

Techno-Economic Analysis for Labeling of Set Top Boxes in India



Submitted to:
US Environment Protection Agency (US-EPA)
&
Bureau of Energy Efficiency (BEE)

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September 2008



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1. Introduction

This preparatory study on Set Top Boxes has been done in order to support the ongoing work of the Bureau of Energy Efficiency (BEE) in its mandate to implement a standards and labeling program for consumer electronics in India.

The Government of India introduced the Energy Conservation Act 2001 (EC Act) in August 2001 and established the Bureau of Energy Efficiency (BEE), a statutory body to implement the EC Act. The Act identifies standards & labeling (S&L) as one of the major program areas for improving energy efficiency in the residential, commercial and public sectors. As part of the implementation design, BEE has decided that all targeted products under the S&L program will carry energy labels in order to help consumers in making energy-efficient purchases.

Labeling and energy efficiency standards for appliances and equipment have proven to be one of the most promising policy instruments. Used for many years in countries, they delivered tangible results. They are among the cheapest and least intrusive of policies. BEE is also implementing the S&L program in partnership with national and international organizations. After initiating the program for refrigerators, air-conditioners and tubular florescent lamps, BEE is now in the process of developing a program for consumer electronics products. BEE has selected Color Televisions (CTV) and Set Top Boxes (STB) as a first two consumer electronics products for endorsement labeling.

The STB market is growing rapidly with numerous foreign DTH manufacturers setting up base in the Indian market. Indian companies' have also started manufacturing DTH equipment, adding to the growth spurt. Observing the potential market for DTH, many players have entered the market providing DTH platforms for satellite viewing. Despite the rapid growth of DTH within the STB market, the production intensity within India for STBs in general is still below expected levels. A large number of required STBs are still being imported. To counteract this industry has recommended customs duty on STBs at par with other consumer electronic products. If this recommendation is accepted, STB production in the country will take off and experts predict that in 2007-08 more than 2.5 million STBs would be produced in the country.

The goal of this techno economic analysis is to assess the impact that efficiency based endorsement label on STBs can bring in India. The objective of this report is to conclude with technically accurate and specific analysis for establishing energy efficiency standards for an endorsement label on STBs that would generate the maximum energy savings for India while creating the appropriate market pull for moving the baseline efficiency upwards.

2. Set Top Box Technology

The basic Set Top Box (STB) takes the signal from the cable feed or satellite dish and converts it into a signal that can be used by a TV, sound amplifier, DVD, VCR etc. A typical STB can be described as a type of computer that processes digital information. STBs can act as a gateway between a television or PC and telephone, satellite, terrestrial or cable feed. The analog STB receives encoded/compressed digital signals from the signal source and decodes/decompresses those signals, converting them into analog signals displayed on your analog television. The STB also accepts commands from the user and transmits these commands back to the network operator, through some sort of back channel.



The television industry has numerous acronyms in place for STB operations. A list of some of the more regularly used acronyms is provided in Table 1.

Table 1: Common Set-Top Box Acronyms

Acronym	Term	Comment
IRD	Integrated Receiver Decoder	Cable or Satellite STB
DBS	Direct Broadcast Satellite	Satellite STB
DTH	Direct-To-Home	Another term for DBS
DTA	Digital Television Adapter	Converts digital signals for use by legacy analog equipment
DTC	Digital Television Converter	Another term for a DTA
DVR	Digital Video Recorder	Records the incoming signal on a hard disk
PVR	Personal Video Recorder	Another term for a DVR
HDTV	High Definition TV	Digital TV with a wider, higher resolution picture
IPTV	Internet Protocol TV	Video signals transmitted over a broadband connection
OTA	Over-the-Air	Standard broadcast TV, also known as Terrestrial
VOD	Video On Demand	Use of two-way communication to select

Types of Set Top Boxes in India

Service providers in India offer three types of set top boxes today:

- Cable Set Top Boxes
- Free To Air (FTA)
- Pay TV Set Top boxes

To simplify the complexity of the various STBs available and associated acronyms we have separated STBs into two classes for this report: basic and advanced. A **basic STB** either decodes or converts signals from a terrestrial, cable, satellite, or IP source for display on a TV. It does not contain a hard disk or storage and it communicates in only one direction. Examples include basic cable and satellite receiver/decoders, digital television adapters (DTA). An **advanced STB** adds one or more functions or services in addition to basic decoding and conversion, including digital recording, video on demand (VOD), video games, and interactive TV.

3. STB Power Modes

Normally, Set Top Boxes (STBs) have three types of power modes. These are:

- a. Active mode or On mode
- b. Active Standby mode
- c. Passive Standby mode.

In India, the PAY TV STBs have only two of the three modes - On mode and Active Standby mode. The power consumption difference between On mode and Active standby mode in a Pay TV service is minimal since most of the STB circuitry remains in an active state even during the standby period. This is required since service providers continuously update STBs as per the requirements of the users. Also the DTH system's Low-Noise Block down converter (LNB) draws power continuously from the STB itself for all modes. Due to this there is not much difference between the power consumption of STB in an "on mode" and "standby mode" for a Pay TV STB.

However in the case of a Free to Air (FTA) Set Top Box, a significant difference in energy consumption can be observed between the on mode and standby mode. This is due the fact that the FTA set top box have On mode and Passive Standby Mode. In Passive standby mode, most of the STBs circuits remain in total off condition and hence the STB consumes very little power.

The STB modes for all types of set top boxes are briefly summarized in table 2 below.

