

Standby trends for televisions

Executive Summary

This report describes trends in standby power for televisions. It is the result of collaboration between the IEA 4E Annexes on Standby and on Mapping and Benchmarking.

Data measured in shops for nearly 9,600 televisions show a consistent and significant reduction of average standby from over 4W in 2000 to well under 1W by 2011. The countries and regions included represent around 45% of global television sales in 2011: Australia and New Zealand, USA, Republic of Korea, Canada, India and 13 countries of the EU. The Republic of Korea since 2001 and more recently the USA show consistently the lowest average standby power with between 20% and 50% lower than the average. Australia has the most consistent data which show that in 2007, two thirds of televisions had standby below 1W with the remainder ranging between 1W and 6W; by 2011, however, 99% were at or below 1W.

Experts began warning of standby as a major energy issue on the late 1980s with the IEA formalising the challenge and policy options in 1997 with its 1 Watt plan. G8 ministers formally committed to address this challenge at their 2005 meeting at Gleneagles and thereafter followed a series of national plans, voluntary initiatives, labelling and regulatory measures applying to a rapidly expanding range of products. Policy approaches culminated in 'horizontal' measures applying to most electrical and electronic products in the EU in 2010 and Australia from 2012. Horizontal measures applicable to most or all products are becoming established as the most effective means to tackle standby as the types of electrical goods available proliferate. Regulation is still required to protect the investment made by the majority of suppliers that comply. This ensures a level playing field and helps guarantee that energy savings are not undermined by non-compliant suppliers.

The success of the Korean early signaling and delivery of a comprehensive policy plan stands out. Furthermore, the failure of other markets to match this policy-driven improvement implies that it is regulation, and the signaling of regulation, that has driven this market further and faster than conventional commercial product development alone.

Whilst there is a need for vigilance that these policy measures are not undermined by developing functionality (such as rapid start standby for televisions), networked standby is emerging as the next significant issue for policy to address. It appears that high level international commitments by ministers, such as that achieved at Gleneagles in 2005, can have real and lasting impacts on policy and carbon emissions.

