Summary: Intervention & Options

Department /Agency:	Title: Impact Assessment of EuP Implementing Measures for Simple Set Top Boxes	
Stage:	Version: 1.0	Date: 9th September 2008
Related Publications:		

Available to view or download at:

http://www.

Contact for enquiries: **Telephone:**

What is the problem under consideration? Why is government intervention necessary?

The level of carbon emissions and energy usage in the UK and globally remain a concern to the UK as a result of global warming, the emissions reduction targets the UK has set itself and the threat to the country's energy security. Climate change means that the UK must reduce emissions quickly and the carbon emission caps established with the EU Emissions Trading Scheme will need to be met in the most cost effective manner. The increasing availability and use of Simple Set Top Boxes in recent years and the power consumed (in both active and standby mode) has further exacerbated the problem. Technical solutions are available to produce quality products which are in demand by consumers and which could use significantly less power during operation and off-mode and standby states. However, behavioural barriers, split incentives and information failures mean that some of the more energy efficient products are not being taken up quickly enough. The market itself has not moved sufficiently quickly to sufficiently low levels of power consumption during operation and in standby and off-modes in response to the price signal provided through the ETS on energy use and as a result, it is felt that government intervention (at the EU level due to the Single Market) in the form of regulation to set maximum energy standards for SSTBs should be introduced to achieve the desired cost-effective abatement.

What are the policy objectives and the intended effects?

The objective of implementing restrictions on power consumption of simple set-top boxes during active function and whilst in off-mode and standby states is to contribute to realising CO2 savings required to achieve the EU ETS cap in the most cost-effective way, by breaking down barriers to behaviour change. Products policy is considered as a necessary complement to the EU ETS for the overall ambition to reduce CO2 in the most cost-effective manner possible.

As the EU Single Market is one of the largest markets globally, this measure is also likely to contribute to improving efficiency of products (and therefore achieve reductions in CO2 emissions) sold outside the EU as well as inside the Single Market.

Lower energy usage as a result of the lower power consumption of SSTBs (and therefore lower energy demand) will also contribute to energy security of the UK.

What policy options have been considered? Please justify any preferred option.

The UK, as a Member of the European Union, has implemented Framework Directive 2005/32/EC of 6 July 2005 establishing a framework for the setting of Ecodesign requirements for energy-using products. The draft Implementing Measure issued by the Commission sets out requirements for simple set top boxes in active and standby modes and the UK is required to take a position on the measure at an upcoming Regulatory Committee meeting in September 2008. This impact assessment sets out the potential costs and benefits of implementing the measure with its currently drafted requirements. This option is considered against a baseline option of not implementing the measure, where additional costs and benefits would be zero but where there might be a non-monetised cost to the UK related to reputation (e.g. as a consequence of voting "No" in the EU Council). It has not been possible to include an option which involves applying more stringent criteria for SSTBs in the time available for this IA since this would involve an additional detailed and complex assessment of the technical feasibility of implementing such requirements prior to additional further modelling of the potential benefits.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

The IM will be subject to review not later than 5 years after it enters into force.

Ministerial Sign-off For SELECT STAGE Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:

..... Date:

Summary: Analysis & Evidence

Policy Option:	Description: Restrictions on consumption (on-mode, off-mode and standby) from potential Commission Regulation implementing Directive 2005/32/EC with regard to ecodesign requirements for simple set top boxes

COSTS

ANNUAL COSTS

One-off (Transition) **Yrs**

£

Average Annual Cost (excluding one-off)

£12,950,103 13

Description and scale of **key monetised costs** by 'main affected groups'

Cost to manufacturers of adapting products are estimated at £67,935,000 . (These costs have been calculated on the basis of estimates provided which included both per product costs and apportioned additional costs to adapt processes and designs. Therefore it has not been possible to separate out one off costs) The costs of testing are estimated to range between £254,000 and £351,000. It is uncertain who will bear the testing costs which represent an administrative cost to the policy; manufacturers or authorities. (These costs are likely to be the maximum since they have been based on independent testing, although if manufacturers were to be allowed to prove compliance by design, these may be significantly reduced. Therefore, the lower estimate has been used to calculate Total Cost and Average Annual Cost)

Cost of increase carbon emissions from the heat replacement effect - £44,440,000

Total Cost (PV) **£ 112,629,000**

Other **key non-monetised costs** by 'main affected groups'

Manufacturers will be required to make changes to product documentation in order to accommodate information requirements included in the EU Implementing Measure. These costs, however, are likely to be negligible.

BENEFITS

ANNUAL BENEFITS

One-off **Yrs**

£ n/a

Average Annual Benefit (excluding one-off)

£ 70,014,884 13

Description and scale of **key monetised benefits** by 'main affected groups'

Total Value Energy Savings £469,550,000

Total Value EU ETS allowance savings (from CO2 emissions savings in the UK) £122,150,000

Total Value Air Quality Damages Avoided £17,230,000

Total Benefit (PV) **£ 608,930,000**

Other **key non-monetised benefits** by 'main affected groups'

Increased security of energy supply for the UK as a result of the lower energy use by SSTBs .

There will be environmental benefits from reductions in air pollutants (NOx. SOx and PM emissions) that it is not yet possible to monetise (therefore not included in the Air Quality Damages Avoided estimate above). They refer to reduced acidification and eutriphication of ecosystems in the UK.

The option will also produce potentially significant wider benefits on a global scale, in particular in areas where there are no "caps" on carbon emissions. SSTBs produced in the UK (and EU as a whole) and sold in these areas as well as those produced locally to EU standards for the EU and also consumed locally will use less energy and produce lower carbon emissions than would have otherwise been the case.

Adopting the IM will also assist in enabling a longer-run agenda shift towards tighter emission caps in the future.

Key Assumptions/Sensitivities/Risks

The estimate for benefits above covers the period 2008 – 2020. However, it is likely that some products sold during this time will be used after that period and consequently additional benefits will continue to arise from the policy beyond 2020. Rough estimates on future benefits are included in the details of the IA but many uncertainties over the future use of such products exist (e.g. in the number of products being sold, the product mix on the market, availability of substitutes etc.) and it is therefore difficult to predict the level of benefits directly attributable to the policy so far into the future. However, it should still be noted that the benefits of £608,930,000 indicated above are likely to be only partial.

Price Base Year 2008	Time Period Years 13	**Net Benefit Range** (NPV) **£ n/a**	**NET BENEFIT** (NPV Best estimate) **£496,301,000 (estimate)**

What is the geographic coverage of the policy/option?				UK(but same in EU)
On what date will the policy be implemented?				1 year after publication in Official Journal – c 2010
Which organisation(s) will enforce the policy?				Under review but currently UK Trading Standards
What is the total annual cost of enforcement for these organisations?				Unknown but share of c. £250k. Note these are separate from the Testing Costs identified above and the amount is indicative for ALL products being considered under EuP Implementing Measures
Does enforcement comply with Hampton principles?				Yes
Will implementation go beyond minimum EU requirements?				No
What is the value of the proposed offsetting measure per year?				£ N/A
What is the value of changes in greenhouse gas emissions?				£ 77,710,000 net
Will the proposal have a significant impact on competition?				No
Annual cost (£-£) per organisation (excluding one-off)	Micro **Unknown**	Small **Unknown**	Medium **Unknown**	Large Unknown
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Unknown Decrease of £ Unknown **Net Impact** £ Unknown

Key: **Annual costs and benefits:** **(Net) Present**

Evidence Base (for summary sheets)

[Use this space (with a recommended maximum of 30 pages) to set out the evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Ensure that the information is organised in such a way as to explain clearly the summary information on the preceding pages of this form.]