Table 2: Various STB Modes

<i>Mode Category</i>	<i>IEC Mode Name</i>	<i>Definition of Mode</i>	<i>Mode Observed in Today's STB</i>	<i>Approximate Power Use of a Typical STB</i>
On	On (Play), but the definition only includes video signal processing	User perceives STB to be "ON" when in this mode. This is when the user is watching or recording a show. The STB is plugged in and is performing any number of functionalities for the user, including, but not limited to: video signal processing, DVR recording and playing, DVD recording or playing, feeding video signal to multiple televisions, etc.	Yes	Today: 10 to 15 W typically
	Active Standby	User perceives the STB to be "OFF" in this mode, but this mode is actually a form of on. The STB is plugged in and is exchanging data with, or downloading programming from the service provider. A switch on the STB itself or a signal from the remote control can move the STB into the Active mode from this mode. Currently, this mode has nearly the same power consumption as the active mode.	Yes	Today: 8 to 14 W typically

		Likely, this is because other relevant circuits, like the signal processor, etc. is not being disengaged when the user is not watching TV.		
Sleep	Standby Passive	<p>This mode does not exist in today's PAY TV STBs in India.</p> <p>STB is plugged in; all services other than communications provided by the STB are disengaged, including signal processing, DVR recording, and data downloading from service provider.</p> <p>STB can be turned to ON or Active standby mode with the remote control, a switch on the STB itself, a signal from the service provider, or a signal from the internal clock of the STB that tells the STB that it needs to "wake up" to record a show on the DVR.</p>	Exist only in FTA STB	Today: 6 to 10 W Typically
Off	Disconnected	STB is unplugged and drawing no power. Box cannot communicate with service provider, and when plugged in, must download programming from service provider, which can take hours.	Yes	NA

4. Set Top Box Market in India

TV viewing is undergoing a change in India with the implementation of Conditional Access System (CAS) and availability of Direct to Home (DTH) services. CAS stands for conditional access system, which is a digital mode of transmitting TV channels through cable and set-top box (STB). The transmission signals are encrypted and viewers need to buy a set-top box to receive and decrypt the signal. The CAS scheme which was proposed to be introduced in 2003 in the metro cities of Delhi, Kolkata, Mumbai and Chennai, but got rolled back in all cities except for Chennai, is back again. Three metros Delhi, Kolkata, and Mumbai are undergoing the implementation of CAS in certain notified areas. The Set Top Box (STB) market growth in India can also be attributed to the growing implementation of CAS (conditional access system), DTH (direct to home) services.

There has been exponential growth in the STB market, due to introduction of Conditional Access Schemes (CAS) and Direct to Home (DTH) systems in the country. India has around 9 million DTH subscribers out of which Doordarshan's DD Direct has 5 million subscribers. The other two players, Dish TV and TATA Sky have 2.8 million and 1.6 million subscribers respectively. A big boom is going to come in DTH service with companies like Bharti, and Reliance soon coming in to the market with similar products. Sun TV is also set to roll out its DTH services in the four southern states.

A brief scenario of STB requirements for a DTH or CAS connection has been described in following table.

Table 3: STB Requirement in India

	CAS	DTH
Set Top Box	The set top box can be either 'purchased' or taken on 'rental' scheme. At present there are two rental schemes, (1) digital set top box will be provided at a monthly rental of Rs30 / month plus refundable deposit of Rs.999 with a deduction of Rs.12.50/month, (2) set top box will be provided at a rent of Rs.23 (for analog) or Rs.45 (for digital) plus refundable deposit of Rs.250 with a deduction of Rs.3/month.	No rental scheme is available for set top box. The viewer buys a set top box (viewer is the owner of the set top box) while the antenna is provided by the service provider. For all the apartments in the same building, a single antenna can be used.
Number of STB for multiple TV household	Per TV one set top box & a different cable connection	Per TV one set top box but no separate antenna will be required

There are around 10 millions STBs installed in India presently which includes STBs of both cable and DTH services. The STB manufacturing industry is still facing high pressure because of limited production compared to the huge demand in today's market. This is because of the weak research and development and poor STB manufacturing infrastructure in India. There is also a shortage of skilled manpower for STB manufacturing in India at present. Presently a major volume is imported from other countries like China, Taiwan and very little production is happening in India. The industry forecast predicts a very high growth in the STB market as more numbers of players are expected to enter into DTH services. Till now the big DTH players have only explored the main metropolitan and other big cities of India like Delhi, Mumbai and Pune, Bangalore etc. Still the small cities and towns are a potential huge market for these players. Presently Tata Sky, Sun Direct and Dish TV are the major market players in the DTH industry and Reliance and Bharti are doing everything possible to enter into the market at the earliest. Tata Sky is collaborating with Humax to increase availability of STBs. Humax is supplying STBs to Tata Sky with the help of local manufacturing. Noida based Kortek India Electronic Pvt. Limited and Dixon Technologies are also major OEM (Original Equipment Manufacturer) suppliers of STBs for Humax.

From figure 1 below, we can see the growth till date in the STB market in India. The import and export data are also shown in the graph which actually illustrates a very high import in the last few years.