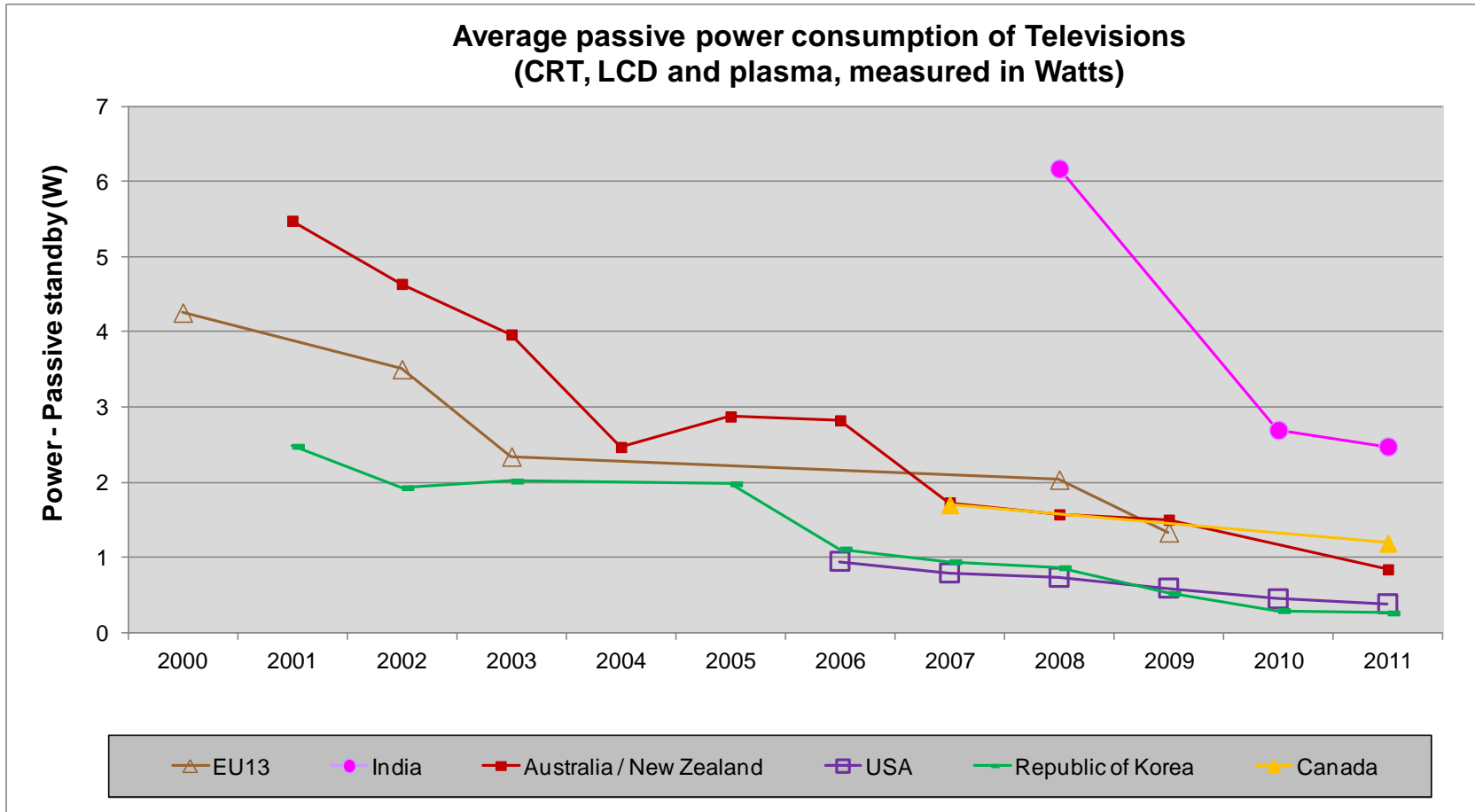


Figure 1. Average passive power for televisions. Data for all countries except the USA and Republic of Korea are from measurements in shops; USA data are from a Californian government database but correlate closely with 2008 measurements from US shops.

