

Topten Product Criteria Paper on Simple Set-Top Boxes

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The Project in brief

Topten is part of the international Euro-Topten Plus initiative supported by the European programme Intelligent Energy Europe and several national institutions (energy agencies, WWF, consumer associations, research institutes). On global level, Topten is coordinated by TIG, the Topten International Group. This association promotes to the Topten Charter, TIG statutes and Rules of Procedure (www.topten.info).

Topten is a service that supports the market for energy efficient products. It aims at making energy efficient products the first choice for consumers, by offering them a user-friendly tool for product comparison and selection. The key element is an online information platform for consumers presenting the most energy efficient appliances currently available in various product categories, including household appliances, office equipment, consumer electronics and cars. Information on energy consumption and performance of products as well as several other characteristics (i.e. brand, model, price, picture) is provided. Product data is based on labels and standardized declarations as well as tests from accepted well-known institutions. The service is independent of manufacturers and retailers.

Consortium

The project is co-ordinated by the Agence de l'Environnement et de la Maitrise de l'Energie (ADEME). The other 19 project partners are:

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Austria : Austrian Energy Agency	AT
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Italy: WWF Italia Onlus	IT
Lithuania: LNCF, consumer federation	LT
Luxemburg: Oeko-Zenter, asbl	LU
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1 Introduction

Simple set top boxes (STB's) are an intermediate technology to keep existing analogue television equipment functioning in the transition to digital broadcasting. These products will be required for a limited period only. Current schedules predict an end to analogue terrestrial television broadcasting in Europe by 2015, with Southeast Europe regions likely to be the last to switch over. At that stage the number of simple STB's required to convert analogue television equipment will start a dramatic decline and products already installed will probably be disposed of when the associated analogue television equipment is replaced. The set top box will still exist as a product type to provide high functionality to basic television equipment as new broadcasting and home networking technologies emerge.

Criteria papers provide a central tool for the Euro-Topten Plus partners to collect and analyse product data and to establish a national Topten selection. Appropriate selection criteria and technical specifications are a crucial precondition for meaningful and well-accepted Topten websites. The purpose of this criteria paper is to provide a common basis for the definition of technical specifications. Obviously, the range of products differs significantly in European member States in terms of price level, configuration, energy classes and energy consumption corresponding to levels of purchasing power and behavioural aspects (mentality, customs, etc.).

Within the European wide Topten project, an aligned approach for technical specifications for all national Topten websites is aimed at. A high level of uniformity and congruency of the different national websites will enhance the awareness amongst manufacturers. Good quality product data at national level furthermore allows to analyse the situation at European level and to make policy recommendations, which are shown on www.topten.info.

This paper contains the product specification for Topten simple set-top boxes. A product should meet all criteria described in Chapter 4 in order to be listed on www.topten.info as a Best Available Technology.

In an ideal situation, criteria are based on international or European standards. In some cases widely accepted and strictly defined standards are missing – (e.g. for products in the consumer electronics segment). Within the methodology of WP3, it was intended to use the implementation measures of the Ecodesign directive as a basis for the criteria definition. The information in this criteria paper is therefore mainly based on the “Preparatory studies for Eco-design Requirements of EuPs – Simple Digital TV Converters (Simple Set Top Boxes)” and the corresponding implementing measure.

2 Product Specification

This chapter provides an overview of simple set-top boxes. It also gives a technical analysis of the product and explains EU and national product and test standards.

2.1 Product Definition

A simple set-top box (STB) is an appliance for the reception, decoding, processing and local networking of digital broadcasting and related services. The primary purpose of simple STB's is to allow analogue television equipment to receive basic and additional digital broadcasting services. According to the EUP Preparatory Study, a "Simple" STB is further defined as:

- A "simple" STB has no CA (Conditional Access) function. If the product is sold with a CA interface, this should not be active if the product is to comply with the definition of a "simple" STB. A CI Connector (Common Interface connector - Interface for additional functionalities) is an acceptable feature of a "simple" STB provided that it is not equipped with an active CA functional block.
- Time shift and recording functions based on integrated hard disc, flash card or solid state memory are acceptable added functions of a "Simple" STB.
- A "simple" STB offers no recording function based on removable media in a standard library format (DVD, VHS tape etc.). Such devices may, in the future, be categorised as Complex STB's or more logically as a separate product genre – the Digital Television Recorder.
- HD (High Definition) broadcast signal reception converted to HD (or SD- Standard Definition)) video output streaming is an acceptable added function of a "Simple" STB.