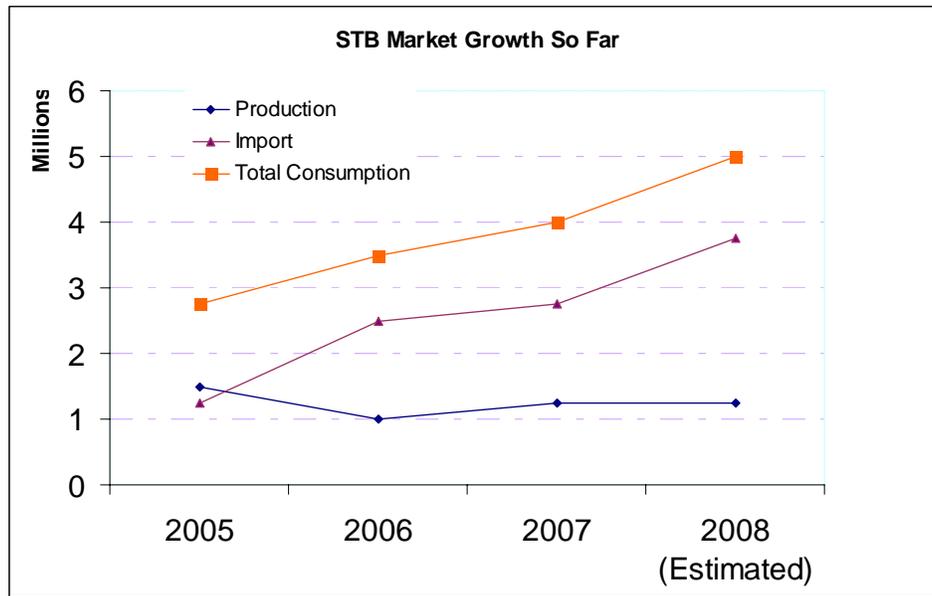


Figure 1: STB Market Growth

Industry has observed almost 85% of STB market growth during the year 2005-06. This was mainly because of the Conditional Access System (CAS) notification in four metros and the beginning of Direct to Home (DTH) services in India. A major fraction of STB imports happened during this period from low cost manufacturing countries like Taiwan. The local manufacturing industry observed a decline during the 2005-06 period because of high manufacturing costs in India and low availability of skilled labor. During the year 2006-07 growth in the market was not significant because of industry struggles caused by issues relating to CAS. The government was negotiating with cable operators for CAS implementation in metros and consumers were feeling the heat of high cable prices and low quality services. This in reality helped the DTH industry secure a significant market share and also resulted in a high growth of STBs in the 2007-08 period.

The STB industry is expected to grow at a rate of approximately 30% over the next few years since CAS is now mandatory and will be implemented in all four metros. Along with this other big players are also ready to enter in to the DTH services market. This will create stiff competition within the market which in turn will create and match huge demand of set top boxes in India. As per the data given in a very recent report published in rediff.com the DTH industry is adding 0.2 million subscribers every month.

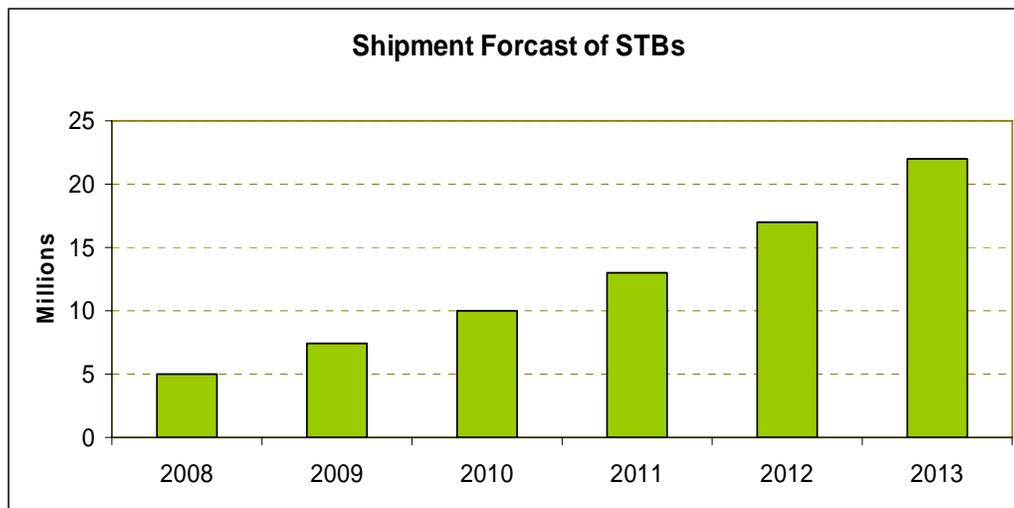


Figure 2: STB Shipments Forecast

Figure 2 above forecasts the shipments of STBs based on the assumption of an annual growth rate of 30% over the forecast period, resulting in shipments of 10 million by 2010 and about 20 million in 2013.

4.1 Major Players and Market Share

The current players in the DTH industry are:

1. DD Direct of Prasar Bharti comprising of 33 FTA channels and 12 All India Radio Channels
2. Dish TV of ZEE Group
3. Tata Sky – the joint venture between Tata group and Rupert Murdoch’s Sky TV

As per the discussion with various manufacturers and service providers we find that that DD Direct of Prasar Bharti deals with approximately 5 million homes whereas Dish TV deals with approximately 2.8 million homes and Tata Sky deals with approximately 1.6 million homes in India.

DD Direct

The DTH venture of Doordarshan started in the year 2003, when the “Pilot project of “Kuband transmission” (Free-to -air DTH)” was approved by the Government. The prime objective of the project was to provide TV coverage to the uncovered areas of the country that came within the shadow zone of terrestrial transmission due to difficult terrain conditions. DTH technology emerged as a natural choice to fulfill the objective because it ensured coverage for the entire population in the country in a cost effective and reliable way.

Initial launch of Doordarshan DTH was extremely successful and the service became immensely popular scaling quickly to cover an estimated subscriber base of 5 million. But over time as other private DTH players came into play in India with their costly yet attractive programming options, Doordarshan DTH started losing popularity due to its weak content and lack of any marketing strategy that could formulate a sustainable model to generate revenue and increase popularity. The FTA DTH of Doordarshan today is a loss-making proposition. The revenue generated is comparatively negligible when compared to the cost of content creation and programming, transmission, salary of staff etc.

DISH TV

Dish TV DTH service has a subscriber base of 2.8 million. Dish TV technology revolves around a satellite system, headend system, receiving system, interactivity, and expansion. The aggregation of DTH signals is from various satellites. Dish TV uses a high power Ku-band satellite and multiple transponders carrying 12- 20 channels each. The Dish TV DTH services are on NSS 6 satellite. The set top boxes used for Dish TV's DTH services are Handan and Kaunmedia both from Korea. Dish TV DTH services also provide value added services such as movie-on-demand, gaming, sports active, news active, EPG, and multilingual services.