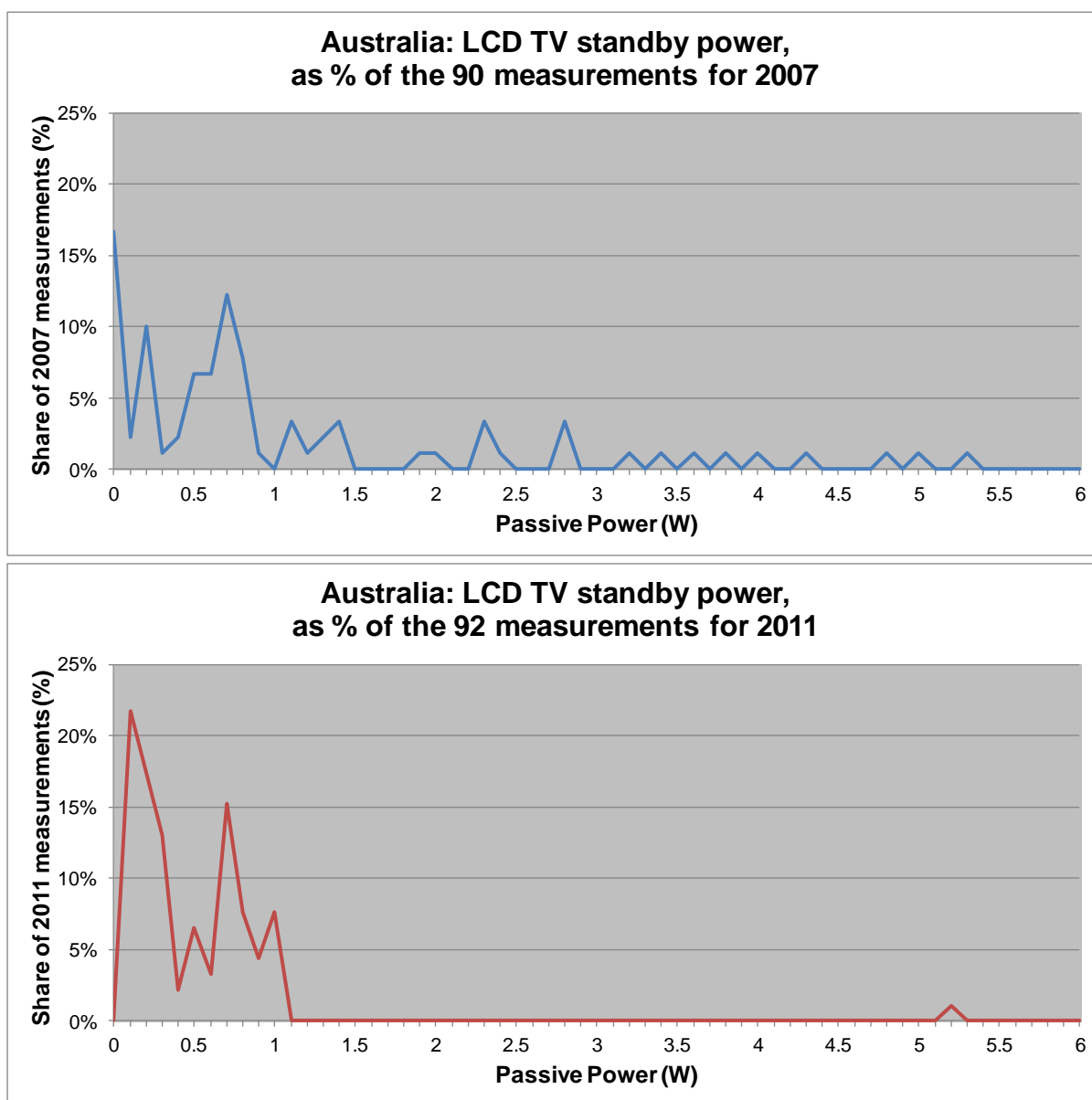


Figure 2. Histogram of passive standby power for Australian LCD televisions, normalised as a percentage of the dataset in 2007 (upper chart) and 2011 (lower chart). 2007 data included 3 televisions above 6W; 2011 had none above 6W.

Introduction

This report describes evidence on standby power for televisions gathered from 6 countries/regions of the world. It is the result of collaboration between the IEA4E Annexes on Standby and Mapping and Benchmarking. Analysis was carried out during late 2011 and early 2012. A full benchmarking report on standby will be published by IEA 4E in 2012.

Nearly 26,000 measurements of standby performance data were collated covering 156 different products. This report focuses on the results for televisions which were the products with the most data; 37% of the data (nearly 9,600 measurements) were about televisions of various screen types. Data were gathered from a few recent projects with 43% from an Asia Pacific Partnership standby project and around one quarter from the European SELINA project.

Observations on the data and graphs

- i. Figure 1 shows a consistent and significant reduction of average standby from over 4W in 2000 to well under 1W by 2011.
- ii. The Republic of Korea shows consistently the lowest average standby power throughout this period with between 20% and 50% lower than the average. These levels are matched closely by US performance from 2006 onwards. There appears a likely link between the beginning of the Korean standby campaign in 2005 and its consistent and rapid reduction resulting in achieving or matching the lowest average of nations surveyed. Similarly the significant drop in standby for the EU in 2009 could be attributed to the introduction of MEPS in that year.
- iii. In Figure 1, the relatively high average for India in 2008 at just over 6W probably reflects the use of technology in the products that has been displaced in other markets reviewed. This includes the persistence of CRT screens in India, which has been sustained much longer than in many other countries: India had 95% CRT screen sales in 2008¹ which had reduced to 60% in 2011 (compared to global averages of 41% and 11% respectively – see Table 7). The data shows a significant improvement to less than 3W in 2010 and 2011.
- iv. The graphs shown in Annex 4 also show significant improvement trends for standby in microwave ovens, set top boxes and home audio products. Note that these graphs are not sales weighted.
- v. The Australian government has tracked and published standby data consistently over a longer period than other nations and so provides a valuable historical perspective. As a result, Australia can demonstrate the most significant overall reduction in standby over the period 2000 to 2011.

¹ TV Energy Consumption Trends and Energy-Efficiency Improvement Options, Young et al., LBNL, Environmental Energy Technologies Division, International Energy Studies Group (commissioned for the SEAD initiative), July 1 2011, Fig 2-10 (quoted from DisplaySearch, 2009).