1. Introduction/Purpose

The Framework Directive for the Eco-design of Energy Using Products (EuP) was adopted in July 2005 and implemented in the UK and other Member States (MS) in August 2007. EuP establishes a framework by which the Commission and MS can bring forward measures to establish minimum standards relating to the environmental impacts of products (e.g. their energy consumption). The legal basis is Article 95 – Single Market.

The ability to establish minimum standards in this way is a key foundation of our approach to reducing the carbon impacts of products in the UK. As a member of the EU, the UK is bound to implement the Framework Directive and any implementing measures made under it. Therefore, it can be argued that the UK has effectively ceded its legislative competence in this policy area and so cannot take unilateral measures to take regulatory/legislative action in this area.

This particular measure relates to the energy used by simple set-top boxes (SSTB) in both active and standby modes. Within the measure, only standalone devices are considered - those built into TVs are out of scope. The formal definition of a SSTB means a stand-alone device which, irrespectively of the interfaces used,

a) has the primary function of converting standard-definition (SD) or high definition (HD), free-to-air digital broadcast signals to analogue broadcast signals suitable to analogue television and radio;

b) has no “conditional access” (CA) function, i.e. it can be used without subscription service;

c) offers no recording function based on removable media in a standard library format.

A SSTB can be equipped with the following additional functions and/or components which do not constitute a minimum specification of an STTB:

a) time-shift and recording functions using an integrated hard disk;

b) conversion of HD broadcast signal reception to HD or SD video output;

c) second tuner.

This Impact Assessment will enable the UK to assess the costs and benefits to the UK of the measure as proposed by the European Commission and help inform our negotiating and voting position during the forthcoming Regulatory Committee meeting and at any subsequent meetings.

The UK has fully participated in all EU discussions on this measure to date, using evidence developed by the UK Market Transformation Programme (MTP) to inform our discussions and to influence the development of the proposal.

The Commission proposal has now been formally tabled for a vote of the relevant EU regulatory committee on 26 September where the UK will need to be in a position to either support or oppose the measure.

Voting at the Committee is under the Qualified Majority Voting Procedure. If approved the measure will go to the European Parliament and the Council for Scrutiny; if it is not then it will be passed to the Council to resolve, followed by a review by the European Parliament. If approved this measure will be subject to review no later than 5 years after entry into force (around 2010).

2. Rationale for Intervention

Market failures occur, for instance, where negative externalities (e.g. carbon emissions) affecting the wider general public are not compensated for in market transactions in terms of the price paid for electrical goods. As a result, the level of pollution via carbon emissions and other air pollutants are higher than might be the case if the cost of pollution were fully incorporated into product prices. To respond to this, policy tools exist to correct for negative externalities. Across the EU, the EU Emissions Trading Scheme internalises the carbon externality back into market transactions and its coverage includes large electricity producers. In total it captures approximately 50% of all EU CO2 emissions.

However, policy tools such as the EU Emissions Trading Scheme do not correct for all market failures, e.g. where barriers to behaviour change still persist (due to another form of market failure – lack of, or inequality in information). For instance, consumers are not always aware of the availability of the most efficient products (and of the difference in costs of running them versus other less efficient equipment. Other barriers include:

- some groups have do not have a good idea about their energy costs;
- some people do not look at energy consumption data (for some products, currently not including SSTBs, included in an energy label) but at the price, brand or other recommendations when they buy a product;
- most people tend to assume that newer products are more efficient.

Even where consumers do have access to all information required to make informed decisions on the purchase of energy efficient products, the fact that there are such a wide range of factors to consider (price, colour, maintenance facility, easy access, brand name etc.) can often mean that energy efficiency is not considered as a major determining factor in the decision to buy one product over another. In addition, frequently consumers do not want to go through the hassle of changing to more efficient products due to the perceived significant time/hassle cost involved

This analysis is consistent with the “third leg” of the Stern Report (the need to develop policies to remove barriers to behaviour change such as a lack of reliable information, perceived significant transaction costs, and organisational and individual inertia) and provides the rationale for the Implementing Measure which complements the EU ETS as described above.

3. Content of the proposed Implementing Measure and options

The proposed Implementing Measure for simple set top boxes sets out a number of eco-design requirements that set limits on the power consumption of electrical and electronic equipment in standby and on-mode for different types of set top box (STB). The following types are considered in the modelling:

a) Standard Definition (SD) SSTB-no hard drive-1 tuner-no display

b) SD SSTB-with hard drive-2 tuners-1display

c) High Definition SSTB-no hard drive-1 tuner-no display

d) HD SSTB-with hard drive-2 tuner-1 display

The requirements from Annex I are summarised in the following Table:

Table 1: Eco-design requirements: power consumption limits		
Year of implementation	Mode	
	Standby mode	Active mode
By 2010		
Simple STB	1.0 W	5 W
Allowance for display function in standby	+ 1.0 W	-
Allowance for decoding HD signals	-	+ 3 W
By 2012		
Simple STB	0.50 W	5 W
Allowance for display function in standby	+ 0.50 W	-
Allowance for hard disk	-	+ 6 W
Allowance for 2nd tuner	-	+ 1.0 W
Allowance for decoding HD signals	-	+ 1.0 W

The implementing measure also requires that one year after this implementing measure has come into force all simple STB shall by equipped with an "Automatic power down" or similar function so that the simple STB should be automatically switched from on mode into standby after less than 4 hours in the on-mode following the last user interaction and/or a programme change, with an alert message 2 minutes before going into standby mode. This shall be set as a default.

As for the measurements, the procedure shall take into account the generally recognised state of the art. Measurements of power of 0.50 W or greater shall be made with an uncertainty of less than or equal to 2% at the 95% confidence level. Measurements of power of less than 0.50 W shall be made with an uncertainty of less than or equal to 0.01 W at the 95% confidence level.

Finally it requires manufacturers to supply information on the product's performance. The elements that shall be contained in the technical are listed in the following box.

Box 1: Technical documentation information requirements

a) For standby and active modes

- The power consumption data in Watts rounded to the second decimal place
- The measurement method used
- Period of measurement
- Description of how the appliance mode was selected or programmed
- Sequence of events to reach the mode where the equipment automatically changes modes
- Any notes regarding the operation of the equipment

b) Test parameters for measurements

- Ambient temperature
- Test voltage in V and frequency in Hz
- Total harmonic distortion of the electricity supply system
- The fluctuation of the power supply voltage during the tests
- Information and documentation on the instrumentation, set-up and circuits used for electrical testing
- Input signals in RF (for digital terrestrial broadcasts) or IF (for satellite broadcasts)
- Audio/video test signals as described in the MPEG-2 transport stream
- Adjustment of controls

4. Identification of Potential Impacts

The Implementing Measure, in setting the requirements identified in section 3 above, seeks to improve the environmental performance of Simple Set Top Boxes in both standby and active modes.

Environmental performance of products must be considered throughout their life cycle, at the component/product manufacturing, usage and end-of-life phases. Changes will need to be made to products that are currently not in compliance with the proposed measure and consequently it is necessary to consider the impacts of those changes on all relevant stakeholders at each stage of the products' life cycles. Table 2 below sets out the potential environmental, economic and social impacts at each of the like-cycle phases that will be examined (including their costs and benefits) in subsequent sections.

