European Commission DG TREN

Preparatory studies for Eco-design Requirements of EuPs

Simple Digital TV Converters
(Simple Set Top Boxes)

Draft Final Report Task 1

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Preface

This Preparatory study on “Simple Set Top Boxes” is in support of the directive 2005/32/EC of the European parliament and of the Council of 6 July 2005. The main objective of the directive is to establish a framework for the setting of eco-design requirements for energy-using products (EuP).

The methodology developed by VHK for the European Commission (MEEUP 2005) is followed.

The report is based on discussions, presentations and documentation from core stakeholders and is made available, for comment and input, to all stakeholders, through the web-site:

www.ecostb.org and www.ecostb.com

All comments and input will be shown to and discussed with the European Commission. They may be shown in the final report without identification of the source unless that is specifically agreed.
Simple Digital TV Converters (Simple Set Top Boxes)

SIMPLE DIGITAL TV CONVERTORS (SIMPLE SET TOP BOXES)

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Introduction

Less than two decades ago Television or TV was synonymous with analogue terrestrial television. As new distribution channels developed, such as satellite TV and cable TV the demand for adaptors to link the new broadcasting technology to the existing TV and VCR equipment started to grow. These converters were the first set-top-boxes to be added to the existing TV-set by the consumer. Set-top-boxes opened the door to new broadcasting systems for the consumer (and to higher electricity bills as well).

The simple set top boxes (STBs) considered in this study 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\textsuperscript{2} predict an end to analogue terrestrial television broadcasting in Europe by 2015, with South-east Europe regions likely to be the last to switchover. At that stage the number of simple STBs 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 genre to provide high functionality to basic television equipment as new broadcasting and home networking technologies emerge.

This study focusses on terrestrial (DVB-T), Satellite- (DVB-S), Cable- (DVB-C) and where relevant IPTV-STBs. The primary purpose of these simple STBs is to allow legacy analogue television equipment to receive basic and additional digital broadcasting services in the transition to full digital television broadcasting. Digital television tuner/demodulators that require an add-on processing platform, such as those in USB stick form factor for personal computers are not part of this study.

\textsuperscript{2} Source EBU and DigiTag
1. Definition

1.1. Product Category and Performance Assessment

The generic product in this preparatory study is the set-top-box. A general definition of set-top-boxes is:

A STB is an appliance for the reception, decoding, processing and local networking of digital broadcasting and related services.

Additional functionalities implemented in a STB could be:

- Conditional Access (CA)
- Networking: examples of networking functions are VoIP and the provision of principal signals for other products
- Recording
- Interfacing
- Return channel (allowing unique user interaction with broadcast content)
- Picture and sound processing.

1.1.1 Existing Product definitions

What is a simple STB and what specifications for simple STBs are used? To define these products, trade categorisations, voluntary and mandatory initiatives, and relevant International test standards were studied. For the definition of simple STBs for this study the following sources are considered the most appropriate: the EU Code of Conduct, the California Energy Commission (CEC), the US Environmental Protection Agency (EPA) for Energy Star and Standards Australia.

The simple STB definition of the EU Code of Conduct:

```
"Simple digital TV converter"
A stand alone device, using an integral or dedicated external power supply, for the reception of (free) Standard Definition (SD) or High Definition (HD) digital broadcasting services and their conversion to analogue RF and/or line signals.

The following components/features are included in the power allowance targets but do not constitute a minimum specification (i.e. they may not be present in the device):

- Tuner/demodulator:
  - Cable version: Single cable tuner/demodulator
  - Terrestrial version: Single RF tuner/demodulator, active antenna powering
  - Satellite version: Single satellite tuner/demodulator, single LNB feed.
- Single MPEG Decoder (SD or HD as appropriate)
- Analogue Composite and Component video outputs
- One Analogue Composite and Component video input
- Stereo analogue audio out
- Stereo analogue audio in
- Support for Off-air Software Upgrade
- Electronic Programme Guide (EPG)
- Operating system support for Interactive Services (e.g. MHEG/MHP/OpenTV etc.);
  no return path
```

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- Timer control facilities
- Auto standby

The simple STB definition of the California Energy Commission (CEC)

“Digital television adapter” (DTA)
A commercially-available electronic product for which the sole purpose is the conversion of digital video terrestrial broadcast signals to analogue NTSC video signals for use by a TV or VCR.