TATA SKY

Tata Sky currently has 1.6 subscribers as of January 2008. The company plans to touch 8 million subscribers by 2012. Tata Sky has partnered with the global leaders in the space of digital technology to bring a state-of-the-art satellite television service to India. Tata Sky has partnered with Thomson and Humax for building top-of-the line digicoms (Set Top Boxes), customized specifically for the Indian markets. The technology's feature rich design enables Tata Sky to deliver multiple programming, pricing packages and interactive services to its customers.



Other players (listed below) either have the license/ Letter of Intend or have applied for the license to operate DTH services. They cover approximately 1 million users:

1. Sun Direct of Sun Network
2. Reliance Blue Magic from Reliance ADAG
3. Bharti Telemedia
4. Videocon Industries

Table 4: Market Share of Major Players

Brand	Approx Quantity (in million)	Market Share (%)
Tata Sky (Pay TV)	1.6	15
Dish TV (Pay TV)	2.8	26
DD Direct(FTA)	5	47
Others (Sun direct etc) (Pay TV)	1	9
CAS STBs	0.3	3

Cable TV currently operates in two modes. Through CAS covering cities such as Chennai, parts of Delhi, Mumbai and Kolkata, and through non addressable systems for the rest of the country. In the case of CAS controlled areas the subscriber has to either buy or rent a STB to see the Pay channels. With the help of CEAMA we have found out that the cable set top box volume is around 0.3 million at present.

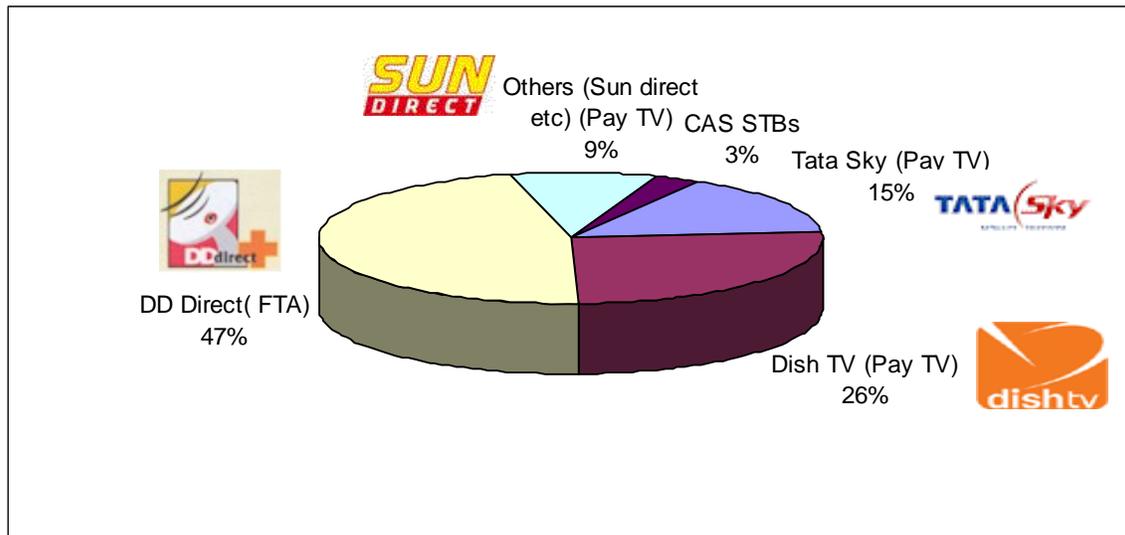


Figure 3: STB Market Share

4.2 STB Buying Process

Buying a Set Top Box (STB) for Direct to Home services is a different process compared to purchasing other home entertainment equipments. For other entertainment equipments like TV, home theaters etc we directly purchase from the stores depending on system features etc. Whereas, in the case of STBs we first buy the services from a service provider and then purchase the STB from that service provider without having any choice. This three step process is explained as follows:

- Service Provider (SP) provides technical specification to STB manufacturer to manufacture the STBs based on type of service to be provided
- Manufacturer supplies the specified STBs to SP without worrying about the energy consumption of the box
- SP sells the STB to consumers without offering a choice on energy consumption or the make

The outcome of this complex process can be summarized in following three points:

- **No choice to consumer:** The consumer has no choice about informed buying of STB's from the Service Provider to avail DTH services.
- **In case of star labeling - No motivation to consumer to buy energy efficient STB's:** The consumer will have no motivation to choose a 4 or 5 star product as the service provider is going to provide the same set of services with irrespective of the STB cost.
- **Quick market transformation is possible with endorsement labeling:** In case of endorsement labeling, the service provider is bound to manufacture all the STBs as energy efficient STBs. Consumers will also recognize the label to understand that the product is energy efficient. Finally, in the case of shifting between two service providers, the consumer will not have to worry about STB energy efficiency.

5. Unit Energy Consumption

Unit Energy Consumption (UEC) is an important input for Set Top Box (STB) data analysis. This has been calculated by utilizing the number of hours per day the set top box is in use in both active and standby modes and the power consumed during use of these modes. The yearly unit energy consumption of a STB is calculated by multiplying the number of days of year into the total energy consumption of one day.

We can see from table 5 below that UEC for Pay TV type STBs is 81 kWhr/Year and for Free to Air type STBs is 44 kWhr/Year. These two values are different since the average power consumption of PAY TV and FTA set top boxes is different in both active and standby mode.

The STB usage hours are taken as 6 hours in active mode and 12 hours in standby mode for both Pay TV and FTA type STBs. This data is taken as per the recommendation of the STB technical committee which comprises of various STB manufacturers, DTH service providers, consumer organizations and manufacturers associations.

Table 5: Unit Energy Consumption

Average Energy consumption (Watts)							
Equipments	Types	Active mode (Watts)	Stand By (Watts)	Houly usage per day	Stand by time (Hours)	Total Consumption on per day (Watt-hr)	Total Consumption on per year (kWatt-hr)
Set Top Box	Pay TV	13	12	6.00	12.00	222	81
	FTA	10	5	6.00	12.00	120	44

6. National Programs for Energy Efficient Set Top Boxes

Listed in table 6 below are Set Top Box (STB) programs introduced in other countries.