Table 2: Areas of potential impacts

Life cycle stage	Impact Category		
	Environmental	**Economic**	**Social**
Component/Product Manufacture	Material and energy use requirements during manufacturing process	Costs of production for manufacturers and subsequent consumer prices. Availability of technology and need for R&D. Other compliance issues e.g. labelling, supply chain management, competitive position. Market surveillance and compliance systems and processes.	Possibility of firms leaving the market and any effects on employment
Usage	Changes in electricity consumption across UK due to less power consumed in active, standby and off-modes. Changes CO_2 emissions across UK due to less power consumed in active, standby and off-mode. Changes in air quality as result of less electricity being generated.	Changes in energy costs for consumers and businesses (a select number of businesses may also use SSTBs) resulting from any changes in electricity consumption.	Changes in functionality of products as result of compliance with requirements or due to decisions of manufacturers when faced with decisions on product adaptation. Changes in CO2 emissions and associated climate change impact will bring benefits to communities (from reduced extreme events)
End of life	Ease of recycling and any requirements to deal with different materials used in order to ensure compliance.	Changes in recycling and waste management costs.	

4.1 Component/Product Manufacture

Overall there are not many STB covered by the Implementing Measure that are already compliant with the requirements set for power consumption and power management for off-standby and active modes in products; those that are closer to meeting the requirements are basic SSTB without hard drives (compliance currently estimated at 10% by the Market Transformation Programme (MTP)[1]). For such products, limited action will be required. For those products which are not currently compliant, a range of technical solutions exist in order to bring them into compliance. Examples of possible solutions (provided by MTP) are set out in table A1in the Annex.

4.1.1 Component/Product Manufacture – Environmental

Those products that may have more difficulties meeting the requirements are the STB with hard drives and/or high definition. Expert opinion from the MTP has noted however that the efficiency of hard drives has improved by around 30% over the last year. Moreover, there are developments expected, with lower energy consumption hard drives being released over the next year and it is expected that the price of the hard drives will be decreasing (it has been estimated that the costs per Gb. has dropped by 30%). Generally though, the main

[1] The programme established to support the development and implementation of UK Government policy on sustainable products

environmental impact generated from Simple STBs is not at the production stage but as its use stage. This suggests that environmental costs and benefits from moving to compliance with the proposed standards in terms of materials involved and energy usage in the manufacturing phase are likely to be negligible.

4.1.2 Component/Product Manufacture – Economic

4.1.2.1 Making Products Compliant

In assessing the costs to manufacturers of making the product compliant, it is noteworthy that some of the cost implications for the standby mode will have already been incurred by the time this measure comes into place; this is assuming that the off mode and standby horizontal implementing measure (IM) comes into place earlier than the SSTB IM.

The exemptions to this will be STB models without displays which will be subject to more stringent requirements than those modelled under the standby and off-mode measure[2]. Table A2 in the Annex shows the conclusions of the EU Preparatory Study on SSTBs on the potential improvement options for the reduction of the power demand of simple STBs and combined simple STBs / personal video recorders (PVRs) in active mode, with Table A3 showing the improvement options for standby mode. These tables reflect the results of the preparatory study and these costs have been investigated further in this IA.

Although the preparatory study suggested cost neutral solutions, the various solutions will require some manufacturers to make different technical and physical adjustments to their products in order to bring them into compliance with the proposed requirements; as a result, they will incur some additional costs in making such adjustments. Limited information on these costs is currently available. It is important to note here the difference in opinion between producers and technical experts (EU and UK) on potential costs. Some experts say that the costs would be negligible whilst one producer has said that this could be up to £50 per product on high end devices retailing at around £150 to £200 (though this was based off amortisation of costs across only one production cycle). More realistic assumptions provided by MTP experts range from £0.54 to £5.40 depending on the complexity of the product and the volume of manufacture. Given the fact that the cost estimate for high end products listed above came only from one producer and that the majority of products retail at significantly less than £150 to £200, the following estimates provided in Table 5 below have been adopted for the different product categories in order to estimate costs to manufacturers and not to skew the analysis. In order to avoid double counting, the standby implementing measure requirements have been included in the reference line power consumption for this analysis. However, in previous modelling under the standby implementing measure, it was assumed that all STB models would not feature a display. Therefore, at this more detailed level of modelling, there are some small additional savings, which are included in this assessment, due to off/standby consumption improvements.

[2] In order to avoid double counting, the standby implementing measure requirements have been included in the reference line power consumption for this analysis. However, in previous modelling under the standby implementing measure, it was assumed that all set top boxes featured displays. For the purposes of this more detailed modelling exercise, it has been assumed that basic STB models will not feature a display. Therefore, at this more detailed level, there are some small additional savings due to off/standby consumption improvements accounted for.

Table 5: Estimates of costs to make products compliant (£/per product) (£2008)			
Solution	**Notes**	**Assume costs (£/per product)**	**Assumed costs post 2016**
SD SSTB-no hard drive-1 tuner-no display	**Costs refer to meeting active and standby requirements.**	£0.45	Negligible
SD SSTB-with hard drive-2 tuners-1display	**Costs refer to meeting active and standby requirements**	£2.64	Negligible
HD SSTB-no hard drive-1 tuner-no display	**Costs refer to meeting active requirements alone**	£4.46	Negligible
HD SSTB-with hard drive-2 tuner-1 display	**Costs refer to meeting active requirements alone**	£4.46	Negligible
* Costs are based on existing information from MTP and have been revised downwards to account for VAT but not other taxes (labour taxes, EU ETS) Note also that for the first and third product types, the standby allowance for tier 2 requirements in the IM is stricter, i.e. from 1W to 0.5 and this has been accounted for in the modelling.,			

Projected sales figures for the four types of STB over the period 2010 to 2020 have been provided by MTP. Expert insight from the MTP has also been used to estimate the percentage of products that are already compliant with the proposed restrictions on power consumption to provide an estimate of the volume of products placed on the market in each year from 2010 to 2020 which will need to be adapted. Using the base costs above the following results for costs to manufacturers in table 6 have been produced. Note that these are based on the number of products requiring adaptation in order to comply, which varies per year per type. As can be seen from the Table the largest costs are expected to arise in 2012 and 2013 when the second tier comes into force and also due to the fact that the majority of sales are of products which require more expensive solutions to make these compliant. It is assumed that costs from Estimates of compliance levels running up to the IM requirements coming into force are provided in the Annex in Table A4 and these are combined with the estimated sales provided by MTP and the estimated costs for making products compliant set out in Table 5 above to calculate the cost to manufacturers for making their products compliant. Since some products are predicted to be made compliant earlier in the period and the production cycle is assumed to be 4 years (after which production processes are assumed to be fully adapted and no compliance incurred on sales thereafter), the proportion of sales that will need to be made compliant in the later years will become progressively reduced since a number models will have been made compliant in earlier years. Consequently, it is assumed that costs from 2016 onwards will be negligible as most manufacturers will have gone through a regular redesign process by that point, incorporating technology already available (e.g. low power consumption hard drives) into their products and benefiting from economies of scale.