- vi. The upper histogram of Figure 2 shows that whilst many televisions in 2007 in Australia had standby power less than 1W, around one third ranged between 1W and 6W. The 2007 data set contains three products between 6W and 20W. By 2011, however, 99% were at or below 1W. The 2011 set does include one isolated product at 5W.

Policy implications of graphs

- a) The success of the Korean early signalling and delivery of a comprehensive policy plan stands out from Figure 1. The failure of other markets except the USA to match this policy-driven improvement implies that it is regulation and the signalling of regulation that has driven markets further and faster than conventional commercial product development alone.
- b) In overview, it appears that high level international commitments can have real and lasting impacts on policy and carbon emissions. An important example being the commitment by G8 ministers at Gleneagles in 2005. This appeared to cement the market improvements that followed the earlier IEA 1-Watt challenge.
- c) Horizontal measures applicable to most or all products are becoming established as the most effective means to tackle standby as the types of electrical goods available proliferate. Whilst there is a need for vigilance that measures are not undermined by evolving product functionality (such as rapid start standby for televisions), networked standby is emerging as the next significant issue for policy to address.
- d) The lower part of Figure 2, for 2011, shows why regulation is still required despite the trend and average achieving under 1W in that 1% of products appear failing to comply. Regulation must protect the investment made by the majority of suppliers that comply and ensure a level playing field. This helps guarantee that energy savings are not undermined by non-compliant suppliers.

Overview of data used and analysis process

The data on performance of televisions shown in this report were selected as the strongest sub-set from a much larger database that was collated by the Mapping and Benchmarking Annex Operating Agent, working with the Standby Annex Operating Agent. The data set is described in more detail in Annex 1, and the analysis process in Annex 2.

Figure 1 is based upon measurements from over 9,000 televisions. The datasets are weighted by sales of each technology type in each region. Those for USA, EU27, Republic of Korea and Australia / New Zealand are based on over 1,100 each and considered fairly robust. The data for India are based on around 450 measurements and considered indicative; those for Canada on 150 measurements and considered only illustrative. The range of countries and regions appearing in Figure 1 represent around 45% of global television sales in 2011².

Three quarters of measurements were taken in shops as part of government sponsored research projects using an equivalent methodology, with one quarter from government databases (USA and Republic of Korea). Most power data were separately recorded by screen technology (CRT, LCD, plasma) and combined to derive an average based upon local contemporary market proportion by screen technology. No normalisation adjustments have been carried out on the data – all were judged inherently comparable.

For context, Annex 4 shows graphs for three other sub-sets that showed reasonably strong data: microwave ovens, set top boxes and the category of home audio products. Note that these graphs have not been sales weighted in any way and simply reflect the measurements taken in stores.

Uncertainties on television data

These are the main cautions and sources of uncertainty relevant to Figure 1 and Figure 2:

- i. Types of product measured may **not be representative of the full market** for each screen technology in each or any country (by price range, quality etc) due to the restricted numbers of stores in each country (and year) that hosted measurements.
- ii. **Data for sales weighting by screen technologies** for each country and each year are based on extrapolations and interpolations of incomplete market data. No sales data were available for some countries and sales were estimated by proportioning the sales from another country based on relative populations. See Table 7.

² North America and Europe account for around 17% of global sales each in 2011, plus Australia and Republic of Korea and India adding another 11% approximately (DisplaySearch 2011 and Park, Phadke, Letschert et al. TV Energy Consumption Trends and Energy-Efficiency Improvement Options, Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, International Energy Studies Group, July 2011 p17).

- iii. **Data for sales weighting between countries** for each year are also based upon significant assumptions with several based only upon relative populations
- iv. **Data for USA is mostly derived from a California state database** (California Energy Commission). Whilst this is not from measurements in shops as for most other datasets, the average for 2008 is highly comparable with US data that was derived from in-shop measurements. It has therefore been included in the graph.
- v. **Data for the Republic of Korea is derived from a government database** of manufacturer's declared data which is subject to government surveillance and quality control.

Standby Policies

Table 1 summarises important milestones in addressing standby power demand globally.