Table 6: Various Programs for Energy Efficient STBs

Country	Programme	Scope	Summary of Requirements				Program Type
			Max Passive Standby (sleep)	Max Active Standby	Max Active/On	Other	
Australia	Australian Greenhouse Office	Standard Definition converter for terrestrial Signals High Definition converter for terrestrial signals	1W or 2W 1W or 2W	8W or 7W + FAs to limit of 15W 12W or 11W + FAs to limit of 19W	8W or 7W + FAs to limit of 22W 12W or 11W + FAs to limit of 22W		Minimum energy performance standards (Mandatory)
Canada	Energy Efficiency Regulations	Simple digital to analog converter box for terrestrial signals	1W		8W	Regulation not yet defined	Minimum energy performance standards (Mandatory)
China	China Standard Certification Center (CSC)	Simple STBs (Cable only)	1W		8W	Automatic power down (after 4 hours of inactivity)	Endorsement label
EU	European Code of Conduct for Digital TV Services	Complex STBs Digital TV with integrated receiver and decoder Analogue PVR	3W 1.5W 3W	7W (C), 6W (T,D), 8W (S) + FAs to limit of 15W 8W (C), 7W (T), 9W (S) + FAs to limit of 16W 6W			Voluntary Agreement

		Simple STBs (no CA)	2W		7W (C, T, D), 10W(S)		
		Simple STBs (High Definition TV)-SD o/p	2W		11W (C, T, D), 14W(S)		
		Simple STBs (High Definition TV)-HD o/p	2W		12W (C, T, D), 15W(S)		
GEEA	Group for Energy Efficient Appliances	Same or similar to EU code of conduct	Same or similar to EU code of conduct			Automatic Power Down	
Korea	Energy Boy Standby program	TV with integral pay TV set top box	1W		8W + FAs to limit of 15W		Endorsement Label
		Simple digital to analog converter box for terrestrial signals Pay TV Set Top Boxes	1W (optional)	8W + FAs to limit of 15W			
Taiwan	Standby Power Promotion Alliance	Set Top Box	2W				Voluntary Agreement
US	Energy Star	Simple digital to analog converter box for terrestrial signals (DTA)	1W		8W	Automatic Power Down	Endorsement Label
	National Telecommunications and Information Administration (NTIA)	Set Top Boxes other than DTAs Simple digital to analog converter box for terrestrial signals (DTA)	To Be Determined 2W			Automatic Power Down	Endorsement Label Criteria for national subsidy of US\$40 per STB (max 2 per household)

7. Analysis of Set Top Box Energy Consumption Data

A Set Top Box (STB) consumes a significant amount of energy in an average Indian consumer's home since it usually remains in an "On" or "Standby" mode even if the television is switched off. We have collected the energy consumption data for both Free to Air (FTA) and Pay TV type STBs from manufacturers. The data available from manufacturers is limited since STB manufacturing is still a new industry and data from this sector is not well-organized. Collaborating with the consumer electronics manufacturing association (CEAMA), we collected data on 10 models for Pay TV type STBs and 3 models of FTA type STBs, as shown in the figure below.

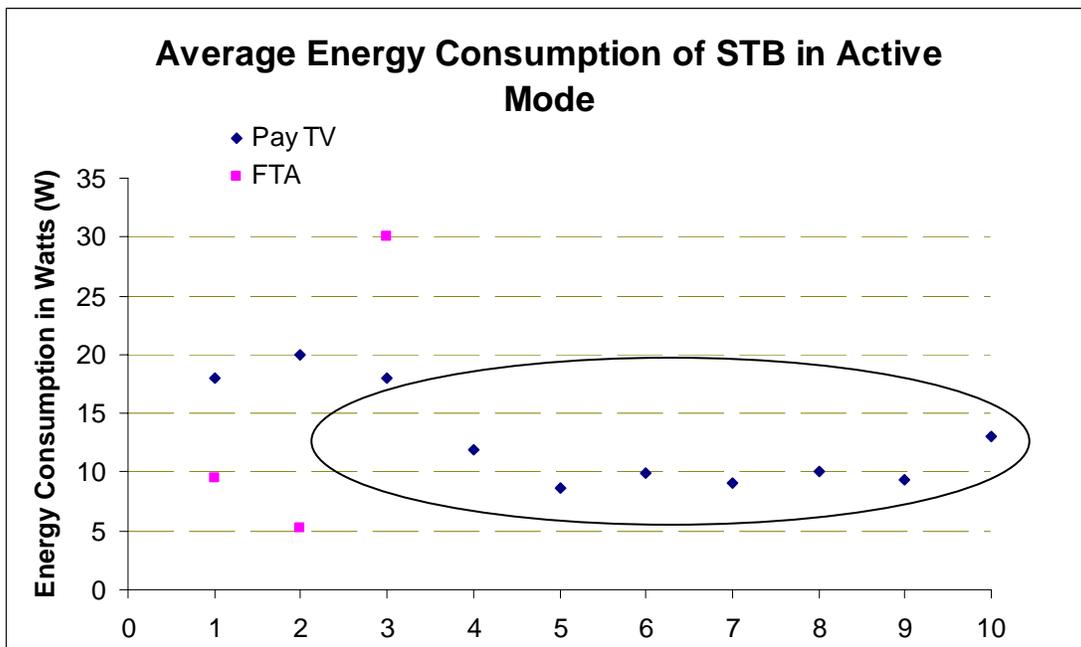


Figure 4: Average Energy Consumption in Active Mode

Figure 4 shows the energy consumption of set top boxes in Active or On mode. We see from the circled data points that the energy consumption of PAY TV type STBs exists in a range of 9W to 14W. The Active or On mode power consumption of FTA type STBs varies across a large range. As per the data provided by manufacturers it varies from 5W to 30W. Though we don't know the market share of the products which are consuming 30W of energy but still this large variation range indicates the high potential of reduction in energy consumption of FTA type STBs by discouraging the sale of substandard products in market through endorsement labeling.