Table 6: Costs to manufacturers /£, discounted at 3.5% (£2008)	
Year	
2008	754,000
2009	2,458,000
2010	6,591,000
2011	7,388,000
2012	15,226,000
2013	15,288,000
2014	12,411,000
2015	7,819,000
2016 - 2020	Negligible
Total	**67,935,000**

It should be noted that uncertainties exist in the data for the number of products requiring adaptation along with similar uncertainties over the exact costs that will be incurred by different

manufacturers of different products, meaning that actual costs may vary significantly. However, owing to the lack of other data, these are the best estimates available that can be generated to date.

Additional costs might be incurred by manufacturers if they are made responsible for testing costs in order to demonstrate compliance of their products with the requirements of the implementing measure. Potential compliance testing cost are identified in Table 8 in Section 4.1.2.5 Market Surveillance and Compliance Systems and Processes below, and in more detail in Table A5 in the Annex.

4.1.2.2 Information Requirements

In addition to the costs associated with actually making products compliant, the Implementing Measure requires manufacturers to "declare in the technical documentation file a test report" and provides a list of elements to be included in this report. This requirement will necessitate that manufacturers make minor changes to their product documentation with associated costs. No specific information is available on the costs for producing documentation for STBs but the proposed changes are very minor and associated costs are likely to be negligible. This is also because some of these costs will probably have been incurred due to the standby and off-mode IM for some of the products, under the assumption that this is implemented first. Whatever small costs that are incurred will be associated with a redesign of product documentation and will be a one off cost to manufacturers. Given the volumes and economies of scale associated with the products in the electronic and electrical equipment sector, the costs on a per product basis will be negligible.

4.1.2.3 Supply Chain Management and Competitive Position

The potential solutions for ensuring compliance with the Implementing Measure's requirements are likely to involve a range of the supply chain situations set out Box A1 in the Annex which provides more details on supply chain and competition issues associated with the Implementing Measure. Expert opinion from the Market Transformation programme suggests that there is widespread availability of suppliers of the hardware and software required to make components compliant and in a competitive market, suggesting that there is unlikely to be a shortage of required parts and that individual suppliers will not be able to impose significantly increased prices due to higher demand. There are therefore unlikely to be any major competition issues associated with adoption of the Implementing Measure.

The range of supply chain solutions and the number of companies able to provide the required solutions also suggest that it will be relatively straightforward for manufacturers to adapt their supply chains to the requirements of the Implementing Measure at minimal cost.

4.1.2.4 Costs to Consumers

The switch over in the UK to digital television has resulted in significant numbers of set top boxes being purchased. According to Ofcom, 18.7 million set top boxes have been sold in the UK since 2002 up to the first quarter of 2007; these are installed in approximately 16.1m homes. The original estimate for the UK was a potential market of 14.3 million. This is the second highest in Europe after Italy (estimated at 16.6million). The following Table shows sales figures for freeview STB from 2007, quarterly.

Table 7: Freeview STB sales

Q1 2007	Q2 2007	Q3 2007	Q4 2007	Q1 2008
1,084,650,	942,690	1,170,855	1,775,130	1,151,955

Source: Ofcom (2008): The Communications Market: Digital Progress Report, Digital TV, Q1 2008. Available at: www. Ofcom.org.uk/research/tv/reports/dtv/stu_2—8_q1/dtu_2008_q1.pdf

It is predicted that the sales will continue to grow until 2012 with households replacing existing STBs or buying additional ones. The average price of STB has decreased significantly over the last few years (e.g. SSTB without hard drives have reduced from £31 to £24) and there are no indications that this situation is likely to change as a result of increased costs to manufacturers associated with the requirements of the Implementing Measure, given the competitive nature of the electrical product sector. Indeed, of the two SSTB of 9 products tested in a recent survey[3], without hard drives, that would meet the EuP requirements one is priced £4 below the average of £24 whilst the other one is only £6 above. In the short run manufacturers would ideally pass on increased costs to consumers (manufacturers would definitely do this in the long run due to competition) and the extent to which this is possible will depend on the competitiveness within the product sectors. The rate of increase in prices in the electrical domestic appliance sector has been consistently below the rate of inflation, suggesting that the increase in price to consumers might not be significant. Moreover, over the next 3 to 4 years the technology of lower energy hard drives will have developed further so, according to experts, there will be limited impacts on the selling price of high efficient hard drives.

In the case where the overall amount of costs are passed on to consumers, the costs per product are likely to be low (a few pounds or less). Over the lifetime of the product they are outweighed by the savings due to reduced electricity bills, as demonstrated in Table 6 above and Table 14 below . Consequently, consumers will benefit, (although the savings from each product will be small and therefore not noticeable to the consumer). The small increase in capital costs due to the measure (actual and as a percentage of appliance capital cost) means that the measure is unlikely to present a cash flow issue to the fuel poor.

4.1.2.5 Market Surveillance and Compliance Systems and Processes

The draft Implementing Measure sets out a number of requirements for compliance verification procedures. This is replicated in the following Box.

Box 2: Verification procedure

For power consumption larger than 1.0 W: Member State authorities shall test one single unit.

The model shall be considered to comply with the provisions set out in Annex I, Points 1 and 2, as applicable, of this Regulation if the results for active and standby mode conditions, as applicable, do no exceed the limit values by more than 10%.

Otherwise, three more units shall be tested. The model shall be considered to comply with this implementing measure if the average of the results of the latter three tests for active and standby mode conditions, as applicable, does not exceed the limit values by more than 10%.

For power consumption smaller than, or equal to, 1.0 W: Member State authorities shall test one single unit.

The model shall be considered to comply with the provisions set out in Annex I, Points 1 and 2, as applicable, of this Regulation

[3] http://www.ricability-digitaltv.org.uk/index.htm

if the results for active and/or standby mode conditions, as applicable, do not exceed the limit values by more than 0.1W. Otherwise, three more units shall be tested. The model shall be considered to comply with this implementing measure if the average of the results of the latter three tests for active and/or standby conditions, as applicable, does not exceed the limit values by more than 0.1W. Otherwise, the model shall be considered not to comply.
Source: Draft IM, Annex II

No first-hand data is available on the costs of testing for compliance in the UK for STB. Data from Australia estimate a cost of $2,000/test per model supplied, equivalent to around £930 per test per model to today's rate of exchange (test by a testing laboratory; EnergyConsult Pty Ltd, 2007). This has been used to calculate the testing costs as reported in the Table A5 in Annex, including assumptions. A summary Table is presented below.

Table 8: Testing costs (2008 – 2020)/£

	Undiscounted	Discounted
Lower bound	301,000	254,000
Upper bound	417,000	351,000

Note that there are a number of caveats associated with these estimates, e.g. number of units undergoing testing may be an overestimate; equally companies may undergo their own compliance test in-house at a lower cost. It is noted that the UK has not yet determined the regime for testing EuP appliances for conformity and it is uncertain at this time whether or not testing will be carried out independently with the costs falling to the authorities or whether some form of self-certification system based on verification of design will be put in place. An amount in the region of £250,000 may be set aside by the authorities for establishing compliance systems for all products subject to EuP requirements and it is to be noted that this is separate from the compliance testing costs indicated above.

4.1.3 Component/Product Manufacture – Social

It seems unlikely that manufacturers in the UK will opt to leave the market rather than incur the extra costs associated with making their products compliant or will be forced to leave the market as a result of competition from other manufacturers. Thus impacts on employment are expected to be negligible.

