Appliances Guide
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Energy efficient Televisions

Country

South Africa

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1 Country-wide saving potential

TVs

About **13.5 million** TVs are in use in South Africa (reference year 2010). The average annual consumption of each of these TVs amounts to about **230 kWh**. In total, this causes an annual electricity consumption of **3.1 TWh**. As model calculations show, enormous efficiency improvements can be achieved, especially if old inefficient models are replaced by modern efficient ones. The calculations of the efficiency scenario are based on the assumption that every time a new TV is bought, the most efficient "Best Available Technology" (BAT) model is chosen and that the improvements of the most efficient models over the years are taken into account. By this means, even an absolute decoupling of the annual energy consumption and the increasing stock of TVs can be achieved. While the stock is expected to grow by 22 % between 2010 and 2020, in the efficiency scenario the energy consumption can be reduced by 25 %. Although the stock is expected to grow by another 27 % until 2030, in the efficiency scenario the energy consumption can be further reduced by 65 % (Figure 1). Thereby, higher living standards (e.g. increasing appliance ownership rates and household numbers) have been anticipated. In contrast, in the baseline scenario with moderate efficiency gains the energy consumption would still increase by 12 % by 2020 before the energy consumption can be reduced between 2020 and 2030 by 26 % (cf. 65 % in the efficiency scenario).

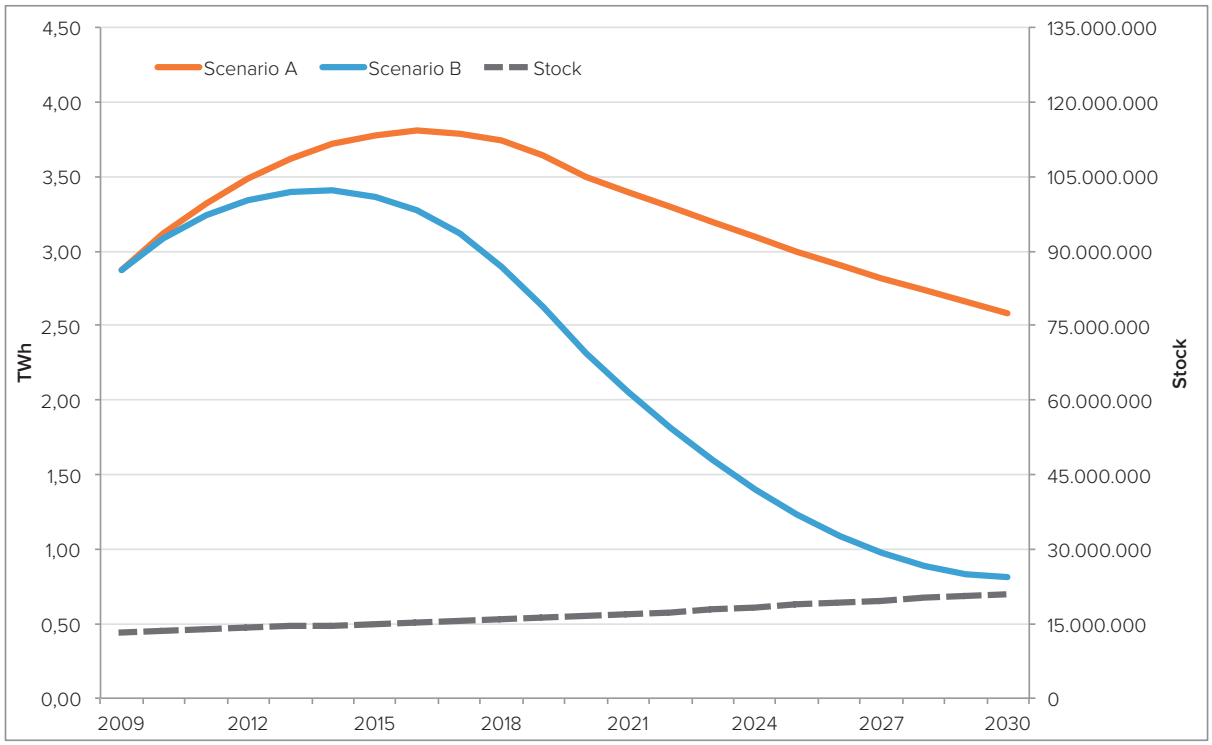

Figure 1: Electricity consumption TVs, Baseline Scenario (A) vs. Efficiency Scenario (B)

Source: Wuppertal Institute (2015)

Table 1: Country-wide saving potential 2010 - 2030: TVs

Base year 2010	Total energy consumption of TVs per year [TWh/year]	3.12
	Stock number TVs	13,500,000
	Average annual energy consumption of TVs in the stock [kWh/year]	231
	Total annual CO_2eq emissions related with TVs [Mt/year]	2.1 1
2020	Energy savings potential in 2020 vs. baseline development [TWh/year]	1.18
	Resulting change in energy consumption 2020 vs. 2010 [TWh/year]	-0.81
	CO_2eq emission reduction potential vs. baseline development [Mio.t/year]	0.78
	Stock number of TVs in 2020	16,500,000
	Average annual energy consumption of new TVs (all BAT) in 2020 [kWh/year]	50
	Total incremental investment costs [not discounted] until 2020 (end-user perspective) [€]	610,879,963
	Total incremental investment costs [not discounted] until 2020 (societal perspective) [€]	535,859,616
	Total economic benefit until 2020 [not discounted] (end-user perspective) [€] scenario B vs. scenario A	-105,836,530
	Total economic benefit until 2020 [not discounted] (societal perspective) [€] scenario B vs. scenario A	-330,984,745