The simple STB definition of the US Environmental Protection Agency for Energy Star:

“Digital television adapter” (DTA)
A DTA receives terrestrial, (over the air) digital signals and converts them to an analogue output suitable for analogue TVs. It does not provide ad digital signal output. The DTA category does not include converters that work with satellite or cable digital signals, nor does it cover devices with multi-functionality such as a DVD player with digital to analogue conversion capability.

The simple STB definition of the Standards Australia:

DTV STB–Free-to-Air (FTA)
A commercially available electronic product with a primary purpose to receive and decode FTA terrestrial digital television broadcast signals, for use by a video display device or a recording device.
The standard distinguishes Standard definition (SD) decoding (the ability to decode video transport streams that are MPEG 2 MP@ML) and High definition (HD) decoding (the ability to decode video transport streams that are MPEG 2 MP@HL).

From these definitions there is no clear identification of a simple STB. What the definitions have in common is that the box should be able to receive digital (television) broadcasting signals (services). The CEC, Energy Star and Australian definitions are restricted to terrestrial broadcasting, and the Australian definition does not indicate that the received signals have to be converted to analogue signals. Both the EU and Australian definitions (explicitly) allow for more functions than the conversion to analogue signals. Furthermore, the EU Code of Conduct and the Australian Standard also provide definitions for (more) complex STBs. In this context the Energy Star definition extends criteria to the reception, though not the output streaming, of high definition broadcast information.

If the definitions and specifications of the simple boxes and the complex are considered, the following conclusions can be drawn. The decisive factor as to whether a box is a complex box or a simple box seems to be the involvement of a service provider: that is a vertical market subscription television service. A complex box comes with Conditional Access (CA) support and the service provider is able to manipulate the functional characteristics of the box. Therefore an initial definition of a simple box appears to be “one that has no conditional access” set of functions that is service provider controlled.
Risk assessment of the definitions

For a workable definition, a risk assessment of the proposal is needed: e.g. is the definition **robust** on the one hand and **flexible** enough on the other hand to be used in regulation? The proposition is that a definition is robust if it cannot be (easily) qualified in the context of the wording of that definition. A definition is flexible if it allows future trends in functionality to be included.

For **robustness** the qualification is, can manufacturers modify the STB design in such way that:

a) the STB does not meet the accepted product definition on which eco-design criteria is based and therefore need not comply with related regulatory parameters

b) the modification costs are less than the costs needed to meet the regulatory criteria.

A closed definition runs high risks of being circumvented by products that have some functionality that is not included in the definition. The CEC definition is closed (by the words ‘sole purpose’) but in this case the risks are minimized because the same definition will be used in a subsidy program and therefore it is not likely that condition b) will be fulfilled.

But also a more open definition, e.g. the EU Code of Conduct, can be avoided by jumping to the next category of functionality, the complex STB. An allowance table makes this more difficult, because adding functionalities from the allowance table does not bring the STB outside the “simple” definition, it merely allows some extra power consumption for the added functionalities. Furthermore, in both the Code of Conduct and the Australian Standard the (total) extra power consumption allowed is limited. So, whatever functionality from the allowance table is added, the total consumption of the STB in standby active mode should not be higher than e.g. 15 W.

However, in principle the naming **simple** suggest that complex boxes exist, which – by definition – will be outside the scope of regulation for simple boxes.

The **flexibility** refers to the question; is the definition flexible enough to cope with functional and technological trends? What is complex today, can be simple tomorrow and in general, regulation can not be changed overnight and should be stable for a longer period, so that it can be used as a design guidance for STB developers and manufacturers.

What are the trends expected for **simple** STBs? In the near future, to take full advantage of the usable lifetime of TVs and video recorders with analogue tuners, simple STBs will be used to enable the reception of digital TV broadcasting. However, it is likely that recording functions will be included and it may have a return channel for interactive applications. The return channel would not necessarily be internet based, it can be PSTN or GPRS. A n important trend in the simple STB will be the move to High Definition television broadcast reception and output. Significant stocks of standard definition simple STBs are likely to be replaced by High Definition versions in the switchover period.
Simple Digital TV Converters (Simple Set Top Boxes)

As the broadcasting infrastructure in each European member state switches from analogue to digital, TVs will have integrated tuners and decoders to receive these broadcasts. The simple STB, marketed with the prime function of converting digital broadcast signals to analogue signals will rapidly become obsolete. STBs that provide many functional features to enhance the basic TV functions will still have a significant market, but as argued later, may usually fall under the definition of a complex STB.