It is estimated that in EU-25 the energy consumption of STB's can be reduced from 14 TWh down to 5 TWh in 2014, which represents a reduction potential of 64% and a saving of EUR 1.4 billion at today's electricity prices, along with the abatement of 4 Mt of CO₂ emissions. By 2020, if assuming that these devices will disappear from the market (most new TVs and video-recorders should be shipped with integrated digital tuners), around 47 TWh could be saved.

The technical parameters of simple STB's are shown in the figure below. It shows a simplified generic block diagram of a typical set top box. The blocks consuming the majority of the electricity are:

- the main processor
- MPEG decoder (often part of the main processor)
- RF front-end¹ and the
- power supply / power distribution itself

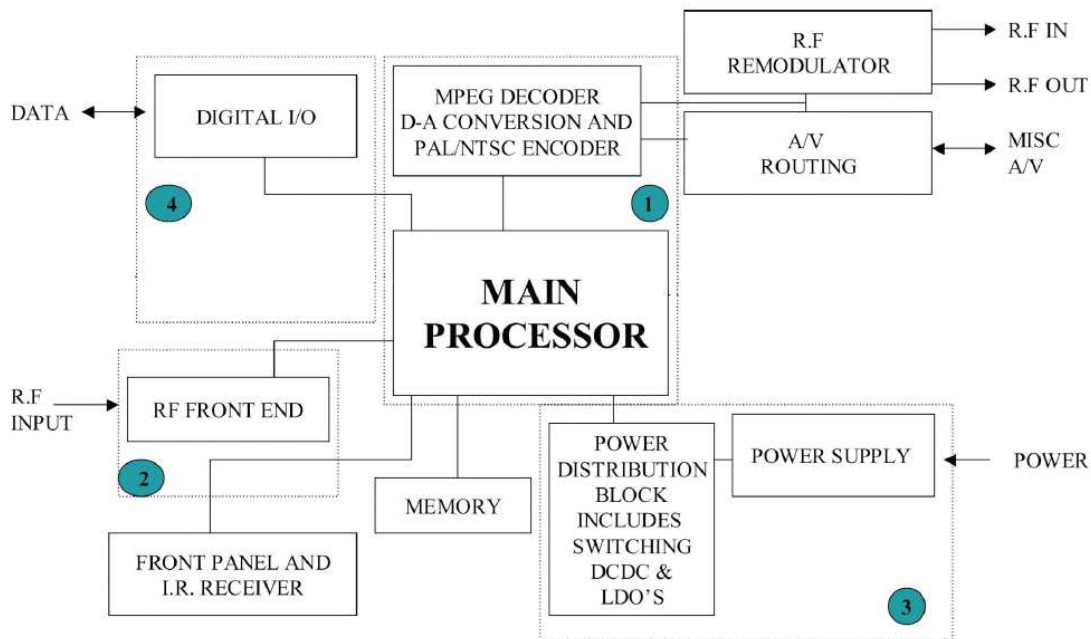


Fig. 1 - Simplified generic block diagram of a typical set-top box²

2.2 Product Types

Simple STB's can be classified into simple STB's for DVB-T (digital video broadcasting – terrestrial), DVB-S (digital video broadcasting – satellite) and DVB-C (digital video broadcasting – cable). Simple STB's for DVB-H (digital video broadcasting – handheld) and IPTV (internet protocol television) have no significant market penetration and are not considered relevant for the simple conversion of analogue TV products to mainstream digital broadcasting reception.