2030	Energy savings potential in 2030 vs. baseline development [TWh/year]	1.77
	Resulting change in energy consumption 2030 vs. 2010 [TWh/year]	-2.31
	CO_2eq emission reduction potential vs. baseline development [Mio.t/year]	1.15
	Stock number of TVs in 2030	21,000,000
	Average annual energy consumption of new TVs (all BAT) in 2030 [kWh/year]	30
	Total incremental investment costs [not discounted] between 2021 and 2030 (end-user perspective) [€]	711,018,000
	Total incremental investment costs [not discounted] between 2021 and 2030 (societal perspective) [€]	623,700,000
	Total economic benefit until 2030 [not discounted] (end-user perspective) [€] scenario B vs. scenario A	883,210,950
	Total economic benefit until 2030 [not discounted] (societal perspective) [€] scenario B vs. scenario A	-33,063,580
Lifetime data for TVs purchased in the analysed timeframe	Total electricity savings, scenario B compared to scenario A [TWh]	29.88
	Total GHG emission reductions scenario B compared to scenario A [Mt]	19.51
	Total incremental investment costs [not discounted] (end-user perspective) [€] scenario B vs. scenario A	1,321,897,963
	Total incremental investment costs [not discounted] (societal perspective) [€] scenario B vs. scenario A	1,159,559,616
	Total economic benefit [not discounted] (end-user perspective) [€] scenario B vs. scenario A	1,563,383,096
	Total economic benefit [not discounted] (societal perspective) [€] scenario B vs. scenario A	338,616,780

Source: Wuppertal Institute (2015)

2 Subtypes and markets

Televisions are categorised as essential appliances by all income groups and, with few exceptions, a TV is one of the first three electronic appliances that a household will purchase. The country also has high daily viewing rates by international norms of above 4 hours per day. The global TV market is highly competitive and new models are constantly being introduced with new innovations offering ever improved viewing and features. In 2014 the global market is transforming from LCD to LED as the new market standard. These TVs are very efficient compared to their predecessors but South Africa has large stocks of previous generation technology, such as CRT and LCD, which are less efficient. TVs are omnipresent in modern society with many homes having multiple TV sets in the house and the same products can also be found in restaurants, coffee shops, bars, offices and shopping centres.

South Africa has a long history of appliance manufacturing and the first large appliances (electric stoves) were manufactured in 1932. Refrigeration came soon after and other domestic appliances such as gas stoves, washing machines, tumble dryers followed. Historically there was a limited number of locally manufactured mass produced appliances available to the middle to lower income groups while the high income groups were typically serviced by European imports. With the new democratic Government and the onset of globalisation in the mid-1990s several South African companies have shut down their manufacturing plants but still two remain in 2014.

However, televisions (TVs) are not manufactured in South Africa but several companies import components and assemble units locally. TVs are not classified under large residential appliances and fall under ‘audio visual’. This sector of the market is made up of specialist brands as well as ‘value’ or second tier brands, which are not necessarily household names. TVs are not subject to any tax or import duties [1].

As recently as the late 1980’s the country’s electrification rate for residential households was around 35%, whereby almost all white households had electricity and the electrification rate of non-white households was extremely low. An electrification programme was implemented in the early 1990’s and by 2001 the electrification rate had increased to 61 % [2] and by 2011 it was 83 % [3]. By the late 1990’s the country’s electrification programme expanded the market for electrical appliances by an estimated 50 % [4]. The national electrification programme had a profound impact on ‘essential’ appliances and televisions were, and still are, one of the first electronic devices a household will buy along with refrigerators and ovens.

The country's significant income inequality means that the middle to lower end of the market chooses appliances almost exclusively based on price and brand. These appliances generally have less functionality and are typically higher consumers of electricity. Conversely, upper income households choose their appliances based on functionality, design, brand, guarantees and after sales service, aesthetics and to a lesser extent and only more recently on their energy consumption. This income inequality also means that the middle to lower income groups categorise their appliances as 'essential' and 'non-essential'.

Market Characteristics

There is a large selection of TVs available on the market with several technology types. A brief description of the main ones is given in Table 2.

Table 2: TV types

Type and Description	General Advantages and Disadvantages
The original television, a Cathode Ray Tube (CRT) consists of a vacuum tube and electron guns (consisting of a cathode, control grid and focussing anode), internal electrostatic deflection plates, and a phosphor target	• Most widely available and affordable • Proven to last longer than plasma and rear projection technologies and is maintenance free • Quality of the screen, images and colour saturation are on par; the brightness is still ideal and the contrast features are considered high quality • Ambient light compromises image quality less than with other technologies. • Wider viewing angles with convex compared to flat screen. • Heavy and bulky shapes and take up a lot of space in comparison to thin and wall-mountable flat panels. • Resolution is not as good as other technologies. • Size limitations, also concerning high energy consumption
Rear Projection TV (RPTV) uses a projector to create a small image from a video signal behind the screen and using a bright beam of light, magnifies this image onto a viewable screen. There are four types of RPTVs: CRT: Same as CRT set, but the image is projected to overcome the size limitations of a normal CRT. LCD (Liquid Crystal Display): A lamp transmits light through a small LCD chip	• Suitable for "home theatre" systems and available in large sizes (up to 203 cm) • Initially less costly than other early flat screens • Light weight and thinner than CRTs • Integrated audio surround sound system • Limited viewing angles; picture dims with movement horizontally and vertically movement from the centre • Reflection of ambient light might create a problem • Compared to other flat screens, requires more physical space • Initially the only way for consumers to watch on large