The conclusion regarding the risk assessment on current definitions of simple STBs is, that these are not robust or flexible enough to be used in product categorisation for, say, regulation. Either they are closed and therefore easy to circumvent or they draw an arbitrary line between simple and other (complex) STBs which can become obsolete with technology and market changes.

So how to solve this problem? In the next section a possible solution is provided.

The basic rules for a viable definition are:

1. The STB manufacturer is the addressee of regulation because potential regulation targets tangible products.
2. Regulation should only target those issues that are in the control of addressee (in this case the STB manufacturer).
3. Regulation is to be based on the functionality that is (actually) provided to the end user

Potential consequences of these rules are

1. The functionality that is specified by another party (other than the manufacturer) defines the boundary between simple (regulated) and complex (not yet regulated) STBs. For example: Conditional Access (CA) and always on (AO) functions.
2. The principle of efficient design and efficient components should be supported by means of an allowance table for added functions.
3. Potential (but not used) functions should not qualify.

The availability of conditional access (CA) and STB functions that need to be always on (AO) are important differentiators between simple and complex STB.

So the definition of simple STBs is given by the absence of any conditional access (CA) module. Simple STBs just offer no CA. Throughout this study the products that meet this definition of “Simple Digital TV Converters” are referred to as “Simple STBs”.

There is one problem remaining with this definition: There are - by this definition –simple STBs including hard disks for time shift purposes and there are simple STBs with integrated DVD-player coming to the market. To solve this problem simple STBs with additional components as DVD-players or hard disk, are simple STBs with additional features, i.e. with extra allowances for these features.
1.1.2 Scope of the study
The target of the study are simple STBs, i.e. STBs without conditional access (CA) as explained in the definition above.
The main criterion under review in the study is the energy efficiency of simple STBs. In detail this is influenced by:

- Efficient design and efficient components (to meet power consumption targets) defined by
  - A Basic configuration with a basic power consumption target.
  - An allowance table with additional functions for which additional power consumption is defined. (Functions not covered by the allowance table are assumed to be covered by the basic configuration -unless they involve CA and/or AO functions)

- Power management (the STB is always in the lowest power consumption mode for the required functionality) Power management can encompass:
  - Timer control facilities
  - Automatic standby feature
  (Where CA and AO functions are present they should be inhibited or switched off by power management in a product supplied as a simple STB)

1.1.3 Technical parameters
The technical parameters of simple STBs are shown in the figure below. Figure 1.1 shows a simplified generic block diagram of a typical set top box. Some of the opportunities for power management of these circuit blocks in relation to operational and standby states are reviewed.
The blocks consuming the majority of the power are
  - the main processor,
  - MPEG decoder (often part of the main processor)
  - RF front-end and the
  - power supply / power distribution itself.
In the simple STB the return path Modem and Conditional Access are (subject to definition) not relevant.
**Block 1: MPEG Decoder Main Processor**

In standby no TV picture is required so the MPEG decoder (along with D-A conversion and composite video encoding) can be disabled to reduce power consumption. Increasingly, this MPEG decoding to output streaming (digital and analogue output interfaces) is an integral part of the main processor. The choice of software architecture can also have significant impact on energy consumption.

**Block 2: RF front-end**

In the Standby-passive state the RF front-end can be disabled or put into sleep mode. This also applies to two or more RF Tuners in STBs with integral storage. Where the STB automatically comes out of standby to download data it may be possible to reduce clock frequency to save power if processing data with a low symbol rate.

**Block 3: Power supply and power distribution**

In the standby mode, where there is no self powered auxiliary microprocessor control unit (MCU) an internal power supply will still be active. For STBs using an external power supply, this will always be active and must have good energy efficiency characteristics. Power supply conversion efficiency at light load becomes important both in external and internal supplies.