The most common form factor for Simple STB's is the classic rectangular casing type with a steel box design and a décor front panel made of plastic. Most front panels are equipped with one or more LED's to display the operating status of the STB. Front

¹ RF front end is a generic term for everything in a receiver that sits between the antenna and the intermediate frequency (IF) stage.

² Source: Preparatory study for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes); Page 12;

panel controls are reduced to a minimum and the remote control is usually essential for the normal operation of the STB. All STB's use an OSD (On Screen Display) on the connected TV instead of a comprehensive display on the front of the device. The following pictures show typical examples of "traditional" STB form factor and the "Scart Stick" (Bottom left corner of Fig.2).



Fig. 2 - Typical examples of simple set-top boxes³

In addition to the STB's produced/offered by traditional CE manufacturers there are numerous Simple STB's available from a large number of different brands. Most of these devices are imported from China. To reduce the costs of materials and transportation the size of the Simple STB has been reduced significantly. An extreme example of this trend is the Scart Stick form factor which is shown in Fig.2. Several of these devices were displayed at the booths of OEM/ODM manufacturers at the IFA 2007 (Internationale Funkausstellung) in Berlin.

The following components/features are included in the basic configuration of the Simple STB but do not constitute a minimum specification (i.e. they may not be present in the device).

³ Source: Preparatory study for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes); Page 54;

STB			
CABLE	TERRESTRIAL	SATELLITE	DSL
Single cable tuner / demodulator	Single RF tuner / demodulator Active antenna powering	Single satellite tuner / demodulator Single LNB feed	No tuner / demodulator
Single MPEG2 Decoder (SD or HD as appropriate)			
RF Modulator / Loop-through			
IR Remote Control			
Support for Off-air Software Upgrade			
Electronic Programme Guide (EPG)			
Timer control facilities			
Auto standby			
Analogue Composite and Component video outputs			
Single Analogue Composite and Component video input			
Stereo analogue audio out and in			
Operating system support for Interactive Services (e.g. MHEG, MHP, OpenTV)			

Fig. 3 - Basic configuration of a simple set-top box⁴

2.3 Best Available Technology

The main focus in the development of Simple STB's was to cut the costs for manufacturing and for design. The rapid development of new higher integrated modules available from the vendor's shelf offers the opportunity to refocus on new features of Simple STB's with simultaneous consideration of lower energy consumption. The main topics in this development are:

- Higher integration of chips
- More energy efficient software development
- Higher power supply efficiency
- Auto switch-off to standby-mode and low power standby.

The following options to further improve simple STB's with HD (Hard Disc) or PVR's (Personal Video Recorders) are addressed in current product development:

- Hard Disc Drive

⁴ Source: Preparatory study for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes); Page 55;

DSL - Digital Subscriber Line technology uses existing telephone lines to transport high-bandwidth data, such as multimedia and video, to service subscribers.

The majority of simple STB's with a programme storage capability currently use a hard disc drive (HDD) to store the MPEG data stream for later viewing or time delayed viewing (live pause). The HDD may consume 6 watts of power when active. Smaller, lower power hard discs developed for the portable PC market are now being considered to reduce energy as massive pressure on notebook PCs costs continue to drive down the cost of the HDD component. A parallel solution not yet seen in the market but firmly in the design stage is the use of medium capacity HD cards for the live pause /instant record short duration buffer. High capacity HD cards are predicted to replace HDD's in some low cost simple STB's in less than five years and well within the analogue to digital switch over transition period in EU25.

- Software Design

The influence of clever software design on energy demand of electronic devices is known from personal computers. It is obvious that software design gets more and more relevant to improve (reduce) the energy consumption of most electronic devices.

- Power Management Units (PMU's)

A Power Management Unit (PMU) is an up-integration into a single piece of silicon of the peripheral functions outside of the Main Processor & Power Blocks (see Figure 6.1) to allow the main processor to access a range of peripheral functions using only one control line. This means that the peripheral functions share a common interface with the main processor. Main processor power management control can be implemented cost effectively.