made up of individual pixels to create an image DLP (Digital Light Processing): A digital micro-mirror device (DMD chip) is used to create an image. LCoS (Liquid Crystal on Silicon): Similar to DLP projectors; however, it uses liquid crystals instead of individual mirrors.	screens • All manufacturers stopped producing this technology in 2012
Plasma TV. Each pixel in a plasma display is made up of three cells comprising the primary colours of visible light. Varying the voltage of the signals to the cells allows the perception of different colours.	• Thin, light weight and more portable than RPTVs and CRTs. Wall mountable and the first available mainstream flat TVs • Image quality is good, but inferior to best LCD • Available in very large screen sizes • Reliable and long life expectancy but high energy consumption • Ambient light does not have a major effect on quality and reflection is minimal • Good viewing angles and integrated audio system • Costly, though less expensive than certain high-end LCDs • Manufacturers started exiting the market in 2013
LCD TVs are electronically-modulated optical devices made up of any number of pixels filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images. (CCFLs)	• Thin, flat and light weight and more portable than RPTVs and CRTs. Wall mountable. • Reliable with long life expectancy • Better viewing angles than rear projection TV • Integrated audio system • CCFL backlight contains toxic Mercury, which makes an adequate disposal even more relevant • Manufacturers started exiting the market for CCFL TVs and switch to LED backlit TVs
LED TVs (Light Emitting Diodes as backlight instead of CCFLs)	• Produce an image with greater dynamic contrast and provide a wider colour range • Can be extremely slim, but this may affect integrated sound-system quality (Buyers may opt for external sound bars, which add to energy consumption) • The absence of mercury in the backlight improves environmental credentials (Safer disposal options) • Lowest power consumption of all present mainstream TV technologies.

	• Becoming the new standard as CCFL LCDs are starting to decline • Characterized by rapid innovation steps, offering already e.g. mega sizes, Ultra high definition (UHD), 3D, SMART (internet enabled) and curved designs • Organic LED (OLED) is the latest innovation and destined to be the most advanced and efficient near-future technology.

The energy consumption of TVs is as follows, from most to least efficient (assuming similar screen sizes):

1. (O) LED
2. LCD
3. CRT
4. RPTV
5. Plasma

Televisions are in high demand and available in appliance stores, large supermarkets, hardware stores, general retailers and directly over the Internet. The TV market sector is very competitive and new models can have a lifespan of only a few months on the market. Television sales peak during the December holiday season and buyers from large discount stores often import large quantities which are sold at discount prices. Consumers from the middle and upper income groups are brand conscious, so significant effort is put into making brands recognisable and trusted.

The start of digital terrestrial TV broadcasting in South Africa has experienced numerous delays and thus, at the beginning of 2015, broadcasting is still in analogue format. The country is planning and preparing itself to migrate from analogue to digital broadcasting. Digital broadcasting is far more efficient, allows better picture and sound quality, has capability for enhanced applications (such as electronic programme guides) and ultimately has the potential to increase the amount and variety of television content as well as to increase consumer choice, with many different economic spin-offs. Southern African countries have committed to completing the digital migration process by June 2015. If they have not done so by that date, they will not benefit from protection against signal interferences. International experience has shown that two of the critical key factors for digital migration are 1) affordable digital TVs; and 2) consumer awareness and availability of so-called “set top boxes”, in order to view digital television signals on still existing analogue television set. The purpose of the set top box is to convert the (DTT) signal for reception on an analogue television set. This is different to set top boxes in the Pay TV environment, where the set top box is additionally integral to ensure that only authorised subscribers are able to view the encrypted service. In the free-to-air environment, its function is simply that of a digital tuner as temporary measure pending the broad availability of television sets with integrated digital tuners (“IDTV”). If consumers haven’t acquired at least such a set top box (or IDTV) by analogue switch-off, they will no longer be able to view the existing terrestrial television broadcasting services. [5]. However, any required set top boxes will add as further electricity requirement to digital and non-digital TV viewing, during operation and standby.

Penetration Rates and Sales

As mentioned, TVs are purchased with high priority across all income groups and even for the lowest income category of households in South Africa with an electricity connection only electric hotplate stoves have a higher penetration (22 % versus 34 %). Many more affluent households have even more than one set. Figure 2 shows the penetration rates of TV across all households and Figure 3 the annual sales as a percentage of households. Television sales are estimated at between 1.1 [6, 7] and 1.6 [8] million units per annum and, as is evidenced by the range of values, sales are very sensitive to economic conditions and disposable income. A significant percentage of total TV sales are also for non-residential applications, which include shops, hotels, places of entertainment and offices.