Experts began warning of standby as a major energy issue on the late 1980s with the IEA formalising the challenge and policy options in 1997 with its 1 Watt plan. The IEA 1 Watt plan provided a global policy approach template and is described in more detail below. G8 ministers formally committed to address this challenge at their 2005 meeting at Gleneagles and thereafter followed a series of national plans, voluntary initiatives, labelling and regulatory measures applying to a rapidly expanding range of products. Policy approaches culminated in 'horizontal' measures applying to most electrical and electronic products in the EU in 2010 and will take effect in Australia for 2012.

The Republic of Korea has perhaps implemented the earliest and most comprehensive policy plan, with undeniable success. It began with the launch of the 'Standby Korea 2010' roadmap in 2005 that laid out the problem and how the government, working with industry, planned to address it. Voluntary measures from 2005 lead to mandatory warning labels by 2008 and an expanding range of MEPS by 2009.

The EU began early with its voluntary code of conduct in 2001 and achieved the global first of a 'horizontal measure' in 2010.

In most countries, ministerial "messaging" to industry expressed the need to address standby power by design and was signaled several years in advance of regulatory measures, encouraging industry leaders to respond.

The policy challenge is by no means over, due to the increasing complexity of functionality and inter-connectedness of modern products and appliances. The nature and implications of 'networked standby' are now being thoroughly investigated under several initiatives including the IEA 4E Standby Annex, the SEAD initiative and in a European ecodesign preparatory study. Possible mitigating measures include minimum standards under consideration in Europe.

The IEA's 1W plan³

In 1999, the IEA proposed that all countries harmonise energy policies to reduce standby power use to no more than one watt per device. The proposal contained 3 elements:

- Participating countries would seek to lower standby to below 1 watt in all products by 2010
- Each country would use measures and policies appropriate to its own circumstances
- All countries would adopt the same definition and test procedure

Follow-up processes to the G8, APP, APEC and CSD Marrakech accord have all called on Governments to make a greater commitment to the IEA 1–Watt standby target and other programs to tackle standby power.

As the number of products with a standby power component increases, dealing with each product separately is becoming less cost effective and it is growing more difficult to define products individually. The solution proposed by the IEA is to apply a uniform standby power requirement to all products (such as the 1-Watt target) – the so-called “horizontal approach”. This ensures that all devices are included by default, unless specifically excluded. No products should be permanently excluded; instead, a postponement would be granted, with an interim level set in the meantime. The EU became the first major region to enforce such a horizontal measure in 2010.

An IEA guiding principle⁴ is that all devices should have the ability to automatically move to the lowest power needed for required functionality.

³ From IEA Fact Sheet: Standby Power Use and the IEA “1-watt Plan”, April 2007

⁴ IEA G8 Recommendation, 2007.

Table 1. Chronology of key events and policies addressing standby⁵, in particular relating to televisions.

Year	Policy or event	Comments
1986	First identification of standby as a significant energy issue	
1992	First ENERGY STAR specification addresses standby	Desktop computers, 30W limit (60W for integrated computers)
1997	European manufacturer voluntary agreement with the European Commission on standby for colour televisions and VCRs.	Standby <10W and sales weighted average <6W for each signatory company by 2000 ⁶ .
1997	IEA 1-Watt plan	
2001	EU establishes voluntary code of conduct on standby for consumer electronics products	Covers set top boxes, external power supplies.
2001	IEA publishes study on the sources and scale of the standby challenge	<i>'Things that go blip in the night - Standby power and how to limit it'</i>
2002	Australia publishes standby plan	
2003	European manufacturers establish voluntary commitment for CRT and non-CRT televisions ⁷ .	Sales weighted <3W in 2005; <1W by 2007 for each signatory
2005	Republic of Korea publishes 1-Watt plan	Roadmap 'Standby Korea 2010'.
2005	International measurement methodology for standby ⁸	IEC 62301.
2005	G8 leaders endorse the IEA 1-Watt target	In the 2005 Gleneagles Plan of Action
2006	California introduces 3W TV standby requirement	
2008	Republic of Korea – mandatory standby warning label for televisions in force	Expanded to further 6 products in 2009 plus 12 more in 2010.
By 2009⁹	Standby MEPS in place in Australia and New Zealand, China, EU, Republic of Korea, USA. Standby labels in place in each of these plus Brazil and Japan	Cover various products, mainly consumer electronics.
2010	'Horizontal' MEPS at 1W in force in EU covering most electrical appliances for home and office use. Specific regulations for external power supplies and televisions	First major horizontal measure. 1W limit (2W if display is included) via the ecodesign directive.
2011	European Commission preparatory study into networked standby published	
2012	'Horizontal' MEPS in Australia require 1W standby. Standby MEPS in place in Canada for Compact Audio, Video and TV devices	
2013	EU MEPS require 0.5W standby	0.5W limit (1W if display is included).