Another scenario of energy consumption in STBs is the energy consumption in standby mode. A STB is set to be in standby mode when somebody has switched off the box by pressing the off button on the remote or otherwise and the equipment is still connected to the power supply. The power consumption in Standby mode in Pay TV type set top boxes is very close to what it is in Active mode. This is mainly because of the LNB of dish antenna and the two way communication requirement in Pay TV services. Even if the STB is in standby mode, the LNB draws power from STB and some circuitry is still running to download and update the STB services which have been provided by service provider.

The figure below shows the Standby mode power consumption of both PAY TV and FTA set top boxes.

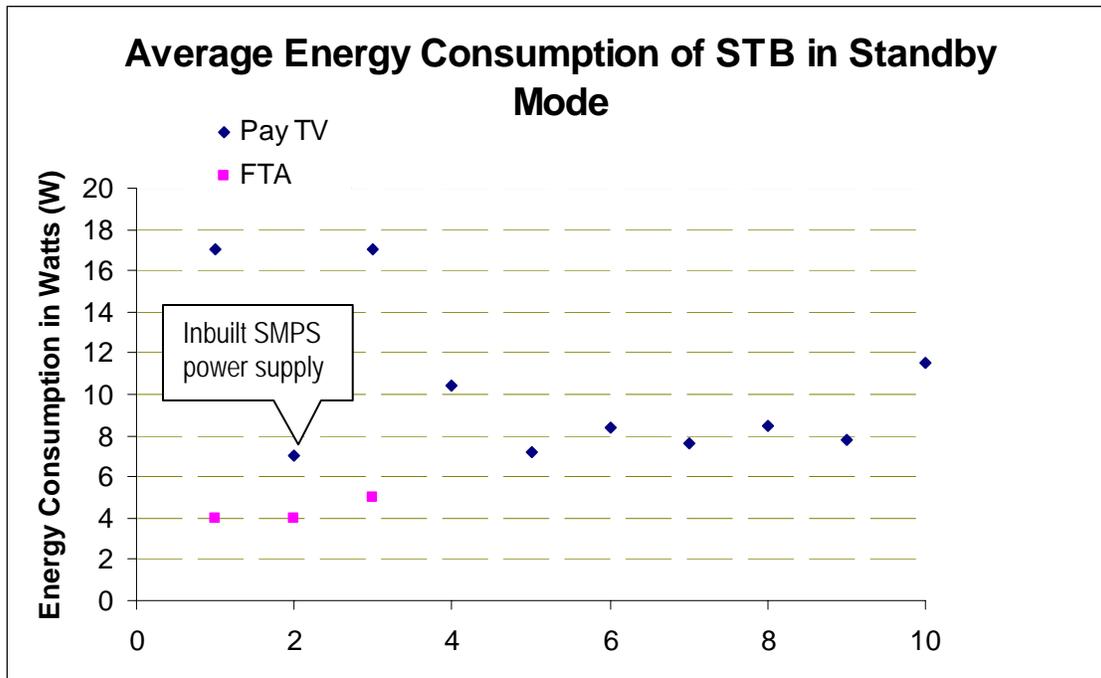


Figure 5: Average Energy Consumption in Standby Mode

We can see from figure 5 that the energy consumption in stand by mode for FTA STBs is within 4 to 5W which is high when compared to the same in US and Europe. In US, Europe and Korea the maximum standby mode power consumption for these type of STBs is 1 W.

The energy consumption of Pay TV type STBs in standby mode in Korea and Europe varies from 6W to 8W and in some cases it is as low as 3W. In India also, one manufacturer reported the maximum standby power consumption of this STB to be 7W which is basically due to the inbuilt SMPS (Switch Mode Power Supply). This indicates that the technology to reduce the standby power consumption in STBs is available and it is possible for manufacturers to meet the international standards of STB energy consumption.

8. Shift in Efficiency Baselines through Labeling

Here we will analyze the savings potential by shifting the energy efficiency baseline of Set Top Boxes (STBs) both in Active and Standby modes by implementing endorsement labeling.

In this analysis we are assuming that the market share of the products which are qualifying for the endorsement labels increases by 25% over a period of 5 years from the date of implementation. The policy case for efficiency of the product is assumed to improve by 30%.

8.1 Active Mode

Figure 6 below is plotted to display the market shift of Active or On mode energy consumption of Pay TV type STBs. The worst product consumes around 20W of power and enjoys just over 5% of market share.

We have considered the average power consumption in active mode is 13W. The policy case here we have taken is 9W which is 30% better compare to the power consumption of average product in the market and around 55% better compared to baseline of 20W.

