.6W, and 0.7W power in standby mode. Interestingly, these units, actually, had 0W passive standby power.

Table 23: Hungarian Survey 2007/2008 – Integrated Stereo Metering Results

Appliance	Integrated stereo			
Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Delay start	0	NA	NA	NA
Active	30	11.1	21.3	2.8
Passive	30	2.8	16.0	0
Off	0	Not relevant	Not relevant	Not relevant
Total Number of Units	30			

Figure 39: Hungarian Survey 2007/2008 – Integrated Stereo; Passive Standby Mode

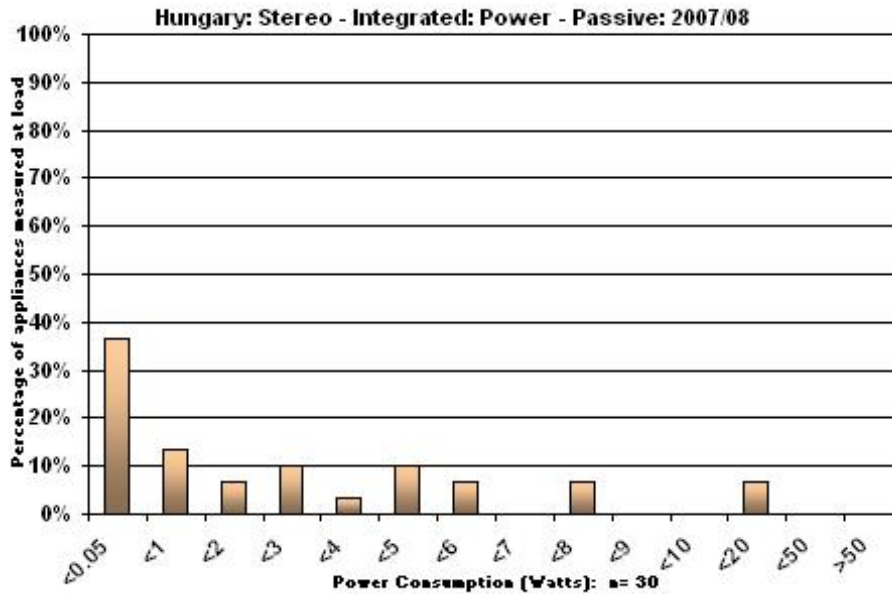
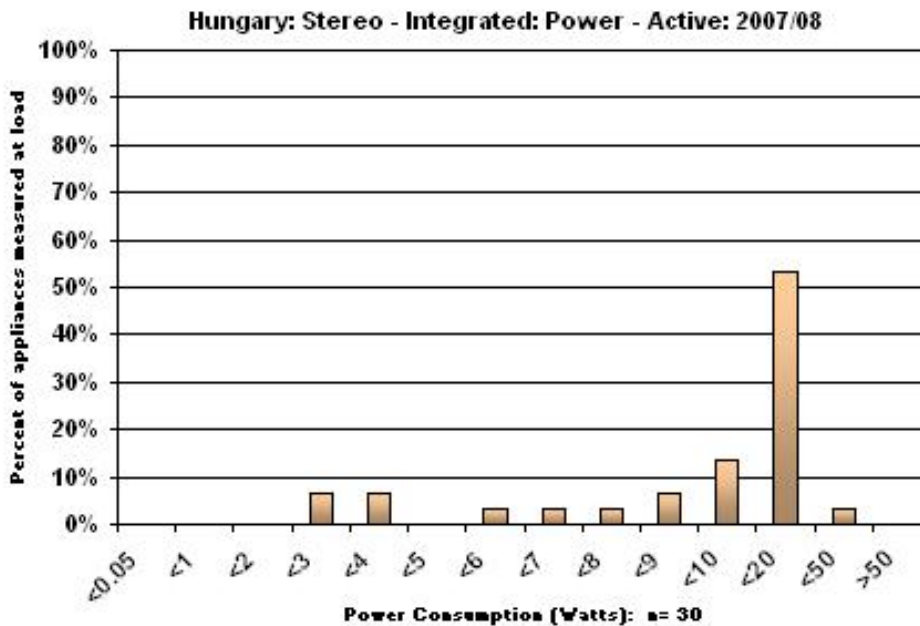