Table 9 below provides an indication of the number of enterprises involved in the manufacture of electric domestic appliances in the UK and the number of people employed. No more detailed information has been made available to enable us to be broken down specifically address STBs.

Table 9: Number of enterprises and total employment in UK electronics manufacturing 2006

SIC Code	Description	Number of Enterprises	Total Employment
29.71	Manufacture of electric domestic appliances	383	17,000
Source: ONS (2007): Annual Business Inquiry 2007, available at: http://www.statistics.gov.uk/abi			

The previous sub-section indicates that UK companies will not likely be negatively affected in their competitive position vis-à-vis other EU and international competitors, and given the relatively straightforward solutions available for making products compliant and their limited costs, it is unlikely that manufacturers would simply elect to leave the market. There is consequently unlikely to be any significant effect on employment levels as a result of adopting the Implementing Measure.

4.2 Product Usage

As with impacts associated with the component/product manufacturing phase, Table 4.1 sets out the potential areas of impacts for the Implementing Measure under the three categories of impacts: environmental, economic and social. The likely costs and benefits under each of these three categories are set out in the following sub-sections.

4.2.1 Product Usage – Environmental

Three areas of environmental impact associated with reduced power consumption during use and in standby and off-mode losses have been identified as environmental benefits resulting from the implementation of the proposed Implementing Measure. These are:

- Reductions in electricity consumption across UK due to less power being consumed;
- Reductions in CO2 emissions across UK due to less power being consumed;
- Improvements in air quality as a result of less electricity being generated at power stations due to less power being required;
- Additional non-monetised benefits (e.g. ecosystems benefits resulting from reduced air pollutants, reduced CO2 emissions and associated climate change impacts benefiting communities in terms of reduced numbers and scale of extreme events)

There may be some environmental costs (lower levels of the benefits identified above) related to the removal of the standby and off-mode functions from STB if manufacturers elected to redesign their products in such a way to avoid the stipulations of the IM. These however are not considered here as they would be included in the IM concerning standby and off-mode. Moreover, the draft IM on off-mode and standby attempts to avoid such negative impacts by stipulating that "Equipment shall, unless inappropriate for the intended use, provide off mode and/or standby mode" in Annex II of the measure, Ecodesign Requirements.

In order to calculate benefits for each of the three impact types, the model has calculated the likely reductions in electricity consumption and CO2 emissions and resulting improvements in air quality subsequent to lower levels of electricity generation. Note however that in calculating the energy savings one needs to bear into account the Heat Replacement Effect (HRE[4]). This stems from the fact that the energy savings will have to be offset by an increased need for space heating energy, although this is limited in the case of SSTBs..

The calculations of the benefits of the products modelled in terms of reduced electricity consumption, reduced CO2 emissions and air quality improvements already account for the baseline situation and have taken the following into account:

- the increase in household numbers
- the decrease in household size
- the increased number of consumer electronic products in each household and the number of hours they are on

The models also take into account the lifetime of each product (with a random distribution around the average) and calculate the number needed to replace those disposed of, plus or minus any increases or decreases in sales needed to meet the overall expected stock numbers.

The modelling accounts for the 'business as usual' references scenario and takes into account improvements in product performance that are due to normal processes (such as improved technology, the need for cost savings and competition) and to adopted policy relating to

[4] HRE carbon calculations reference old MTP carbon factors rather than the standard carbon factor for this analysis. Updates to bring this in line with other Carbon factors were not possible within the time constraints of this analysis, and would have very little impact on the final figures.

electrical and electronic equipment (including the EuP implementing measure on standby). The impacts are therefore assessed as being in addition to what the market and existing policies are expected to deliver. The majority (estimated at >98%) of these savings arise from this policy alone – there are only very minimal possible overlaps with other policies – CERT being the only policy that could contribute very slightly to these impacts. Consequently, the benefits stated are considered to be net of the baseline.

The modelling assumes a constant value for CO2 emissions from electricity. Similarly the air quality assumptions assume a constant generation mix between different sources (in accordance with IPPC standards). Emission factors (taken from the NAEI) and damage costs (from IGCB central values) have been provided by DEFRA to carry out the air quality related calculations.

4.2.1.1 Changes in damages from climate change as a result of changes in CO2 emissions

In accordance with government guidance, the valuation of the decrease in emissions that will result from products using less power is calculated using the projected EU Allowance price under the EU Emissions Trading Scheme i.e. the revenue gained from selling permits for emissions.

The values for the EU Allowance used for the period 2008 to 2020 are as follows:

Table 10: EU allowance under emission trading

£/tCO_2	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
2008 Prices	16.0	16.4	16.8	17.3	18.0	28.5							

Assumptions: All prices expressed in £2008, Exchange rate of €1 = £0.7, 2010 -2012 uses prices from the forward market (averaged across August 2007-May 2008), and 2013-2020 is based upon the European Commission's price forecast of €39 (2005 prices) from their Impact Assessment for measures to meet the Climate and Energy Package, adjusted to 2008 prices.

Applying these allowance prices to the CO2 savings identified (discounted at 3.5% and in 2008 prices), table 11 below provides the value of the benefits from reducing CO2 emissions which would result.

Table 11: Value of reduction in CO2 emissions (£2008)

Year	Energy savings (GWh)	CO2 reduction (Ktonnes)	Value of CO2 emission reduction (£, undiscounted)	Value of EU ETS Allowance Savings (£, discounted)
2008	0	0	0	0
2009	41	17	290,000	280,000
2010	122	52	880,000	820,000
2011	875	376	6,520,000	5,880,000
2012	1,008	434	7,800,000	6,800,000
2013	1,139	490	13,960,000	11,750,000
2014	1,267	545	15,530,000	12,630,000
2015	1,384	595	16,960,000	13,330,000
2016	1,473	633	18,050,000	13,710,000
2017	1,562	672	19,140,000	14,040,000
2018	1,639	705	20,080,000	14,240,000
2019	1,705	733	20,900,000	14,320,000
2020	1,769	761	21,680,000	14,350,000
Total	13,984	6,013	161,790,000	**122,150,000**

The CO2 emissions reductions set out in Table 11 above do not account for the fact that reduced energy consumption by STBs will lead to a loss in heat emanating from the equipment and consequently, there is likely to be a “heat replacement effect” (HRE) as people use more

heating in order to compensate for the loss of heat. This extra heating will result in a corresponding increase in CO2 emissions, representing an environmental cost of the policy.

Table 12 below sets out the levels of CO2 emissions that would result from the increase in energy use and calculates their value. The cost applied to the CO2 emissions is not the same as in Table 11 above (the EU ETS allowance rates set out in Table 10) since heat energy is not in the capped ETS sector. Therefore, in accordance with DEFRA guidance, these emissions are valued at the shadow price of carbon in 2008 prices.