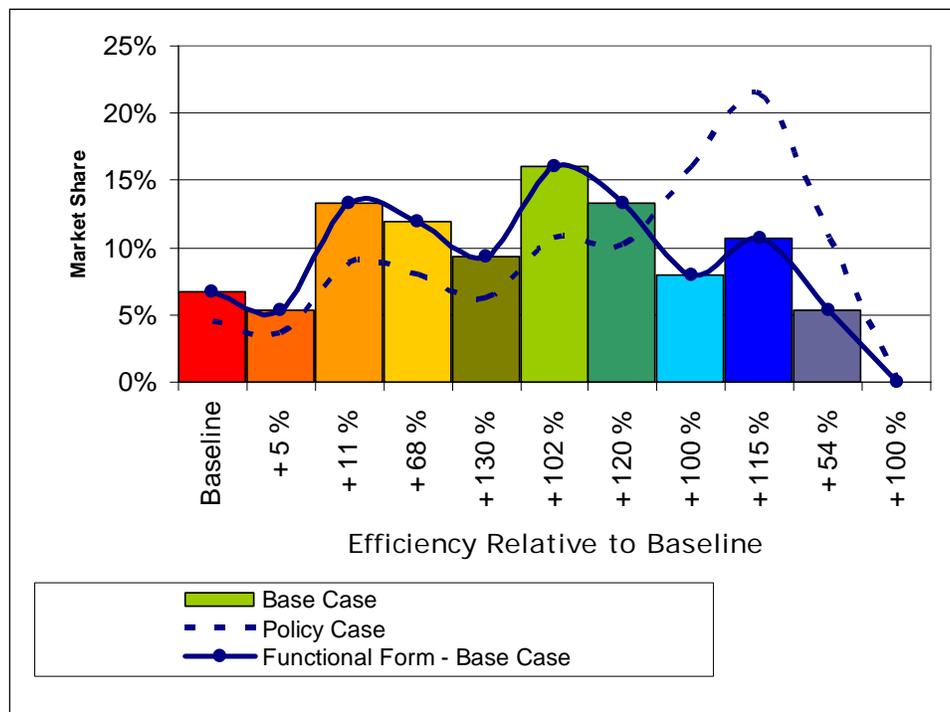


Figure 6: Market shift of Active Mode Power consumption in Pay TV STB

8.2 Standby Mode

The standby mode power consumption in Pay TV type STBs is very close to the power consumption for On mode. Figure 7 below displays the market scenario and energy consumption of Pay TV STB in standby mode.

The policy case considered is 8W which is again 30% better as compare to the power consumption of an average product in the market.

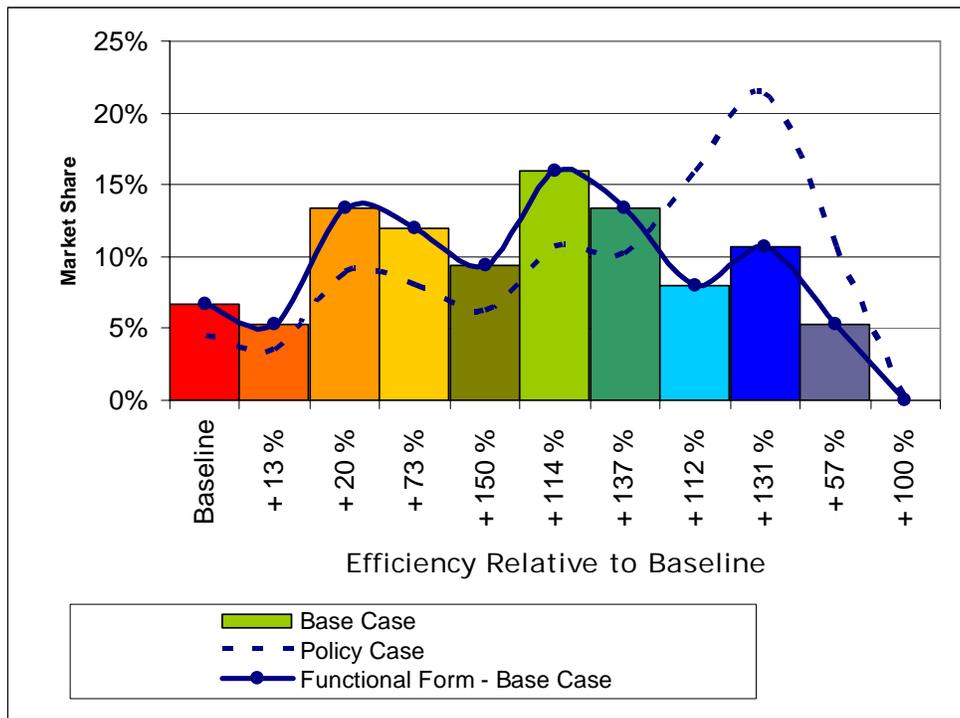


Figure 7: Market shift of Standby Mode Power consumption in Pay TV STB

9. National Impact Assessment

To analyze the national impact by improving the efficiency of Set Top Boxes (STBs) we calculate the savings based on the following policy level. We have assumed 30% efficiency improvement for Active mode and 30% improvement in Standby mode compared to the average power consumption of a product for both PAY TV and Free to Air STBs.

Table 7: Unit Energy Consumption with Policy Level 1

Average Energy consumption (Watts)							
Equipments	Types	Active mode (Watts)	Stand By (Watts)	Houly usage per day	Stand by time (Hours)	Total Consumption per day (Watt-hr)	Total Consumption per year (kWatt-hr)
Set Top Box (Policy Level 1)	Pay TV	9	8	6.00	12.00	155	57
	FTA	7	4	6.00	12.00	84	31

Unlike in the case of Minimum energy Performance Standards (MEPS) where the complete market moves to a higher efficiency level, an endorsement labels pulls a certain portion of the market to an improved efficiency level. Hence level of energy savings derived from efficiency improvements through endorsement labeling in a year largely depends upon the response of the STB manufacturers and service providers. Though it is very difficult to predict the behavior of the market, we have assumed market transformation rates in the following percentage for an annual basis.

Table 8: Assumptions of Yearly Market Transformation

Year	Trasformation Percentage
2009	10%
2010	18%
2011	25%
2012	35%
2013	50%
2014	70%
2015	80%

The impact analysis has been done considering the implementation of endorsement label by the end of the 2008. The time period considered for the analysis is 7 years that means from 2009 to 2015 even though the savings will still continue after 2015 considering the life of the equipment will be more than 10 years. We have considered this short period to calculate savings since the STB technology is not very mature in India and service providers are expected to introduce new and more complex STBs in coming years.

The following figure 9 shows yearly energy savings from 2009 to 2015. We can see clearly from the figure that in initial years the savings will be less considering the slower transformation of the market and the low shipment of STBs but it becomes significant in later years when the market picks up and transforms rapidly towards energy efficient STBs and also the STB volume increases exponentially.