**Block 4: Digital I/O and Modem**

Where required these circuits may be idle for much of the time, even when the rest of the STB is fully active.
1.2. Test standards

This section of Task 1 reports on the investigation of those standards, relevant to the measurement of the environmental performance of digital television STBs and approved by Internationally recognised standardisation bodies, or where relevant Industry Associations. The Internationally approved standards often share ratification and are published as European Standard/Norme (EN) and International Electrotechnical Commission Standard (IEC) under a common reference number and title.

A typical test regime for a digital television STB to be brought to the European market encompasses three categories of Test Standard:

- those relating to power consumption
- those relating to health and safety
- those qualifying electromagnetic compatibility.

Not all of the testing according to these standards is mandatory. A recent example of the compulsory or client specific standards testing regime for a current STB product from a major European manufacturer\(^4\) is:

**Safety**

[IEC60065:2001]
[EN60065:2002] Audio, video and similar electronic apparatus - Safety requirements

**EMC**

[CISPR 13:2001 + A1/03]
[CISPR 22:1997 + A1/00 + A2/02]
[EN 55022:1998 Class B + A1/00 + A2/03] Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
[CISPR 20:2002 + A1/02]
[CISPR 24:1997 + A1/01 + A2/02]
[IEC 61000-3-2:2000]
[EN 61000-3-2:2000] Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16A per phase)

\(^4\) Pace Micro Technology plc.
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[IEC 61000-3-3:1994 + A1/01]
[EN 61000-3-3:1995 + A1/01] Electromagnetic compatibility (EMC) Part 3: Limits Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current * 16A per phase and not subject to conditional connection

*Surge Testing*

[EN 55024] Surge testing

For the purposes of this preparatory study only the standards directly relating to environmental performance as defined in the MEEUP methodology are considered relevant and these are specifically for power consumption testing.

International standards;

The scope of the standard is the measurement of electrical power consumption in the Standby mode. The standard is not limited to consumer electronics. Useful guidance is given on metering requirements and methodologies for low power measurement. This standard is currently under review.

*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 of measurement of the power consumption of digital terrestrial, digital cable and digital satellite STBs and the definition of the different modes of operation relevant to the power consumption. Test conditions and signals are covered in detail but the methodology does not extend to STBs with integrated recording or DVD playback capability.

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. CEA-2013 defines maximum background mode (SLEEP state) energy consumption of basic digital STBs, whose primary function is video reception and delivery. SLEEP state energy consumption is important since Digital STBs spend large amounts of time in this state when consumers are not watching television. CEA-2013 also provides a detailed SLEEP state power measurement specification and procedure, which is included in Annex A. CEA-2013 Annex A can be used as the test method for specifying SLEEP state power of any STB, including types with advanced features. Measurement methods defined in CEA-2013 are applicable to both basic and advanced STB types.
Since the three standards mentioned were developed with different working group briefs, it is worth summarising and comparing the key operating modes and test conditions.

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

<table>
<thead>
<tr>
<th>EN/IEC 62301</th>
<th>IEC 62087</th>
<th>CEA-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature: 23 degrees +/-5 degrees C.</td>
<td>Temperature: 15 to 35 degrees C with 20 degrees C preferable.</td>
<td>Temperature: 22 degrees C +/-4 degrees C.</td>
</tr>
<tr>
<td>Instrument accuracy: 10W or less, 0.01W. 10W up to 100W, 0.1W. Greater than 100W, 1W.</td>
<td>Instrument accuracy: Not given</td>
<td>Instrument accuracy: Resolution to be 0.1W or better. True power watt meter preferred.</td>
</tr>
<tr>
<td>Not specific to STBs but detailed methodology on low power measurement</td>
<td>Specific to digital television STBs with detailed coverage of test signals and external loads</td>
<td>Specific to digital television STBs includes Treatment of parasitic peripherals, such as LNBs and security cards</td>
</tr>
</tbody>
</table>

As a reference for tests available, the results of four test runs by Stiftung Warentest concerning STBs are displayed below with their relevant results.

Satellite STBs November 2005 (STBs as they were available in Germany in 2004.)

<table>
<thead>
<tr>
<th>STB</th>
<th>1</th>
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Terrestrial STBs (DVB-T) March 2006

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Satellite and cable (c) STBs (DVB-S / DVB-C) November 2006

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Terrestrial STBs (DVB-T) March 2007

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1.3. Existing Legislation and Voluntary Agreements

1.3.1 European Legislation

There are four European Community Directives covering relevant for simple STBs:

- Directive 2002/96EC (WEEE)
- Directive 2002/95/EC (RoHS)
- Low Voltage Directive (LVD) 73/23/EEC

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### 1.3.2 Eco-Labelling and National Programs for energy efficient Set-top Boxes

The following table displays the programs on efficient STBs and related eco-labelling projects, the respective requirements and the target dates.