Table 12: Value of increase in CO2 emissions as a result of the heat replacement effect

Year	CO2 Emissions Saved from lower power consumption of STBs /kt CO2	HRE Factor[1]	CO2 Emissions /kt CO2	Shadow price of carbon/£ per tonne	Value of emissions/£ (undiscounted)	Value of emissions/£ (discounted)
2008	0	0.3378	0	26.5	0	0
2009	17	0.3333	6	27.0	160,000	150,000
2010	52	0.3293	17	27.6	480,000	450,000
2011	376	0.3257	123	28.1	3,440,000	3,100,000
2012	434	0.3224	140	28.7	4,010,000	3,490,000
2013	490	0.3195	156	29.2	4,570,000	3,850,000
2014	545	0.3168	173	29.8	5,140,000	4,180,000
2015	595	0.3144	187	30.4	5,690,000	4,470,000
2016	633	0.3123	198	31.0	6,130,000	4,660,000
2017	672	0.3105	209	31.6	6,590,000	4,840,000
2018	705	0.3089	218	32.3	7,030,000	4,980,000
2019	733	0.3076	226	32.9	7,420,000	5,080,000
2020	761	0.3066	233	33.6	7,840,000	5,190,000
Total	**6,013**		**1,884**		**58,500,000**	**44,440,000**

[1] These HRE factors are calculated from the carbon HRE beneficial factors provided by MTP for the % of carbon savings that would be realised from the reductions in power consumption of STBs. The value is calculated as "1 minus the HRE factor".

The carbon emissions represent a cost of the policy and are recorded in the cost section of the summary sheet above.

4.2.1.2 Value of reduced damage costs due to air quality improvements

The reduction in energy usage that will result from restricting power consumption will have additional benefits in terms of air quality since less pollution will be generated from power stations. The value of air quality impacts can be assessed by measuring the marginal external costs caused by each tonne of pollutant emitted. In this case, in the absence of detailed data on air pollution from power stations, damage costs approximating the value of air quality changes by applying average values for the benefit of reducing a pollutant emitted by one tonne have been used as provided by Defra.

Applying these costs to the gross amount of energy savings resulting from the reduction in power consumption provides the following benefits in terms of damages avoided for the period from 2010 – 2020 (discounted at 3.5% at 2008 prices). The cost per ton of air pollutants applied for the calculations in Table 13 are included in Table A6 in the Annex and these values have been applied in accordance with DEFRA guidance to the energy savings identified in Table 11 above.

Table 13: Value of Improvements in air quality (£2008)		
Year	undiscounted	discounted
2008	0	0
2009	60,000	60,000
2010	180,000	170,000
2011	1,290,000	1,160,000
2012	1,510,000	1,320,000
2013	1,740,000	1,470,000
2014	1,970,000	1,600,000
2015	2,200,000	1,730,000
2016	2,390,000	1,810,000
2017	2,580,000	1,890,000
2018	2,760,000	1,960,000
2019	2,930,000	2,010,000
2020	3,100,000	2,050,000
Total	22,710,000	**17,230,000**

4.2.2 Product Usage – Economic

The major economic impact as a result of placing restrictions on power consumption is being benefits to consumers in terms of savings from lower electricity bills from reduced power consumption of electrical equipment.

Benefits to consumers from reduced energy consumption have been calculated by taking the savings in energy use (in GWh) identified above and multiplying these by average long run marginal (resource) costs (as advised by BERR and used in a recent impact assessment on Smart Metering) for electricity for both domestic and commercial use in each of the respective years from 2008 to 2020. The Electricity prices (per kWh) applied to the energy savings are given in Table 14.

Table 14: Electricity prices per kWh													
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Domestic	4.99	5.14	5.29	5.30	5.31	5.32	5.33	5.34	5.35	5.36	5.36	5.37	5.38
Commercial	4.29	4.47	4.65	4.67	4.69	4.72	4.74	4.73	4.75	4.77	4.78	4.80	4.82

The resulting savings to consumers and businesses have then been adapted for the fact that lower power consumption in active, standby and off-modes will result in less beneficial heat being generated from electrical products. Although the heat generated from SSTBs will not be excessive, heat replacement factors have been used to scale down the savings from the proposed Implementing Measure under the assumption that additional energy will be required to generate the “lost” heat.

Different HRE factors have been used for different product groups and years between 2008 and 2020.

Table 15: Total savings energy consumption and carbon emissions 2010 – 2020 (£2008)				
	Value energy savings (unadjusted by HRE), undiscounted	HRE factor (consumer electronics)*	Savings in energy consumption/GWh (adjusted by **HRE S-cost) , undiscounted	Savings in energy consumption/GWh (adjusted by **HRE S-cost) , discounted @3.5%
2008	0	79%	0	0
2009	2,090,000	79%	1,660,000	1,600,000
2010	6,440,000	80%	5,170,000	4,830,000
2011	46,400,000	81%	37,520,000	33,840,000
2012	53,550,000	81%	43,580,000	37,980,000
2013	60,600,000	82%	49,620,000	41,780,000
2014	67,510,000	82%	55,590,000	45,220,000
2015	73,870,000	83%	61,160,000	48,070,000
2016	78,750,000	83%	65,230,000	49,540,000
2017	83,660,000	83%	69,320,000	50,860,000
2018	87,900,000	83%	72,840,000	51,640,000
2019	91,630,000	83%	75,920,000	52,000,000
2020	95,210,000	83%	78,870,000	52,190,000
TOTAL	747,610,000		**616,480,000**	**469,550,000**

*Note that these HRE factors were based on figures provided previously for other implementing measures, i.e. standby and off-mode and may be subject to change in the future. They have been developed on the basis of a consumer price for electricity of 10p per kwh (2010 price). Electricity prices used in this IA and to calculate savings in column 2 above are based on prices set out in table 14. It has not been possible to adjust the HRE factors in light of this difference in the time available for this IA but only very slight changes would occur in the HRE factors and this will affect calculations significantly.

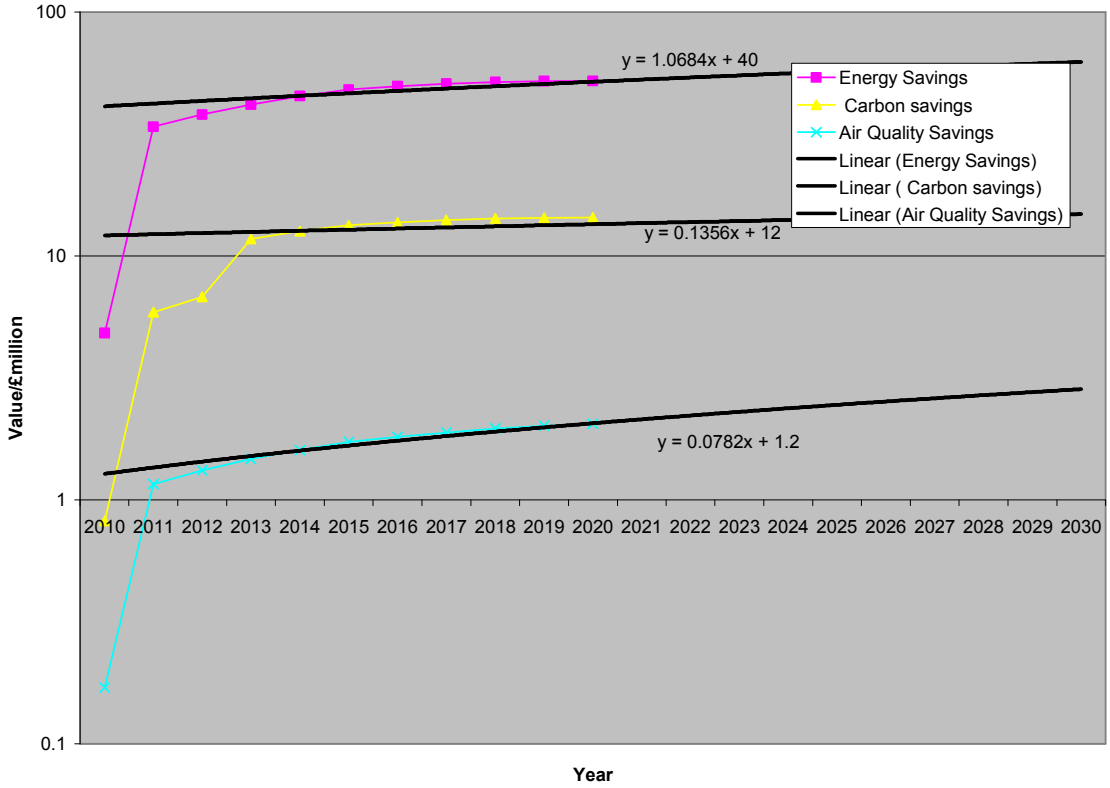
**savings are net of the Heat Replacement Effect (HRE) see

http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=151 for details.