Figure 40: Hungarian Survey 2007/2008 – Integrated Stereo; Active Standby Mode



Portable Stereos

Furthermore, 26 portable stereos were included in the 2007/2008 Hungarian store survey. A portable stereo contains more than one stereo component (tape, CD, radio) and an amplifier and speakers built into the integrated unit with one power plug and is portable, that is has a handle to carry with and an option for battery operation. Table 24 shows the summary of the metering of portable stereos. Three modes were recorded: off, passive and active standby. The average of the metered values in off mode was 1.3W. Off mode could be taken for 21 units, because the rest did not have an on/off switch. The range of metered values is seen in Figure 41, with minimum metered values of 0W, and maximum of

3.9W. There were only 8 units that had a standby switch, of which 5 had no other. These 8 could be metered for passive power. The average passive standby power was 2.0W, ranging from 0W to 3.4W (Figure 42). The average active standby mode power was 4.0W. The minimum power was 2.3W, the maximum was 8.4W (Figure 43).

Table 24: Hungarian Survey 2007/2008 – Portable Stereo Metering Results

Appliance	Portable stereo				
	Mode	Number of Measurements	Average Power (W)	Power Max (W)	Power Min (W)
Delay start		0	NA	NA	NA
Active		26	4.0	8.4	2.3
Passive		8	2.0	3.4	0
Off		21	1.3	3.9	0
Total Number of Units		26			