#### National Programs for energy efficient Set-top Boxes and related equipment

<table>
<thead>
<tr>
<th>Country</th>
<th>Programme</th>
<th>Scope</th>
<th>Summary of requirements</th>
<th>Program Type</th>
<th>Date</th>
</tr>
</thead>
</table>
| Australia                | Australian Greenhouse Office                   | Standard definition converter for terrestrial signals | Max Passive Standby: 1W or 2W  
Max Active Standby: 8W or 7W +Fas to limit of 15W  
Max Active/on: 8W or 7W +Fas to limit of 15W  
Other: Minimum Energy Performance Standards (mandatory) | Targeted for 01.10.2007                         |
|                          |                                                | High definition converter for terrestrial signals    | Max Passive Standby: 1 W or 2 W  
Max Active Standby: 12 W or 11 W + FAs to limit of 19W  
Max Active/on: 12 W or 11 W + FAs to limit of 22W  
Other: Minimum Energy Performance Standards (mandatory) | Pre-publication date 2008  
Effective date TBD         |
| Canada                   | Energy Efficiency Regulations                  | Simple digital-to-analogue converter box for terrestrial signals | Max Passive Standby: 1 W  
Max Active Standby: 8 W  
Other: Minimum Energy Performance Standards (mandatory) | Targeted for end of 2007                        |
| China                    | China Standard Certification Center (CSC/CECP)  | Simple STBs (Cable only)                             | Max Passive Standby: 1 W  
Max Active Standby: 8 W  
Other: Minimum Energy Performance Standards (mandatory) | Targeted for 2008                        |
| China                    | China National Institute of Standardization (CNIS) | To be determined                                    | To be determined                                               | Minimum Energy Performance Standards (mandatory) | Targeted for 2008 |

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9) SOURCE: IEA International Workshop on Energy Efficient Set-Top Boxes Paris 2007,  
CSC: Technical Specification for Energy Conservation Product Certification for Digital Cable Receiver Decoders (STBs) and others.  
10) CECP was reorganized into the China Standards Certification Center (CSC) in 2004. Both names are still available.
### Simple Digital TV Converters (Simple Set Top Boxes)

<table>
<thead>
<tr>
<th>Country</th>
<th>Programme</th>
<th>Scope</th>
<th>Summary of requirements</th>
<th>Program Type</th>
<th>Date</th>
</tr>
</thead>
</table>
| EU            | European Code of Conduct for Digital TV Services | Complex STBs                 | Max Passive Standby: 3 W  
Max Active Standby: 7 W (C)  
Max Active/on: 8 W (C)  
Other: 6 W (T, D)  
6 W (S) + FAs to limit of 15W | Voluntary Agreement | Current to 31.12.2007 |
|               |                                                | Digital TVs with integrated receiver and decoder | 1.5W  
8 W (C)  
7 W (T)  
9 W (S) + FAs to limit of 16W | Voluntary Agreement | Current to 31.12.2007 |
|               |                                                | Analogue PVR                 | 3 W  
6 W | Voluntary Agreement | Current to 31.12.2007 |
|               |                                                | Simple STBs (no CA)          | 2 W  
7 W (C, T, D)  
10 W (S) | Voluntary Agreement | Current to 31.12.2007 |
|               |                                                | Simple STBs (High Definition TV) – SD o/p | 2 W  
11 W (C, T, D)  
14 W (S) | Voluntary Agreement | Current to 31.12.2007 |
|               |                                                | Simple STBs (High Definition TV) – HD o/p | 2 W  
12 W (C, T, D)  
15 W (S) | Voluntary Agreement | Current to 31.12.2007 |
| GEEA 11       | Group for Energy Efficient Appliances (Reference: CE03-2007) | Digital to analogue converters (simple converter boxes) | 2 W# or less  
Terrestrial 7 W (,+ 4##) W or less  
Cable 7 W (+ 4##) W or less  
Satellite 1 W (+ 4##) W or less  
(+ 4###) W or less  
(+ 2###) W or less | Voluntary Agreement | Current to 31.12.2007 |
| Korea         | Energy Boy Standby Power Program               | TV with integral pay TV set-top box | 8 W  
8 W + FAs to limit of 15W | Endorsement Label | Replaces current requirement from 01.7.2007 |
|               |                                                | Simple digital-to-analogue converter box for terrestrial signals | 1 W  
8 W + FAs to limit of 15W | Endorsement Label | Replaces current requirement from 01.7.2007 |
|               |                                                | Pay TV set-top box box (optional) | 1 W  
8 W + FAs to limit of 15W | Endorsement Label | Replaces current requirement from 01.7.2007 |