The above analysis has considered benefits across an implementation period between 2008 and 2020. It is most likely the case that the energy savings, reductions in carbon emissions and air quality improvements resulting from the proposed legislation will continue beyond 2020, with future sales of compliant products meaning that energy consumption, carbon emissions and air pollutants will all continue to be reduced with respect to the current baseline position.

Figure 1 below is based on a linear projection of the benefits identified from the MTP models (which go up to 2020) for a further period to 2030.

Figure 1



Extrapolating the benefits into the future based on the trendlines for the benefits accruing from 2008 to 2020 would yield approximately an extra £ 730 million in energy saving, carbon emission and air quality savings for the period 2021 – 2030. Table A7 in Annex provides more detail on the calculation of this figure.

However, it must be noted that this level of benefits is highly uncertain, given the fact that a simple linear trend line has been used as for the calculations. Little information is available on the level of replacement during this extra period and it does not take into consideration any improvements in energy consumption that may have happened in the absence of the implementing measure. Care must be taken in comparing these extra benefits with the overall costs identified in this impact assessment since costs to manufacturers as a result of the legislation have been assumed to be negligible after only one production cycle and consequently taper off after 2015.

4.2.3 Summary of Monetised Benefits

Table 15 summarises the benefits predicted in terms of the benefits to consumers of energy savings, the value of reduced damages from climate change due to lower emissions and the value of air quality damages avoided. It is worth noting that the appraisal period starts from 2008 and then estimates the benefits over the lifetime of the measures whereas the costs also start from 2008 but they are only expected to be transitional. There may be some disadvantages in doing this (i.e. since the market has been transformed, we would be unlikely to attribute the net-benefits to the policy forever) however it is difficult to estimate with accuracy how cost and benefits will decrease or increase over time.

Table 15: Total economic benefits (£, discounted at 3.5% over period from 2008 to 2020 (2008 prices)	
Total Value Energy Savings	469,550,000
Total Value CO2 savings	122,150,000
Total Value Air Quality Damages Avoided	17,230,000

Total	**608,930,000**

4.2.4 Product Usage – Social

In a general sense, the issue of functionality is not likely to be a major issue in most cases. However, there are instances where a reduced power usage will hinder the speed with which a product operates or returns to a state where it can perform its main function. Again, this may not be an issue in many cases and manufacturers might be able to introduce product changes without any fear of losing their market share. It is expected however that such costs will decrease overtime.

4.3 End of Life Phase

The materials used in implementing solutions to enable products to comply with the proposed implementing measure are already used in many applications by a wide range of products. Expert opinion suggests that there will be negligible changes in the waste stream generated from products which are to be made compliant with the requirement of the legislation.

Similarly, as people purchase newer energy efficient products which are in compliance with the requirements of the draft implementing measure, there might be some who simply throw away their old equipment, thereby increasing the waste stream. Often there is a delay in products entering the waste stream, with as much as 30% of products being stored/retained for a number of years after primary use (Kuerh and Williams, 2004[5]).

Consequently no major environmental or economic effects are expected in the end-of life phase as a result of implementing the requirements.

4.4 Sensitivities

No sensitivities have been carried out for the following: (i) changes in EU Allowance prices when calculating the benefits in terms of carbon emission reductions; and (ii) variations in electricity prices for the calculation of consumer benefits.

Also note that the “rebound effect” (which analyses where money saved from energy efficiencies may lead to subsequent emissions elsewhere) is not accounted for but that it would apply to the CO2 and local air quality impacts only which are small relative to energy savings benefits.

Preliminary sensitivity analysis carried out on the basic MTP models has suggested that the aspect of the implementing measure responsible for the greatest energy savings by the end user is the power management requirement (for the STB to enter a low power mode automatically after a period of 4 hours) – rather than the power consumption threshold requirements. The impact power management has on the usage profile results in the largest savings and further reduction of the time delay (for example, if the implementing measure were to require a low power mode to be entered after 3 hours rather than 4) would result in the greatest improvement in benefits for implementing the measure.

Due to the scale of the difference between predicted costs and benefits, inclusion of either of these factors will significantly increase the monetary benefits due to energy savings and those due to CO2 and air quality, while leaving the cost constant but it would not affect the overall conclusions of this IA.

[5] in “Computers and the Environment”.

5. Climate Change Policy Cost-Effectiveness Indicator

All Impact Assessments that estimate changes in CO2 emissions in excess of either (i) 0.1MtCO2e average per year for appraisal of less than 20 years, or (ii) 2.0MtCO2e over the lifetime of appraisal of more than 20 years, are required by PSA Delivery Agreement 27, Indicator 6 to undergo a Climate Change Policy Cost-Effectiveness analysis. This involves measuring the proportion of tonnes of CO2 abated, for which the cost falls below the Shadow Price of Carbon. This Impact Assessment falls into that category with average per year CO2 emissions reduced in excess of 0.1MtCO2.

Since the implementing measure results in changes in CO2 emissions in both the EU ETS traded sector (due to energy savings as a result of reduced power consumption by STBs) as well as changes in emissions in the non-traded sector (as a result of increased heating requirements since STBs will give out less heat when operating at reduced power consumption rates), it is necessary to consider two cost effectiveness indicators, one for the traded sector and one for the non-traded sector.

The cost effectiveness indicator is calculated as follows:

Cost effectiveness = NPV minus PV of CO2 / CO2 costs or savings

In the case of CO2 emissions in the traded sector:

(£496,301,000 - £122,150,000)/ 6,013 ktCO2 = -£62.22.

This figure represents a saving of £62.22 per tonne of CO2 saved and since it is a benefit (i.e. a negative cost) is clearly well below the weighted average discounted EU ETS Allowance price for the traded sector (calculated as £ £20.31 per tonne).