Common benefits of PMU's are:

- The direct interconnection to the main processor allowing the main processor to readily put certain blocks to "sleep" when not needed.
- Serial addressing of the main processor and function blocks leads to simplification in layout and placement and to a reduction of costs.
- Implementation of functions in software reduces hardware cost and power consumption.

Current energy efficiency criteria

Criteria at EU level

The current implementing measure (Commission Regulation) COMMISSION REGULATION (EC) No 107/2009 of 4 February 2009 for simple set-top boxes of the Directive 2005/32/EC of the European Parliament and of the Council stipulates the following requirements one year after this regulation has come into force (January 2010):

	Standby mode	Active mode
Simple STB	1.00 W	5.00 W
Allowance for display function in standby	+ 1.00 W	-
Allowance for decoding HD signals	-	+ 3.00 W
Standby mode mandatory		
‘automatic power-down’ or similar function mandatory		

Fig. 4 - First stage criteria of the Commission Regulation⁵

Simple STB's with an integrated hard disc and/or second tuner are exempt from that requirement. This means the energy consumption for this product type is not limited.

Three years after this first stage, simple STB's placed on the market shall not exceed the following power consumption limits:

	Standby mode	Active mode
Simple STB	0.50 W	5.00 W
Allowance for display function in standby	+ 0.50 W	-
Allowance for hard disk	-	+ 6.00 W
Allowance for 2 nd tuner	-	+ 1.00 W
Allowance for decoding HD signals	-	+1.00 W

Fig. 5 - Second stage criteria of the Commission Regulation⁶

^{5, 5} Source: COMMISSION REGULATION (EC) No 107/2009 of 4 February 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for simple set-top boxes

2.4 Other legislation and labels relevant for STB's

2.4.1 European Legislation

There are four European Community Directives relevant for simple STB's:

- Directive 2002/96/EC (WEEE)
- Directive 2002/95/EC (RoHS)
- Low Voltage Directive (LVD) 73/23/EEC
- Electromagnetic (EMC) Directive 89/336/EEC, amended by Directive 92/31/EEC
- Eco-design Directive - Commission Regulation (EC) No 107/2009

2.4.2 Global Legislations and Label Programmes

The following table shows programmes on efficient STB's, related eco-labelling projects and the respective requirements on a world wide scale.

Country	Programme e.g. label	Scope	Programme Type
Australia	Australian Green-house Office	Standard definition converter for terrestrial signals	Minimum Energy Performance Standards
		High definition converter for terrestrial signals	
Canada	Energy Efficiency Regulation	Simple digital-to analogue converter box for terrestrial signals	Minimum Energy Performance Standards (mandatory)
China	China Standard Certification Center (CSC/CECP)	Simple STB (cable only)	Minimum Energy Performance Standards

	China National Institute of Standardization (CNIS)		(mandatory)
EU	European Code of Conduct for Digital TV Services	Complex set-top boxes, simple STB Digital TVs with integrated receiver and decoder Analogue PVR	Voluntary Agreement Will be obsolete when the Eco-design Directive has come into force.
	Eco-design Directive - Commission Regulation (EC) No 107/2009	Ecodesign requirements for simple set-top boxes	Minimum Energy Performance Standards (mandatory)
Korea	Energy Boy Standby Power Program	Simple digital-to analogue converter box for terrestrial signals Pay TV set-top boxes	Endorsement Label
Switzerland	Swiss Federal Office of Energy	Same as EU	Standards (mandatory)
Taiwan	Standby Power Promotion Alliance	Set top box	Voluntary Agreement
USA	Energy Star	Simple digital-to analogue converter box for terrestrial signals (DTA)	Endorsement Label
	National Telecommunications and Information Administration (NTIA)		
UK	Energy Saving Trust (Energy Saving Recom-	Simple STB (DTA) for Terrestrial Digital TV MPEG	Endorsement Label

	mended)	2 SD output Simple STB (DTA) with HDD Recording capability	
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2.5 Test Standards

The following standards are relevant for the assessment of the energy consumption of STB's.

International standards

EN/IEC 62301:20005. "Household Electrical Appliances, Measurement of Standby Power". The scope of the standard is the measurement of electrical power consumption in the standby mode.