Figure 41: Hungarian Survey 2007/2008 – Portable Stereo; Off Mode

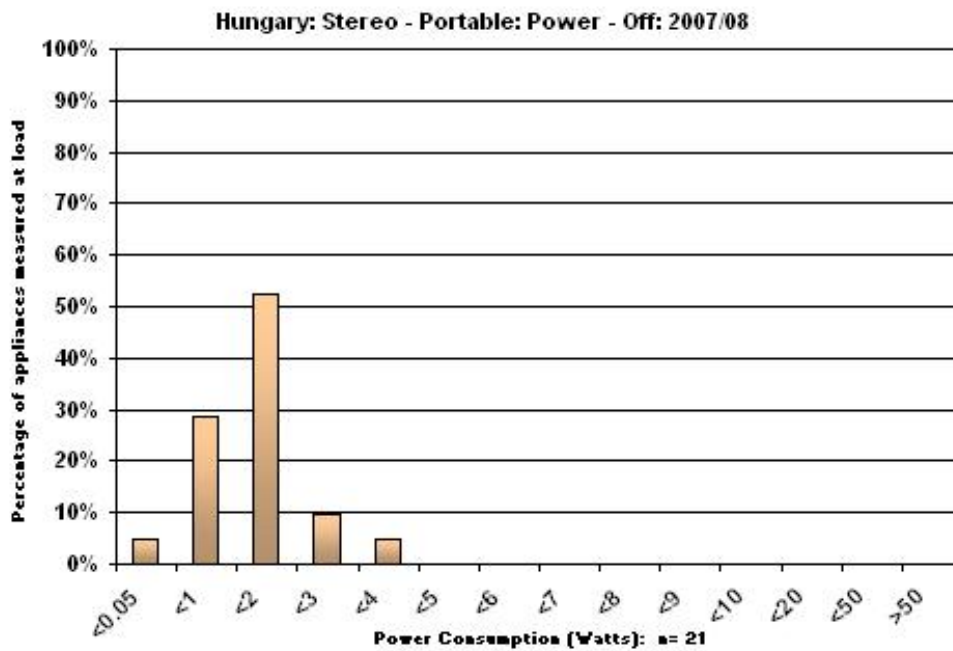


Figure 42: Hungarian Survey 2007/2008 – Portable Stereo; Passive Standby Mode

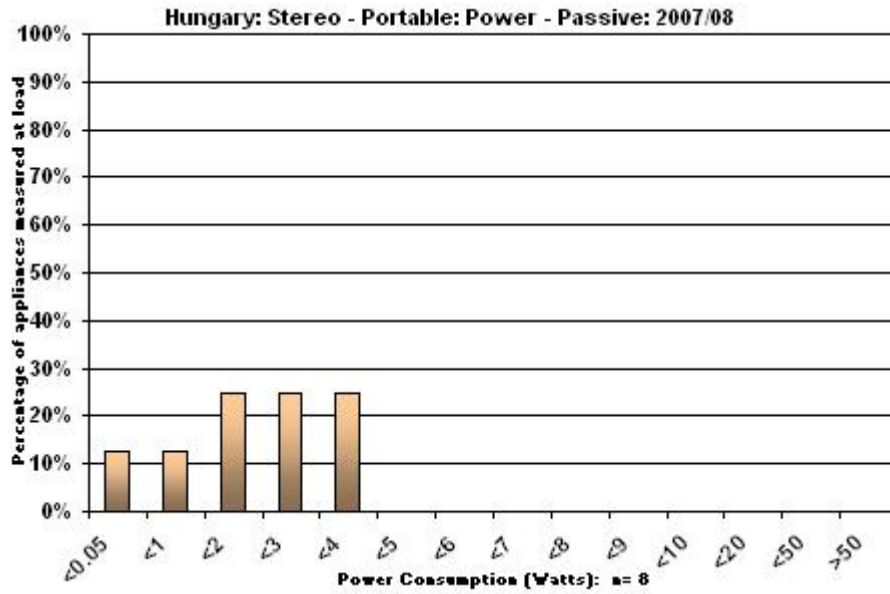
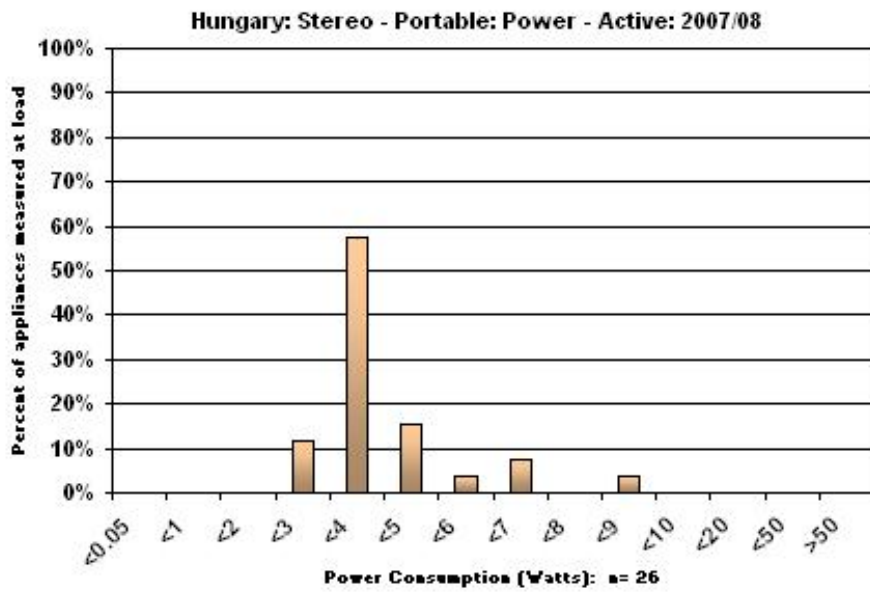


Figure 43: Hungarian Survey 2007/2008 – Portable Stereo; Active Standby Mode



Appendix A – List of Products

The list of appliances and equipment reproduced below are proposed for inclusion in an internationally coordinated “basket of products”. The data collected will provide a central pool which can be used to track standby power trends over time for different product types in different regions around the world.

The basket of products is divided into two categories, the core 13 products for collection and a secondary grouping of another 29 products should stakeholders have the capacity to collect data on globally traded products.

The core products have been selected for the following reasons:

- they are relatively common in most markets
- they should be readily available in major retail outlets
- they have a high or increasing penetration within markets
- they have relatively simple modes which can be readily measured.

The secondary group present some measurement challenges but the Australian experience will be shared in relation to measuring these appliances as well.