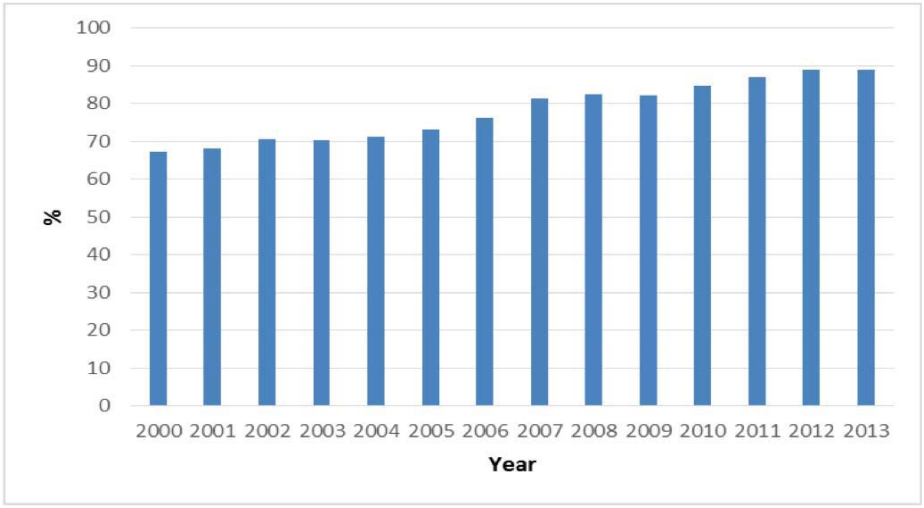

Figure 2: Penetration rate of TVs in SA households 2000 - 2013 (%)

Source: AMPS

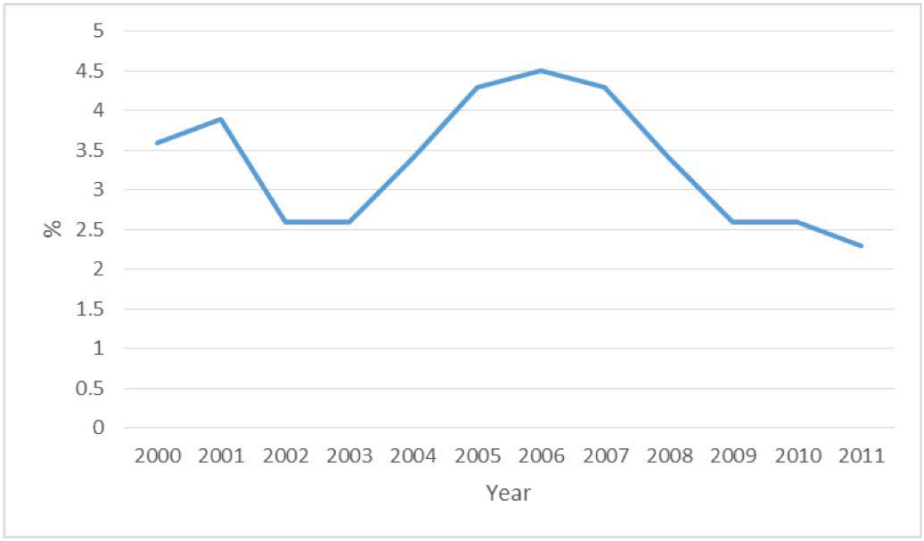

Figure 3: Annual Sales as a Percentage of households 2000 - 2011

Source: AMPS

TV Market – 1995

First interest in energy efficient appliances in South Africa dates back to 1995, when a cost benefit analysis [9] was undertaken by the Department of Minerals and Energy. The study identified the major appliances found in households, such as refrigeration, electric hot water heaters and washing machines. However, this study did not consider TVs and also no electricity consumption figures were included in the appliance labelling study undertaken by the Department of Minerals and Energy in 2003. [10]. Nevertheless, it can be reasonably assumed that the majority of TVs at this time were CRT.

TV Market – 2010

A study undertaken by the Department of Trade and Industry [11] in 2011 aimed to quantify the impact that a mandatory standards and labelling programme would have on the local manufacturing industry. The study surveyed the market and identified the number of models and where possible each models energy class for 12 appliance groups that were selected for the upcoming S&L programme. Although TVs were one of the appliances which were identified by the South African government, this study was limited to the standby energy consumption being capped at 1 W and thus, did not include TV energy consumption during operation. As a result TVs were de facto not considered in the study and no data is available from this time period.

TV Market – 2014

Table 3 gives the number of TV models available in the South African market. The data was sourced from popular online shopping websites[1]; manufacturer websites and data supplied by manufacturers themselves. Although it is not a complete list, with over 800 models it is considered to cover the majority of the market in South Africa. With such a large number of models to choose from, the market is very competitive and consumers are often spoiled for choice. Out of the 810 models only 344 models provided details regarding their standby energy consumption, 318 for their operating power and only few provided an energy class.