IEC 62087:2002 / EN 62087:2003 "Methods of measurement for the power consumption of audio video and related equipment". The scope of the standard includes the specification of methods for the measurement of the power consumption of digital terrestrial, digital cable and digital satellite STB's and the definition of the different modes of operation relevant to the power consumption.

Industry Association Standards (USA)

CEA-2013-(A) "Digital STB Background Power Consumption". The scope of CEA-2013 is: Measurement and maximum limit of Standby Mode ONLY for digital STB. It defines maximum background mode (SLEEP state) energy consumption of basic digital STB's, whose primary function is video reception and delivery.

Comparison of IEC 62301 – IEC 62087 – CEA 2013 where relevant to STB Power Consumption Testing:

EN/IEC 62301	IEC 62087	CEA-2013
Measurement Modes: Standby	Measurement Modes: Disconnected, Off, Standby Passive, Standby Active low, Standby Active high, On.	Measurement Modes; Off, Sleep, On.
Temperature: 23 degrees +/-5 degrees C.	Temperature: 15 to 35 degrees C with 20 degrees C preferable.	Temperature: 22 degrees C +/-4 degrees C.
Instrument accuracy: 10W or less, 0.01W. 10W up to 100W, 0.1W. Greater than 100W, 1W.	Instrument accuracy: Not given	Instrument accuracy: Resolution to be 0.1W or better. True power watt meter preferred.
Not specific to STBs but detailed methodology on low power measurement	Specific to digital television STBs with detailed coverage of test signals and external loads	Specific to digital television STBs Includes Treatment of parasitic peripherals, such as LNBS and security cards

Fig. 6 - Comparison of IEC 62301 – IEC 62087 – CEA 2013⁷

Test standards which should be considered by manufacturers proposing products on the European market:

- EN/IEC 62301 for guidance on low power (standby) testing (it was noted that this standard is concluding a revision process)
- IEC 62087 for guidance on product set- up and test conditions (it was noted that the STB part of this standard has just commenced a revision process)
- CEA – 2013 for guidance on product set-up

⁷ Source: Preparatory study for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes); Page 15;

3 Market data

3.1 Sales data

Sales of Simple STB's for DVB-C are very low in the EU. One reason is the dominance of Satellite digital TV broadcasting in major countries. Furthermore those European countries with a good broadband cable infrastructure, such as Germany, invariably require cable platforms with Conditional Access and often have "always on" functions associated with Internet features. These are so called "complex" STB's.

Commercial market research data on STB's in the EU tends to focus on the retail volumes in the dedicated or traditional retail outlets. Accurate estimates of STB sales from commercial market research are complicated due to limited data from e-commerce. EBay and similar e-commerce is only partly covered and the majority of the e-commerce data is drawn from the extended on-line business of the "traditional" retailer. E-commerce trading from outside the EU is not likely to be covered at all.

3.2 Stock Data

The market and stock data presented in this criteria paper are taken from the preparatory studies for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes). These studies were based on the following data sources:

- The European analogue TV product stock that will need conversion to digital TV to access normal broadcasting services.
- Data on the pan-European digital switch over programme

The simple set top boxes (STB's) are an intermediate technology to keep existing analogue television equipment functioning in the transition to digital broadcasting. These products will be required for a limited period only. Current schedules predict an end to analogue terrestrial television broadcasting in Europe by 2015, with Southeast Europe regions likely to be the last to switch over.