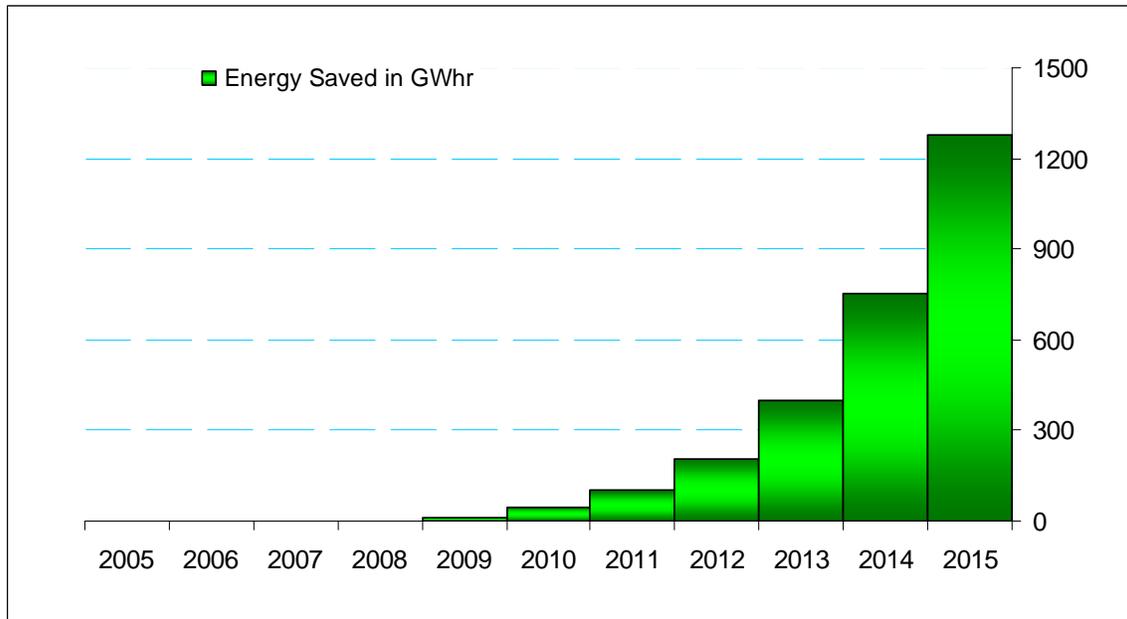


Figure 8: Yearly energy Savings

At present the savings shown in figure 9 does not consider the site to source conversion factor.

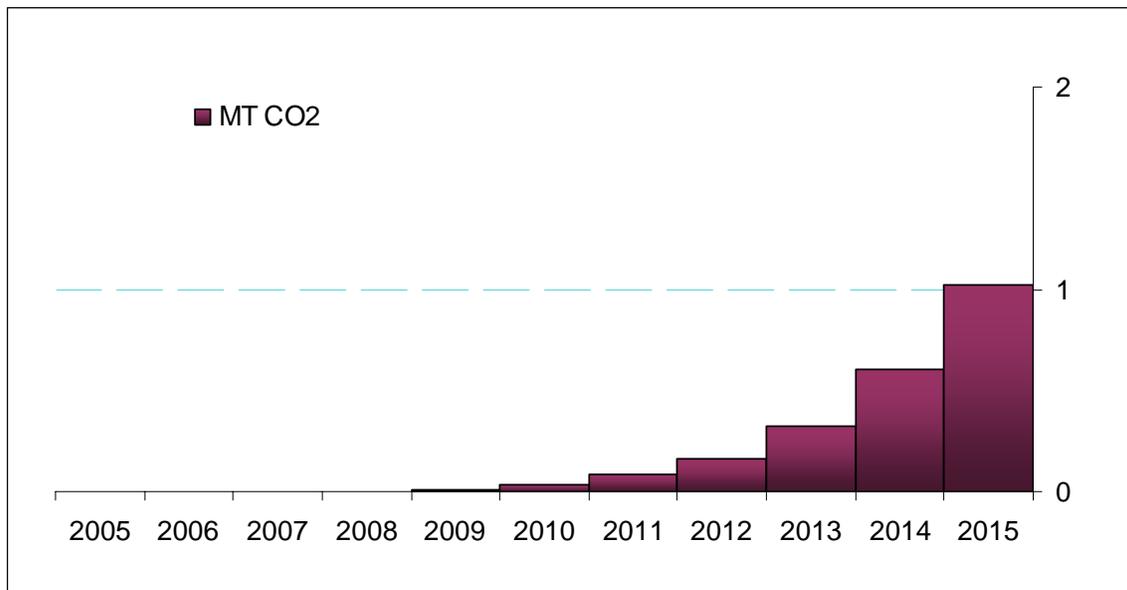


Figure 9: Yearly carbon Savings in MTCO₂

The CO₂ savings depicted in figure 10 correspond to the policy level 1 that is 9W and 8W power consumption in Active mode and Stand by mode respectively for PAY TV STBs and 7W and 4W power consumption in Active and Standby mode for Free to Air STBs. The savings can increase additionally by introducing a higher level of improvement - introducing the passive standby mode which actually consumes less power compared to active standby mode.

10. Conclusion

The above techno economic analysis concludes that there is huge potential of energy savings from implementation of endorsement labels for both Pay TV and FTA Set Top Boxes (STBs) in both Active and Standby modes. These savings can be further increased through additional improvement of STB technology; for example - introduction of passive standby mode in PAY TV STBs.

In this analysis we have considered a 30% efficiency improvement from the baseline in Standby mode and 30% efficiency improvement in Active mode compared to the existing baseline which again can be revised based on future market scenarios resulting in increased savings. This can be done through adopting a tiered labeling scheme in which standards can be revised after a certain time period.

11. References

Data Given by various manufacturers and service providers

<http://www.dth.in/players.php>

National Programs on Energy Efficient Set top Boxes

http://www.iea.org/Textbase/work/2007/set-top/background/stb_programs.pdf

Data shared by Consumer Electronics and Appliances Manufacturers Association (CEAMA)