Table 3: Unit sales by format ('000 units) in 2014

Category	Models	< 1 W	> 1 W	Size (inches)	Energy class (if provided)
CRT	19	0	0	< 30: n = 19	
Plasma	97	49	0	≤ 40: n = 2; > 42: n = 95	B: n = 4
LCD	183	63	7	≤ 40: n = 107; > 42: n = 70	
LED	510	225	0	≤ 40: n = 178; > 42 ≤ 55: n = 253; ≥ 55: n = 79	A+: n = 8; A: n = 4; B: n = 2
OLED	1	1	0	55	

[1] www.pricecheck.co.za and www.shopmania.co.za

Market Trends

South Africa has been in an economic downturn since 2008 and continues to experience sluggish growth. In October 2014 the Minister of Finance revised annual economic growth down to 1.4 % from a forecast of 2.7 % in February 2014 [12]. The duration of these tight economic conditions and the steep rise in electricity tariffs over the same period has had a significant impact on household disposable income. Electricity tariffs more than tripled over the four-year period 2008 - 2012 and will continue to rise at an average of 12 % per year from 2014 to 2018. The consequence is that consumers of household appliances look for '*value offerings*' and it is unclear whether consumers have understood the '*value proposition made by energy efficient appliances'* [13].

The traditional decision making criteria - price, brand, guarantees, after sales service, design and aesthetics - still dominate. However, the combination of the Government's intention to introduce a mandatory Standards & Labelling (S&L) programme in 2015 and manufacturers realising that consumer awareness and understanding of energy efficiency is growing has elicited a response. Manufacturers surveyed have confirmed that - for the appliances that are to be included in the Government's S&L programme - their products meet the MEPS and would like to see the programme come into effect as soon as possible.

As TVs do not fall directly under the 2015 S&L programme (as there is only a MEPS for standby power), little attention has been given towards promoting efficient TVs. In truth, the rapid technological changes being witnessed in the market have reduced consumption, which have been in particular driven by international energy efficiency standards. So even though TVs available in South Africa are becoming more energy efficient little effort has been put towards marketing them as such or raising awareness amongst consumers. E.g., during data gathering, a conversation regarding the general availability of energy efficient TVs with a major retail store representative was completely misunderstood with the response being about power surge protection, which shows that there is obviously little awareness related to this topic among sales personnel.

As can be seen in Figure 4 and Figure 5, energy efficiency is typically only included by the manufacturers as one of multiple features of a TV, but without providing a context or more specific information, which the consumer can actually use for an informed purchase decision. South African retailers focus instead mainly on price and credit facilities (Figure 6). Actual labelling with reference to energy was found on only three of the more than 50 TVs on display in the analysed retail store.

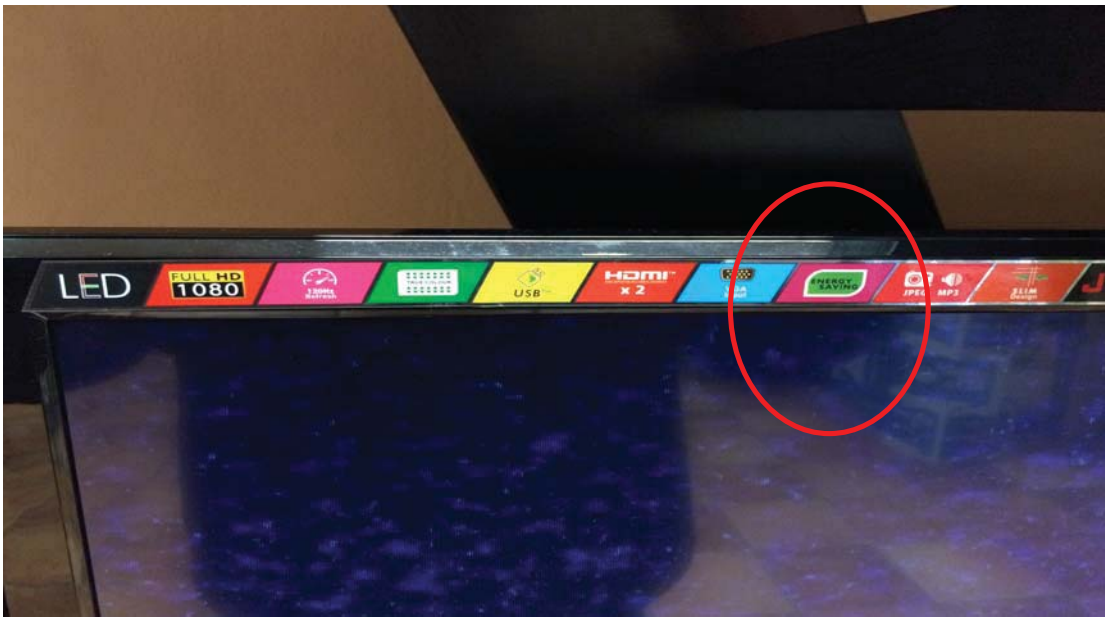

Figure 4: Manufacturer's Label promoting ('Energy saving') features

Source: Photos taken by Theo Covary (2015)

Figure 5: Manufacturer's Label promoting ('Energy saving') features

Source: Photos taken by Theo Covary (2015)

Figure 6: Retailers focus typically solely on price

Source: Photos taken by Theo Covary (2015)

The analysis by on-site visits to several South African retail stores found LCD and LED TV formats readily available in large stock quantities and in many different shapes and sizes as shown in Figure 7. No CRT, RPTV and Plasma models were found anymore, but it is assumed that remainders of CRT and Plasma TVs may be still available in smaller towns, where price plays an even bigger role. The number of LED models in Table 3 shows clearly that the country is in the advanced process of transforming from LCD to LED TVs and this is also evident at the retailer shop floor. Innovation in the TV market is high and manufacturers are constantly introducing new features, technology and sizes to gain an advantage over their competitors.