Digital Terrestrial STBs EU 25 Totals			
	Sales	Replacement	Stock
Start			2.1
2000	1.0	0.0	3.1
2001	1.5	0.0	4.6
2002	2.5	0.0	7.1
2003	4.2	0.0	11.3
2004	6.2	1.0	16.5
2005	9.7	1.5	24.7
2006	12.5	2.5	34.7
2007	16.5	4.2	47.0
2008	19.7	5.2	60.5
2009	23.0	7.7	73.8
2010	28.5	9.0	89.8
2011	36.5	11.5	109.8
2012	35.0	13.2	125.1
2013	48.0	15.0	150.1
2014	56.0	17.5	177.6
2015	14.0	21.0	155.1
2016	12.0	15.0	132.1
2017	6.0	8.0	90.1
2018	2.0	6.0	36.1
2019	1.0	4.0	23.1
2020	0.0	2.0	11.1

Fig. 7 - Sales, Replacement and Stock data for EU 25⁸

Recommendations for participating countries:

The decision if you should work on STB and including it on your national website depends on the date when the final analogue service switch-off becomes imminent in your country (see Fig. 8) and on the broadcasting implementation strategy of your country.

Country	Household with TV (Mil.)	Terrestrial in %	Start	Analogue Switch Off	Transition Period
Austria	3,280	14%	2006	2010	4 years
Belgium	4,4	3%	2002	2010	8 years
Czech	3,7	68%	2005	2010	5 years

⁸ Source: Preparatory study for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes); Page 30;

Republic					
Finland	2,3	43%	2001	2007	6 years
France	24,12		2005	2010	5 years
Germany	36,18	5%	2002	2010	8 years
Greece			2006	2012	6 years
Italy	22,8	73%	2003	2008	5 years
Lithuania	1,3	56%	2006	2012	6 years
Norway		30%	2006	2009 (Dec.)	3 years
Poland	12,7	46%	No decision yet	(2015)	
Portugal	3,2	67,2%	No decision yet	2012	
Romania	6,6	45%	No decision yet	(2015)	
Spain	14,9	73%	2005	2010	4 years

Fig. 8 – Switchover table⁹

According to the European household survey, in 2005 50% of European households accessed normal broadcasts using a terrestrial TV platform (See Fig. 8) 33% using a cable TV platform and 22% a satellite TV21 platform. Only 5% used a digital terrestrial TV platform with a room or house antenna. This is the average for EU 25. Because of fundamentally different, cable infrastructures, and transmitter network development, the distribution of platform types for TV reception varies significantly from one country to another. For example, in Spain the terrestrial TV platform is used by 90% of households while only 9% use cable TV. Germany on the other hand, has less than 5% of all households using a terrestrial TV platform and 56 % using a cable TV platform.

⁹ Source: Preparatory study for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes); Page 25-26;

These differences will impact significantly on the volume of Simple STBs required by each country to support analogue to digital switchover. It is likely that most of these STBs will be terrestrial digital platforms (DVB-T) since existing TVs using a cable or satellite platform that covers normal broadcasting are unlikely to require an additional STB.

3.3 Prices

Market checks done in Germany, France and United Kingdom in August and November 2007 for the preparatory study of the eco-design directive present the following average consumer prices:

	Medium price of simple STBs	Products supplied by traditional brands
Germany:	35 to 50 Euros	up to about 200 Euro
France	40 to 60 Euros	80 to about 300 Euros
United Kingdom	28 to 85 Euros	

Fig. 8 - Consumer prices for STB's¹⁰

Market checks recently done in Austria (topprodukte.at) present the following average prices:

	Medium price of simple STBs	Products supplied by traditional brands
DVB-T ¹¹	40 to 100 Euros	up to about 400 Euro
DVB-S ¹²	60 to 130 Euros	up to about 550 Euro

The term "Traditional brands" means products supplied by leading companies like Sony, LG Electronics, Fujitsu etc. For simple STB prices vary from 40 to 400 Euros. The average sales price of a Simple STB is about Euro 200. Simple STB with integrated Hard Disc are more expensive and vary from 60-550 Euros. The average sales price of Simple STB with integrated HD/2nd tuner is about Euro 300.

¹⁰ Source: Preparatory study for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes); Page 39;

¹¹ DVBT-T: digital video broadcasting – terrestrial

¹² DVBT-S: digital video broadcasting – satellite

3.4 Energy Consumption

The review of the different phases of the product life of a simple STB indicates clearly that the main environmental impact is due to the power consumption during the use phase of the device.