⁵ General sources: Ellis presentation, India 2008; EU ecodesign Directives; IEA STANDBY POWER POLICY SUMMARY.

⁶ Voluntary agreement between EACEM and EC, as reported in 'Things that go blip in the night - Standby power and how to limit it', IEA, 2001, p42.

⁷ Industry Self-Commitment To Improve The Energy Performance Of Household Consumer Electronic Products Sold In The European Union, 1st July 2003

⁸ IEC 62301 Household electrical appliances - Measurement of standby power

⁹ Source: Gadgets and Gigawatts, Policies for Energy Efficient Electronics, IEA, 2009.

Annex 1 About the Data

The data on performance of televisions shown in this report were selected as the strongest sub-set from a much larger database which was collated by the Operating Agent. The distribution of data for televisions by country and by year is shown in Table 2. See Annex 2 for the steps taken in this analysis to derive the graphs.

Table 2. Television data availability by country / region and by year, showing totals for CRT, LCD and plasma screens. The table shows the numbers of television models for which data are available.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
EU27	72		15	71		46		42	131	798	175			1350
India									44		242	161		447
Australia / New Zealand		134	102	176	146	107	65	179	58	56	16	140		1179
USA						7	807	498	826	882	615	1242	133	5010
Republic of Korea	1	5	41	59	50	112	205	225	265	223	Aver*	Aver*		1187
Canada								156				Aver*		156
Grand Total	73	139	158	306	196	272	1077	1100	1324	1959	1048	1543	133	9329

* Average data quoted from a report, not calculated by the Operating Agent from individual product data.

The larger data set from which the television data were extracted contains measurements from 25,600 products from 6 sources:

1. Asia-Pacific Partnership (APP) standby project (11,000 products)
2. SELINA (EU project) dataset (6,000 products)
3. Standby data provided to Mapping & Benchmarking project (televisions only, 1,500 products).
4. Australian data set from 2010/2011 (1,030 products)
5. Indian data set from measurements in shops for 2010/2011 (1,070)
6. California Energy Commission televisions datasets (5,000)

The majority of data (75%) were measured in shops, with 24% from government databases and a small amount from an independent test house. The data spans 1999 to 2012 but 62% of data are for 2007-2010.

Data covers 19 separate countries with 35% of the data from Australia and New Zealand, 29% from EU and 20% from USA. Republic of Korea, India and Canada 6% or less each. For the purposes of this analysis, 13 European countries were grouped together¹⁰ and the countries shown in Table 3 are represented in the main data set. The main data set includes

¹⁰ Countries included are: Czech Republic, UK, Denmark, Latvia, Austria, Romania, Portugal, Belgium, Hungary, France, Germany, Greece, and Italy. Significant omissions in terms of major EU27 populations are Spain and Poland.

data on 156 different products, 26 of which account for 80% of the data. The main product categories (groups of similar products) are summarised in Table 4.

It has been estimated that the products in the data set account for at least 80% of the standby consumption of an average Australian home, based upon comparison with a home energy survey of 2005 which is summarised in Table 5. By similar estimation, the products covered probably account for approaching 80% of the standby demand of a Korean home in 2011, as per Table 6.

Table 3. Data availability for countries and regions represented on graphs for all products (covering over 150 products, not just televisions).

Countries/regions	Count of all product measurements	% of all product measurements
Australia / New Zealand	9,070	35%
EU27	7,433	29%
USA	5,210	20%
Republic of Korea	1,605	6%
India	1,194	5%
Canada	1,124	4%
Total:	25,636	100%

Table 4. Product categories for which data were available.