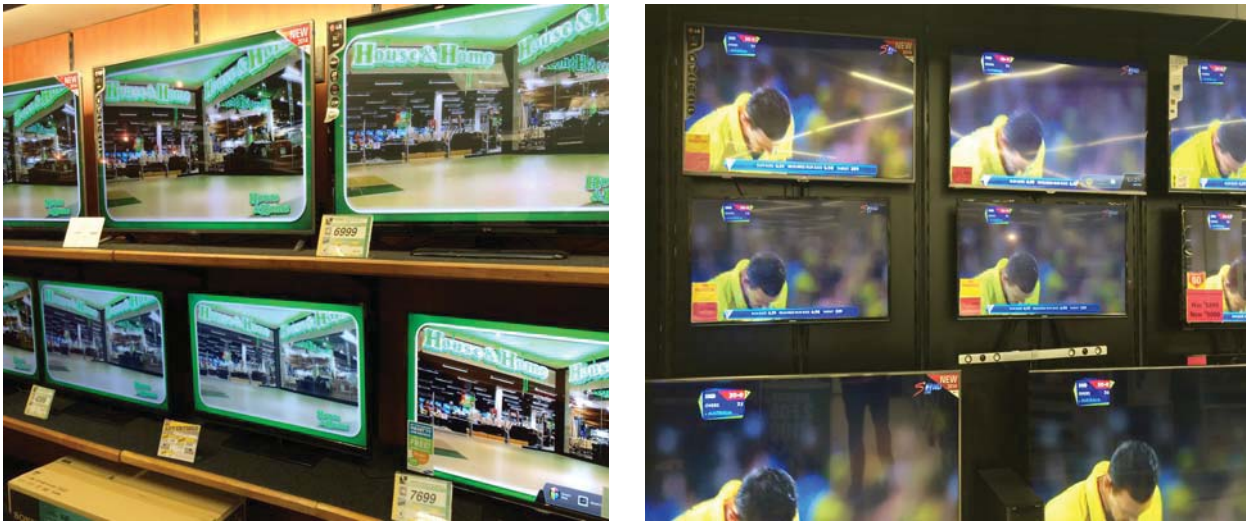

Figure 7: LED and LCD TV on display in South African retail stores

Source: Photos taken by Theo Covary (2015)

Summary of the TV market in South Africa:

- Electricity tariffs in South Africa were amongst the lowest in the world in 1995, thus there was little demand for energy efficient appliances. However, tariffs have tripled over the four years period 2008 - 2012 and households paid around EUR 0.10/kWh in 2014. Additionally, the South African electricity regulator has agreed to a further annual 12 % tariff increase for the period 2014 to 2018.

- During the 1990's South Africa had low electrification rates. A priority of the new Government was to electrify all households, which it has largely achieved. The percentage of households that used electricity for lighting went from 58 % (1996) to 80 % (2007). This programme created a new market for manufacturers of electric appliances and the growth rates were high for the period 1995 - 2005. It is unlikely that these growth rates are sustainable for the period 2014-2030. The country's electrification programme is particularly relevant to the TV market as it has a generally high penetration rate in households.

- As TVs are mostly imported or only locally assembled from imported components, introducing a MEPS will have no impact on the local manufacturing industry.

- Replacement cycles of TV are estimated to be every 10 years, but in reality this number has decreased in recent years significantly, as technology improvements are made and prices decrease. However, still working replaced units generally find themselves in lower income households where they start a new life. Therefore an average technical lifetime of 10 years remains reasonable.

3 Efficiency range and user savings

TVs are popular across all income groups and the number of hours spent in front of TVs is high. In South Africa the average hours watched per day is 4 [14]. Typical TV sizes have increased over the years as technology has improved and consumers have responded to this innovation. The improved energy performance of TVs is thus offset to a certain extent by the significantly increasing average screen size and additional functionalities.

Table 4: Efficiency range and user savings of TV, based on 2014 data

Level	Typical appliance in the stock (over all appliances in use)	Typical inefficient appliance on the market.	Typical appliance purchased (BAU – Business As Usual)	Best Available Technology (BAT)	Expected future BAT (Best not yet Available Technology)
Typical Capacity / Size	30 inch	42 inch	42 inch	42 inch	50 inch +
Category	N/A	N/A	N/A	N/A	N/A
Type	CRT	Plasma/RP	LCD	LED	OLED
Lifetime (years)	10	10	10	10	10
Qualitative performance classification of the provided service:	☐ Poor ☐ Low ☒ Average ☐ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☒ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☒ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☐ Good ☒ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☐ Good ☒ Excellent ☐ No information

Yearly energy consumption: *electricity (kWh)*	120	285	250	95	50
Yearly energy cost (ZAR)	180	430	375	140	75
If applicable: yearly energy consumption for further energy carriers	N/A	N/A	N/A	N/A	N/A
If applicable: yearly water consumption	N/A	N/A	N/A	N/A	N/A
Yearly water cost (ZAR)	N/A	N/A	N/A	N/A	N/A
Purchase cost in (ZAR)	2,000	8,000	5,000	6,000	30,000
Operation & Mainte-nance cost (ZAR)	0 (lifetime)	0 (lifetime)	0 (lifetime)	0 (lifetime)	0 (lifetime)

4 Performance and information requirements

South Africa introduced a voluntary energy label for refrigerators and freezers in 2005. The label was based on the EU design and the objective was to extend this to other large appliances, such as washing machines, dishwashers and dryers but this did not materialise. National Standards for appliances were issued in 2009. VC 9008 published by the Minister of Trade and Industry on 28 November 2014 sets a date for all audio and visual equipment to comply with SANS 941 by 28 May 2015, where the requirement is that the standby power is < 1 W.