The daily use of the Simple STB is estimated to 4 hours in On-mode and the remaining time of 20 hours per day in standby-mode. This equates 1460 hours On-mode and 7300 hours in Standby-mode per year. The average lifetime of a simple STB is 5 years.

For the power consumption of the Set Top Boxes the following assumptions are made based on product data available. The average price per kWh in Europe is 0,14 Euro per kWh.

	Simple STB	Simple STB/PVR	
Power consumption (kW)			
On-mode	0,0070	0,0256	
Standby-mode	0,0061	0,0059	
Working hours per day (h)			
On-mode	4	4	8
Standby-mode	20	20	16
Annual power consumption (kWh)			
	54,75	80,44	109,20

Fig. 9 - Power consumption of simple STB and STB record function (Personal Video Recorders)

	Simple STB	Simple STB/PVR
Annual power consumption per device (kWh)	54,75	108,976
EU-25 stock of STBs in 2007 in mln	47	2,82
EU-25 annual consumption of STBs (MWh)	2573,250	307,312

Fig. 10 - Annual power consumption of STB's for EU-25¹³

3.5 Growth and Trends

Since the number of STB manufacturers in most EU countries is very low, the production data of these manufacturers is suppressed in the statistical data for reasons of confidentiality. From industrial sources the following figures are available:

¹³ Source: Preparatory studie for Eco-design Requirements of EuPs Simple Digital TV Converters (Simple Set Top Boxes); Page 86;

A growing amount of simple STB's is manufactured in the Pacific Rim area, with by far the largest production base centred in the Republic of China. At present most digital STB's "Made in China" are basic STB's for satellite and terrestrial broadcasting. China produced more than 17 million digital STB's in 2004, which is about 35 % of the total worldwide market. As the demand for DVB-T and DVB-C in both China and the rest of the world increases, the Chinese digital STB production is expected to increase at a rate of 21% per annum and to reach 56 million units by 2010. China is expected to supply more than 50 per cent of the worldwide market for digital STB's by the end of this decade.

When looking at the current development in the simple STB market there are two main different products types:

- Simple STB digital to analogue converter in a plastic box
- Simple STB with HD (Hard Disc) or PVR (Personal Video Recorders) in a steel case cabinet

The simple digital to analogue converter box is the actual low price entrance version for the mass market. The HD/PVR simple STB is the coming standard product that replaces the simple digital to analogue converters and the VHS cassette recorders the same time.

Concerning power consumption of STB's the market development is ambiguous because of lack of prescriptive limits for energy consumption. STBs clearly show the possibilities for intelligent optimisation of the power consumption in On-mode as well as in Standby-mode. The main improvements to be considered are:

- Power efficiency of STB components from chip sets, to power supplies and hard discs (for PVR) in On- and Standby-mode.
- Improvement of software design as it is relevant to energy consumption and power management.

3.6 Manufacturers and Distributors

3.6.1 List of Manufacturers and Distributors

The following table contains a list of the main European manufacturers¹⁴ and/or distributors:

¹⁴ Source: Research and Markets - High-definition Set-top Boxes and Chipsets: The European Market to their offering; (<http://www.researchandmarkets.com/reports/c54346>)

Company	Company
AMD	NEC Electronics
Apple	Philips Consumer Electronics
ARC International	Pioneer
BOCA	Pixelworks
Cisco (includes Scientific Atlanta)	Samsung
Conexant Systems	Schwaiger
Fujitsu	Sony
Kathrein	Telestar
LG Electronics	Technisat
Matsushita (Panasonic)	Toshiba
Motorola	Zoran

Additional information can be found in the annex.

3.7 Data sources and Databases

According to the COMMISSION REGULATION (EC) No 107/2009 of 4 February 2009 for simple set-top boxes of the Directive 2005/32/EC of the European Parliament and of the Council the manufacturers are obliged to provide information for the purpose of consumer information in 2010. Manufacturers have to provide the power consumption in Watt of standby and active modes of the set-top boxes.

Research on the websites of the manufacturers can be done or manufacturers can be asked to provide the product data. No external databases with the necessary information could be found.