Categories	% of all product measurements	Products included
Televisions	37%	CRT, LCD, Plasma, LED and Projection screen types
Home audio	10%	18 types of audio players and sources (radios, CD/cassette decks, integrated stereo, home theatre, wireless speakers etc). Excludes portable products.
Cooking products	10%	44% of category is microwave ovens. Includes 39 types of cooking appliance that include a heating function (bread maker, grill, cook top, fondue, rice cooker, espresso machine, toaster etc)
White goods	8%	60% of category is washing machines; 22% dishwashers; 14% laundry dryers. Also includes some washer / dryers.
Video sources	8%	35% of category are DVD/Blu-Ray players; 21% Set Top Boxes. Also includes hard disk and DVD recorders, VCR.
Home computers	6%	Notebooks, desktops, displays
Imaging equipment	4%	Inkjet and laser printers, copiers, multi-function devices, scanners, fax machines.
HVAC	4%	Air conditioners, electric and gas heaters, dehumidifiers, humidifiers, range hoods and fans.
Other	14%	
	100%	

Table 5. Contribution of major product type to household standby in 2005 from Australian intrusive survey, also showing which of these are largely covered in the data set.

Product Category (from Australian survey ¹¹)	% of household standby accounted for by category	Covered in standby data set?	Implicit proportion of household standby covered by the available data set
Computers and peripherals	27.5%	Yes, well represented.	27.5%
Major appliances	11.5%	Yes - Washing machine, dishwasher and dryer, plus cooker(s) and HVAC.	11.5%
Televisions	6.5%	Yes.	6.5%
Set top boxes	3.5%	Yes.	3.5%
Other home entertainment	19.5%	Yes - home audio, other video sources, games consoles.	19.5%
Telephones and other office equipment	7.5%	Yes.	7.5%
Monitoring and continuous appliances ¹²	9%	No. Limited representation of some products.	-
External power supplies	3%	Yes.	3%
Other items with standby mode	4.5%	Yes – many other minor appliances are covered.	4.5%
(Unknown)	7.5%	-	-
Total	100%		83.5%

Table 6. Top ten sources of standby power demand in the Republic of Korea according to a 2011 household survey¹³.

Product	Percentage of total household standby	Covered in standby data set?
Boiler	17.4%	No
Set top box	9.4%	Yes
Rice cooker	9.2%	Yes, to a limited extent
Air conditioner	7.0%	Yes, to a limited extent
Microwave oven	6.9%	Yes
PC desktop	6.8%	Yes
Computer Modem	6.2%	Yes, to a limited extent
Television	6.0%	Yes
Wi-Fi system	4.1%	No
Washing machine	2.5%	Yes
Others	24.5%	Yes
Total	100%	

¹¹ Report for Australian E3 committee 2006/02, 2005 Intrusive Residential Standby Survey Report, March 2006, Prepared by Energy Efficient Strategies.

¹² This covered fish tank and pool equipment, remote doorbells, security systems, sensor lights etc.

¹³ Presentation made by representative of KERI to IEA 4E Standby Annex meeting, 2011 Standby Status of Korea: Did 1W policy work well in Korea? Sydney 2011.

Annex 2 Analysis undertaken

The following steps were taken to clean and analyse the data which were used to derive the graph for televisions shown in Figure 1:

1. Nomenclature (product label / category) was standardised across the datasets.
2. Products were grouped into categories appropriate for type of service provided to the user and similarity of basic function/components (see Table 4). This resulted in a television category being composed of LCD, CRT and plasma screen televisions.
3. Data bins (i.e. data for a particular product, country and year) that would require calculating an average consumption for less than 5 products were considered unreliable and discounted from the analysis.
4. No normalisation adjustments have been carried out. It is assumed that all measurements were taken using a power meter whilst the product under test was in the relevant mode (see below on mode definitions) and so no methodological differences should exist. Also, the majority of standby consumption involves only electronic controls and so supply voltage differences should have limited impact and not require normalisation. All readings were therefore assumed inherently comparable.
5. In calculating an average standby power for a product category (including televisions), averages were first calculated for each product (country/year) individually (e.g. for CRT televisions). Then the average power demands for each product were sales weighted to arrive at a sales weighted average for the category for each country and year. For example, the proportions of sales shown in Table 7 were used to sales weight separate averages by screen type for EU, USA, Canada and Australia; national data were sourced for others.
6. For products that constitute only a very small proportion of the market within a particular category (for example CRT televisions in later years) it becomes nonsensical to apply the 'at least 5 product' rule explained above. This is because their influence on the average is small and as a product diminishes in the market it is less likely to be measured. To avoid the average for that year being omitted due to absence of (for example) adequate CRT data, the 'at least 5 product' rule was waived for products that constitute less than 10% of sales in that country/year.