Energy Label

The South African Energy Strategy of 1998 identified residential appliances as an effective means to achieve energy savings in the residential sector in South Africa. In 2005 the country's first National Energy Efficiency Strategy (NEES) was developed and in the same year the Department of Minerals and Energy (now Department of Energy) introduced a voluntary labelling scheme, which was a precursor to a mandatory Standards and Labelling (S&L) Programme. The voluntary scheme targeted refrigerators but encouraged manufacturers to extend it to all their appliances. It was decided to use the EU designed label, largely because historically the majority of South Africa's appliances were imported from Europe. A South African label was designed, which included some minor changes to the EU label being used at the time, most notably a star with the colours of the South African national flag (see Figure 8 for example). The label was registered with all the relevant national and international authorities.

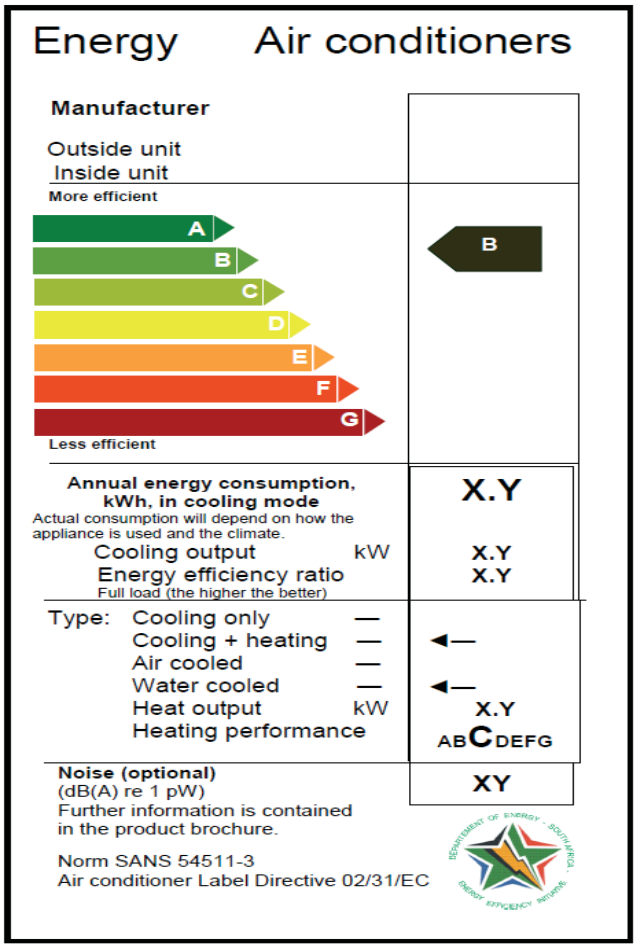

Figure 8: Exemplary Energy Label (for Air Conditioners)

Source: South Africa Bureau of Standards

The voluntary programme had limited impact. With no support or signals from Government on the implementation of a mandatory programme it was soon forgotten and abandoned by manufacturers and retailers. In 2007 the South African Department of Energy (DOE) and the United Nations Development Programme (UNDP) country office agreed to submit a joint application to the Global Environment Facility (GEF) for financial support in order to implement a mandatory S&L programme. In 2008, the South African Bureau of Standards (SABS) formed the Working Group 941 (WG941) who was mandated to develop the South African National Standard "SANS 941 - Energy Efficiency for Electrical and Electronic Apparatus". SANS 941 identified energy efficiency requirements, energy efficiency labelling, measurement methods and the maximum allowable standby power for a set of appliances. SANS 941 created the basis for the development of national testing standards in South Africa, which adopted the existing International Electrotechnical Commission (IEC) standards.

'Audio visual equipment' is included in SANS 941 whereby '*the passive standby power of an apparatus, when tested in accordance with SANS 62301, shall be not more than one Watt*', referring to SANS 62301 "Household Electrical Appliances: Measurement *of Standby Power"*.

The South African energy label in its current format has certain shortcomings. These include:

- The label designed in 2005 is obsolete, and it also does not go beyond A. The standard states 'the indicators for A+ / A+++ shall be placed at the same level as for class A';
- Focus Groups undertaken 2012 found that all consumers viewed the programme would benefit them and supported its implementation. However, reported issues concerning the label included confusion regarding the words used for descriptions on the label. For example, why does it say energy and not electricity? As South Africa has many languages (11 official) so this also means that certain words may be misunderstood; and
- Including extra information was also questioned. For example, why were noise levels included if it is an energy label?