4 Topten Selection Criteria

The recommended Topten selection criteria is based mainly on the Ecodesign Study, the approach of Switzerland and a market research. In January 2010 all products must conform to the Ecodesign Directive. Keeping this in mind the recommended values in 4.3 are set lower than the Ecodesign (2010) one but can be fulfilled already by existing products (best available technologies).

4.1 Energy Efficiency Criteria

The recommended efficiency criteria are:

- Energy consumption in stand-by mode
- Energy consumption in active mode (use)
- Automatic power-down function

4.2 Additional features of interest

Quality related product features are:

- Integrated Hard Drive
- 2nd tuner

Further Information to be provided:

- Price and Electricity costs in 10 years (4 hours On-Mode and 20 hours Standby per day)
- Suitability (Information on where STBs could be bought – online/shops)

4.3 Recommendation for Topten value setting

The recommended values are:

	Standby mode	Active mode
Simple STB	max. 1 W	max. 5 W
Simple STB with HD and/or 2 nd tuner	max. 1 W	max. 15 W

Evaluation:

The following values refer to the best available technology at the date of finishing the preparatory study, on the basis of a STB with a basic configuration, an 'automatic power down' function and a hard-off switch.

STB without any additional features:

- Active mode: 4.00 W
- Standby mode excluding the display function: 0.25 W

STB with an integrated hard drive:

- Active mode: 10.00 W
- Standby mode excluding the display function: 0.25 W

As you can see the recommended values are slightly above the best available products on the market.

5 Additional Considerations

For some years power consumption of Simple STB's was not a main target for the majority of STB manufacturers. The main goals were to follow the technological development and to stay competitive in the rapidly growing market. Higher integration of the applied silicon and improvement of the software needed to speed up booting time were more in the focus than energy consumption. At the international fair IFA 2007 (Internationale Funkausstellung) in Berlin a few manufacturers started to display a low power demand of their new products. Unfortunately, the STBs with the lowest power demand in Standby-mode were Complex STBs. For Simple STBs the main improvement visible was a main switch (on/off switch) on the front plate of the device.

The positions of the main stakeholders, during and after the Consultation Forum meetings for the Eco-design Directive can be summarised as follows. There was broad support for the quick introduction of Eco-design requirements for STB's. In the course of the study, the industry had confirmed that the technology for reducing the power consumption of STBs would be available and could be integrated within these devices before the proposed deadlines without additional cost. There was broad support for the limit values proposed by the Commission, although environmental and consumer NGOs and some Member States indicated that these values should be even lower. Given the fact that consumers tend to leave the STBs permanently in active mode, the proposed auto power-down function was considered by stakeholders to be an essential element in the Eco-design requirements for this product group.

The starting integration of digital receivers into TV sets could reduce the environmental burden given by the double number of receivers: the traditional analogue receiver in the TV set and the additional STB as digital to analogue converter. This development would be nullified with the next technological innovation step in digital broadcasting. Since new broadcasting technology would be faster developed than the existing stock of TV equipment could be changed there will be a significant market share for STBs to convert from the respective new broadcasting technology to the available TV equipment.

6 Annex

Table of international manufacturers:

Company	Company
AMD	NEC Electronics
Advanced Digital Broadcast	Neotion
Amino Communications	Netgem
Amstrad	NXP Semiconductor
Apple	Pace Micro Technology
ARC International	Philips Consumer Electronics
ARM	Pioneer
Broadcom	Pixelworks
Cisco (includes Scientific Atlanta)	Renesas Technology
Conexant Systems	Sagem Communication
Coship Electronics	Samsung
Echostar	Sigma Designs
Fujitsu	Silicon Image (Sci-worx)
Humax	Sony
Imagination Technologies	STMicroelectronics
Improv Systems	Tatung
LG Electronics	Tensilica
LSI Logic	Texas Instruments
Matsushita (Elixent)	Thomson
Matsushita (Panasonic)	Tilgin
Micronas (WISchip International)	Toshiba
MIPS Technologies	Vivace Semiconductor
MND	Wegener
Motorola	Zoran