The following additional issues were noted during analysis:

- No systematic differences in definition of modes between projects/countries have been identified (see Appendix 3 for the mode definitions used under the APP project).
- Just over 1% of all products in the database (225 in total) have a zero recorded against passive power demand. This was assumed to have registered below the minimum threshold of the meter and all zero entries were treated as accurate for calculating average power.
- On advice from a product specialist, it was concluded that 81 products recorded as “LED screen televisions” must have been LED back-lit LCD screen televisions¹⁴. These have been reclassified as LCD TVs.

Table 7. Proportion of global television sales by screen type¹⁵. Data for 1999 to 2004 (in italics) were extrapolated backwards from sourced data for 2005 to 2011.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
CRT %	100%	100%	100%	97%	94%	89%	83%	69%	54%	41%	24%	16%	11%
LCD %	0%	0%	0%	2%	3%	5%	11%	22%	39%	51%	68%	78%	83%
Plasma (PDP) %	0%	0%	0%	0%	0%	2%	3%	4%	6%	7%	7%	6%	6%
Other screen types %	0%	0%	0%	2%	3%	5%	3%	4%	1%	1%	1%	0%	0%
total %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

¹⁴ Only two limited edition models of true LED screen TVs were on the market in 2009/2010, (personal communication, November 2011).

¹⁵ DisplaySearch, Total LCD TV Shipments to grow to 188M Units in 2010, to surpass 260M Units by 2014, 29 June 2010, accessed 13 October 2010. Scaled from published graph.

Annex 3 Power mode definitions from the APP project¹⁶

Note: Since the project work that generated the data in this analysis was completed, the IEC published IEC 62087-BD ed3.0 *Methods of measurement for the power consumption of audio, video and related equipment*. This is the new harmonised global standard for standby measurements for audio / video equipment and is the methodology of choice for future work in this area.

Mode	Definition appearing in the APP Standby project guidance notes
Active Standby	Active standby is when the appliance is on but not performing its main function. For example, the DVD may be on but is not playing or recording. This mode is usually only present in devices (a) where there is a mechanical function which is not active (e.g. DVD drive or motor) but where power circuits are on, or (b) where a device has a battery and the device is charging or (c) where a device is in a quiescent power state (audio amplifier with no audio signal) or (d) the device is downloading data (STB or TV updating Electronic Programme Guide or software)
Passive Standby	When a product or appliance is not performing its main function (sleeping) but it is ready to be switched on (in most cases with a remote control) or is performing some secondary display function (e.g. has a display or clock which is active in this mode). This mode also applies to external power supplies for battery operated equipment (portable appliances)
Network Standby	TBA
Off Mode – Off	The product must have a power switch located on the product. Off mode is 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 woken by the remote control from off mode – it can only be activated via the power switch on the product. No display should be active in 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. An LED may be present to indicate off mode.
Delay Start or other Mode	Delay start is becoming common place on 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 this mode is measured as a separate category. (Note this is different to sleep mode where the timer is used to stop in use operation after a set period)

¹⁶ Table copied from *Appliance Standby Survey Product Guide, Detailed Instructions of the International Standby Basket of Products Survey*, prepared for: Department of Climate Change and Energy Efficiency Australia, 13 April 2010, Prepared by: EnergyConsult with assistance from the SELINA Project. Version: Appliance Instructions V1.7.doc.

Annex 4 Example time series graphs for microwave ovens, set top boxes and home audio products.