11) GEEA Group for Energy Efficient Appliances

## The allowance of 4 W is for simple converters for High Definition TV services (both Standard Definition and High Definition output).

### If the DSL box includes the ADSL modem then there is an additional 2 W allowance in on mode (this allowance is valid only for DSL boxes)
### Simple Digital TV Converters (Simple Set Top Boxes)

<table>
<thead>
<tr>
<th>Country</th>
<th>Programme</th>
<th>Scope</th>
<th>Summary of Requirements</th>
<th>Programme Type</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switzerland</td>
<td>Swiss Federal Office of Energy</td>
<td>Same as EU Code of Conduct</td>
<td>Endorsement Label</td>
<td>Current: 01.1.2006</td>
<td></td>
</tr>
<tr>
<td>Taiwan</td>
<td>Standby Power Promotion Alliance</td>
<td>Set Top Box 2W</td>
<td>Voluntary Agreement</td>
<td>By 2008</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>Energy Star</td>
<td>Simple digital-to-analogue converter box for terrestrial signals (DTA)</td>
<td>1W</td>
<td>Automatic power down</td>
<td>Endorsement label</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set top boxes other than DTAs</td>
<td>To be determined</td>
<td></td>
<td>Proposed effective date: 01.6.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>National Telecommunications and Information Administration (NTIA)</td>
<td>2 W</td>
<td>Automatic power down</td>
<td>Criteria for national subsidy of US$ 40 per STB (max 2 per household)</td>
</tr>
<tr>
<td>UK</td>
<td>Energy saving Trust</td>
<td>Simple STB (DTA) for Terrestrial Digital TV MPEG 2 SD output</td>
<td>2007 - 2.7W 2009 - 1.7W 2010 – 1.0W</td>
<td>Automatic Power Down</td>
<td>Endorsement Label</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Simple STB (DTA) with HDD recording capability</td>
<td>2007 – 3.0W 2010 – 1.0W</td>
<td>Automatic Power Down</td>
<td></td>
</tr>
</tbody>
</table>

### 1.4. Conclusions
- Following the definition process for simple STBs the focus of the study is on set-top-boxes with no conditional access (CA) and no always on function (AO). Simple STBs with additional features such as DVD playback and/or hard disks are covered as well.
- Subject to stakeholder input, it is argued that Digital Video Recorders (DVR - or sometimes called DTR) with an integrated digital television receiver, that record to a standard removable library medium, are not within the scope of the study and represent a specific product genre other than STB.
- Simple STBs are only an intermediate product class that is likely to end production shortly after the implementation of digital broadcast systems throughout Europe is completed.
- The simple STB product is already produced in large volumes at very low market entry point pricing. Chinese manufacturers are likely to carry the main share of this production in the lifetime of the product genre. It is important that the energy efficiency criteria for these
Simple Digital TV Converters (Simple Set Top Boxes)

products has better International Harmonisation, to ensure that the cost benefits of volume production to a common standard, are invested in efficient design and components. Close co-operation with the Chinese certification body CSC/CECP is an important preliminary recommendation to target a narrow window for Internationally harmonised standby mode, on-mode and additional function power requirements.

- The expected lifetime of first generation simple STBs is likely to be short by comparison with other CE products. They will be disposed of when the legacy analogue product they support is replaced by a TV with an integrated digital reception platform or when more functionality is required in the STB such as high definition broadcast reception, recording capability and DVD playback capability. These higher functionality products may prolong the lifespan of the product well beyond the end of the analogue switch off timetable for Europe. This is an important consideration in the assessment of the principle environmental impact of the product – the demand on electrical energy.