Basket of Core Products

Major Appliances (2)

- clothes washers
- microwave ovens – electronic

Home Entertainment Products (6)

- televisions – CRT (conventional)
- televisions – LCD
- televisions – plasma
- portable stereos
- integrated stereos
- Digital Video Disc players (DVDs)

Office Equipment (5)

- computer monitors – CRT
- computer monitors – LCD
- computer printers – laser black and white
- computer printers – inkjet
- multi-function devices (MFDs – combination scanner, printer and fax)

Other Equipment (1)

- external power supplies (no load in addition to equipment powered)

Basket of Secondary Products

Major Appliances (6)

- clothes dryers
 - dishwashers
 - clothes washer/dryer combination units
 - air conditioners (any type with a single phase power plug – typically only window wall types)
 - instantaneous (non storage) gas water heaters (with electronic ignition)
 - microwave ovens – manual timer
-

Home Entertainment Products (8)

- televisions – rear projection
- set top boxes (including variations – digital/analogue tuners, hard drive)
- DVD recorders without hard drive (digital/analogue tuner)
- DVD recorders with hard drive (digital/analogue tuner)
- DVD/VCR combinations
- Video Cassette Recorders
- audio visual receivers (home theatre)
- subwoofers

Office Equipment (15)

- computers (off mode only)
- computer speakers
- computer printers – laser colour
- computer printers – inkjet
- network switches (including hubs)
- routers
- DSL or ADSL modems
- scanners
- facsimiles (fax machines)
- photocopiers – black and white (categorise by copy speed)
- photocopiers – colour (categorise by copy speed)
- telephone answering machines
- cordless phones – primary base station
- cordless phones – secondary base station
- cordless phones – with answering machine

Appendix B – Standard Products and Expected Modes

Appliance	Category	In-use	Active Standby	Passive Standby	Off	Delay Start or Other Mode
Air Conditioner	Heat-Cool			y	y	y
AV Receiver	Home Entertainment		y	y	y	
Breadmaker	Small Appliances			y		
Computers - Desktop	Computers			y	y	y
Computers - Home Theatre Box	Computers	y		y	y	y
Computers - Laptop	Computers				y	
Computers - Monitor	Computers	y		y	y	
Computers - Speakers	Computers		y	y	y	
Cordless Phone Base Station	Other		y	y		
Cordless Phone Outpost	Other		y	y		
Dishwasher	White Goods		y		y	y
Dryer	White Goods		y		y	y
DVD Player	Home Entertainment		y	y	y	
DVD Recorder	Home Entertainment		y	y	y	
Espresso Machine	Small Appliances				y	y
External Power Supplies	External Power Supplies			y		
Facsimile	Other			y		
Fan	Heat-Cool			y	y	y
Games Console	Other		y	y	y	
Gas Water Heaters	Heat-Cool			y		
Hand - held vac	Small Appliances		y	y		
Hard Disk Recorder	Home Entertainment		y	y	y	
Heater - Electric portable	Heat-Cool			y	y	y
Heater - Gas	Heat-Cool			y	y	y
Home Entertainment Other	Home Entertainment		y	y	y	
Home Theatre System	Home Entertainment		y	y	y	
Juicer	Small Appliances		y		y	
Microwave	Cooking			y	y	
Mobile Phone	Other		y	y		
MP3 Dock	Home Entertainment		y	y	y	
Multi Function Device	Computer Peripherals		y		y	
Printer - Inkjet	Computer Peripherals		y		y	
Printer - Laser	Computer Peripherals		y		y	
Set Top Box	Home Entertainment	y		y	y	
Stereo - Integrated	Home Entertainment		y	y	y	y
Stereo - Portable	Home Entertainment		y	y	y	y
Subwoofer	Home Entertainment		y	y	y	
Toaster	Small Appliances				y	
TV - CRT	Television	y		y	y	
TV - LCD	Television	y		y	y	
TV - Plasma	Television	y		y	y	
TV - Projection	Television	y		y	y	
TV/VCR/DVD	Television	y		y	y	
VCR	Home Entertainment		y	y	y	
Washing Machine Front Loader	White Goods		y		y	y
Washer/Dryer	White Goods		y		y	y
Washing Machine Top Loader	White Goods		y		y	y

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