Based on the above listed findings, a review and re-design of the South African label is recommended to incorporate the issues identified locally and in the EU (which has almost eliminated all text in favour of pictograms). The South African S&L project team is currently (2015) deliberating whether to make changes to the existing label in line with the upgrades made to the EU label, which makes greater use of symbols (pictograms) rather than text. The proposed changes (as discussed in meanwhile) to the label are shown - exemplarily for refrigerators - in Figure 9 below:

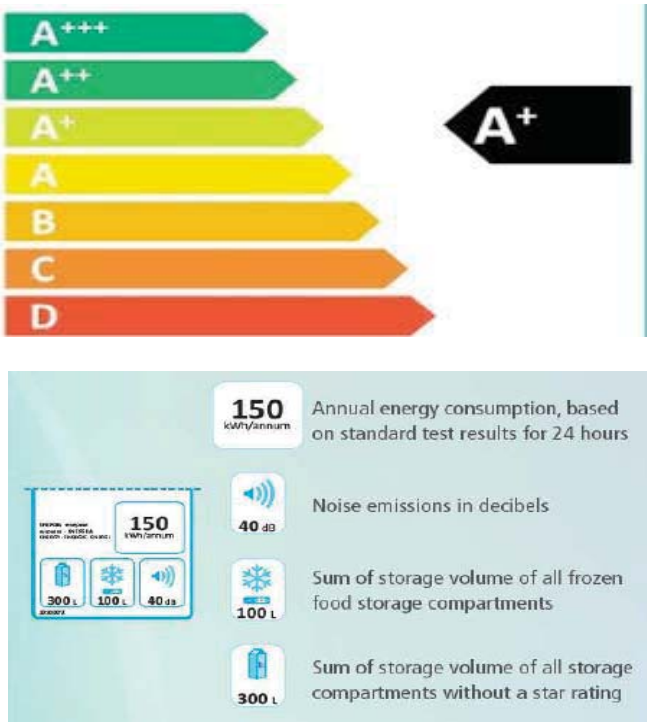

Figure 9: Exemplary draft for a new South African Energy Label (for refrigerators)

Source: South Africa Bureau of Standards (2015)

5 Test procedures and standards

The South African Bureau of Standards has adopted IEC 62087 as national test standard SABS 62087:2008 “Audio and Video Equipment”. The standard specifies methods of measurement for the power consumption of television sets, video recording equipment, Set Top Boxes (STBs), audio equipment and multi-function equipment for consumer use. Television sets include, but are not limited to, those with CRT, LCD, PDP or projection technologies.

The second edition of the standard (2008) cancels and replaces the first edition, published in 2002 and constitutes a technical revision. The main changes with respect to the previous edition are listed below.

Clause 2 is expanded to include references to video content to be used for (average) On-mode measurements. Clause 3 is expanded to include additional definitions and abbreviations. Clause 4 is expanded to include (average) “On-mode” for measuring average television power consumption. Clause 5 is modified to require reporting of the power supply voltage and frequency, and the ambient temperature. Clause 5 also includes updated requirements regarding the power measurement instruments. Subclause 6.7 is updated to indicate that is it maintained for backward compatibility purposes. Clause 11 is newly added and describes the methods for measuring (average) on-mode television power draw. Annex B is also newly added and describes considerations for measuring (average) on-mode television power consumption. Additionally, also Annex C is newly added and describes the video signals to be used for measuring (average) on-mode television power consumption. [15]

Nevertheless, as TVs do not fall directly under the 2015 South African S&L programme, only standby power measurement is required for the respective standby MEPS.

6 Application of the Standard

In the EU, Energy labelling for televisions came into force on the 30 November 2011. Suppliers (manufacturers or importers) are required to supply a printed label with every product that is placed upon the EU market, irrespective if the TV is going to be placed on display to the public or not. Additionally they are also obliged to supply a so-called “product fiche” (a data sheet) in all product brochures. The retailer is required to ensure that the label is clearly displayed on the front of the television. The energy efficiency class is determined on the basis of the Energy Efficiency Index (EEI) and considers the power consumption in normal operating conditions together with the screen area (size) of the TV.

Energy Efficiency Class	Energy Efficiency Index (EEI)
A+++ (most efficient)	EEI < 0.10
A++	0.10 ≤ EEI < 0.16
A+	0.16 ≤ EEI < 0.23
A	0.23 ≤ EEI < 0.30
B	0.30 ≤ EEI < 0.42
C	0.42 ≤ EEI < 0.60
D	0.60 ≤EEI < 0.80
E	0.80 ≤ EEI < 0.90
F	0.90 ≤EEI < 1.00
G (least efficient)	1.00 ≤ EEI

The EEI is calculated using the formula EEI = P/P_{ref} (A), where:

- P_{ref} (A) = P_{basic} + A x 4.3224 Watts/dm²
- P_{basic} = 20 W for television sets with one tuner/receiver and no hard disk
- P_{basic} = 24 W for television sets with hard disk(s)
- P_{basic} = 24 W for television sets with two or more tuner/receivers
- P_{basic} = 28 W for television sets with hard disk(s) and two or more tuner/receivers
- P_{basic} = 15 W for television monitors
- A is the visible screen area expressed in dm²
- P is the on-mode power consumption of the television in Watts

Given the generally high penetration rate of televisions, the developed national test standard and the fact that all televisions in South Africa are essentially imported (often including already e.g. the EU label), it is recommended to extend requirements for televisions beyond the standby power and that it is fully included in the country's mandatory S&L programme as soon as possible.

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