In the case of CO2 emissions in the non-traded sector:

(£496,301,000 - £44,440,000)/ 1,884 ktCO2 = £239.79

This figure would represent a cost of approximately £240 for every tonne of CO2 saved in the hypothetical case where a policy of heating houses with inefficient set top boxes were pursued. The weighted average discounted shadow price of carbon in this sector is £23.59

Therefore, it is clear that the policy results in cost effective reductions in overall carbon emissions.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	*Results in Evidence Base?*	*Results annexed?*
Competition Assessment	Yes	No
Small Firms Impact Test	No	No
Legal Aid	No	No
Sustainable Development	No	No
Carbon Assessment	Yes	No
Other Environment	Yes	No
Health Impact Assessment	No	No
Race Equality	No	No
Disability Equality	No	No
Gender Equality	No	No
Human Rights	No	No
Rural Proofing	No	No

Annexes

Table A1: Description of measures and potential costs to achieve requirements			
STB type	Issue	Cost	Details
1-SD SSTB-no hard drive 2-SD SSTB with hard drive	Achieving standby and active mode requirements (excluding hard disk component)	In the competitive market for a simple SSTB without a hard drive the maximum retail price increase would be $1 to $10, depending upon device design and size of production run. For type 1 - assume a value at the low end, as most products will be higher production run, lower cost – $1 For type 2 – assume a value towards the higher end as products will be lower production run, but higher price can still absorb some costs - $6	The solution is software development (which may or may not involve some chipset changes). This solution is currently available. It is estimated that all products are capable of achieving the required levels with minimum cost. Manufacturers implementing a complete chip set change to achieve these EuP levels will not wish to embark on a commercial road map for the production run of the product that raises component and software costs by more than $1 to $10 – and therefore will amortise costs accordingly. Impact will depend on the complexity of the product and the volume of manufacture. A high end product with added functions may cost more to change and will have lower production volume but higher margins capable of absorbing $10 than a low end product. For the majority of basic products (standard definition with basic connectivity) volumes would be high, and the aim would be to target a maximum of $1 increase in component/software costs. These costs include core software from the manufacturer (the bulk software requirement). To facilitate implementation of the changes by the manufacturer, and win sales, the costs are carried by the chipset provider in the first generation production runs rather than fully loaded on the manufacturer. As production runs increase the software costs are recovered by not passing on the total reduction in silicon manufacturing costs coming from volume production and lower reject rates through purity improvements. Texas instruments state that a change to New Silicon with core software provided is a component /software overhead of a maximum of $10. The only other cost is the software specific to the product (e.g. graphics/user interface / timer etc.) this is at most one man-year of programming at around £180K, and can be amortised over several production runs of various models.
3-HD SSTB no hard drive 4-HD SSTB with hard drive	Achieving active mode requirements	An average retail price increase of $10 (7%).	HD would require the development of new chip sets or changing of the design to an alternative (stripping down the product to a minimal specification) to enable compliance with the active mode requirements. Detailed data on the costs of changing the chip set, and the related software development cost, is not available from suppliers. UK suppliers are stating 25% price increase (approx £50)[6] per product, as they are pessimistically amortising the costs over a small production run. Usually, such costs would be amortised over a longer production run of around 4 to 5 years for affordability. Such approaches have been proven feasible as there are compliant relatively cheap products available in China. Technologists are estimating a realistic $10 (7%) increase in retail price to cover the costs of components and software if the producers do need to change chipsets (efficient chips sets are available at little extra cost, and the main overhead is software, amortised over long production cycles).
2-SD SSTB with hard drive 4-HD SSTB with hard drive	Achieving active mode requirements by reducing hard disk consumption	No cost	For SSTBs with hard drives, these will be compliant in 2013 with a slow ramp up and an exponential growth in 2011 and 2012 as low power consuming hard drives are made available. This is happening as part of the autonomous hard drive development (regardless of policy) and should be met at nil cost over the base case due to the steady increase in hard drive capacity and the prices falling accordingly with a 30% fall in costs versus a similar gain in capacity over the past 1.5 to 2 years. The general trend is for a fall in hard drive prices and a general

[6] Humax

			rise in the capacity at each price point while at the same time lowering energy consumption. It is estimated that the cost per Gb has dropped by 30%. In 2007 hard disk products only accounted for 10% of the total sales of SSTBs (source Ofcom). Over next 3 to 4 years the technology of lower energy hard drives will have developed further. It is also a question of software and memory to achieve an acceptable user interface activation time. These issues are dealt with in new Laptop PCs and this kind of solution (memory buffering hard disc boot up time) will migrate to SSTBs with integrated recording within the proposed implementation period. Requirements are feasible by 2013 - the memory buffer power budget (HDD) allowed for in 2013 is a generous allowance of 6W

Table A2: Improvement options for SSTBs for on-mode

Option	Specification of improvement	Improvement potential	Cost factor/availability
System integration DaVinci silicon	Reduction of components Reduction of PCB size	Reduction of power demand	Cost neutral Available
Software	Software design	Reduction of power load	Cost neutral Available

Source: table 7.1: On-mode Power Consumption Improvement for Simple STBs, European Commission DG TREN "Preparatory studies for Eco-design Requirements of EuPs, Simple Digital TV Converters (Simple Set Top Boxes), Final Report"

Note: This term was used in the preparatory study where costs were not considered to be a burden to manufacturers. Such terminology is not used for the purposes of this IM.

Table A3: Improvement options for SSTBs for standby mode

Option	Specification of improvement	Improvement potential	Cost factor/availability
System integration DaVinci silicon	Reduction of components Reduction of PCB size	Reduction of power demand	Cost neutral Available
Software	Software design	Reduction of power load	Cost neutral Available
Power supply dSID Chip	Additional figures for in-house load management	Reduction in power demand in Standby-mode	Cost neutral, if integrated. Available
Hard mains switch	Complete switch off power when not in On-mode		€2-3 extra costs

Source: table 7.2: On-mode Power Consumption Improvement for Simple STBs, European Commission DG TREN "Preparatory studies for Eco-design Requirements of EuPs, Simple Digital TV Converters (Simple Set Top Boxes), Final Report

Table A4: Costs to manufacturers from making products compliant

	SD SSTB-no hard drive-1 tuner-no display	SD SSTB-with hard drive-2 tuners-1display	HD SSTB-no hard drive-1 tuner-no display	HD SSTB-with hard drive-2 tuners-1display	SD SSTB-no hard drive-1 tuner-no display	SD SSTB-with hard drive-2 tuners-1display	HD SSTB-no hard drive-1 tuner-no display	HD SSTB-with hard drive-2 tuners-1display	TOTAL UNDISCOUNTED	Discount factor (@3.5%)	TOTAL DISCOUNTED
	% of units to be made compliant										
Year	10%	0	0	0	£0.45/unit	£2.64/unit	£4.46/unit	£4.46/unit			
2008	40%	0%	0%	0%	754,000	-	-	-	754,000	1	754,000
2009	60%	10%	15%	10%	929,000	738,000	99,000	779,000	2,544,000	0.966183575	2,458,000
2010	100%	30%	100%	20%	1,054,000	2,590,000	1,083,000	2,333,000	7,061,000	0.9335107	6,591,000
2011	100%	60%	100%	35%	836,000	3,369,000	1,219,000	2,767,000	8,191,000	0.901942706	7,388,000
2012	60%	100%	100%	100%	322,000	6,453,000	1,353,000	9,344,000	17,472,000	0.871442228	15,226,000
2013	40%	90%	85%	90%	85,000	5,855,000	1,090,000	11,128,000	18,158,000	0.841973167	15,288,000
2014	0%	70%	0%	70%	-	5,303,000	-	9,953,000	15,256,000	0.813500644	12,411,000
2015	0%	40%	0%	35%	-	1,964,000	-	7,984,000	9,948,000	0.785990961	7,819,000
TOTAL									**79,384,000**		**67,935,000**

Note: The costs calculated assume that the production cycle lasts 4 years and that after a 4 year period a manufacturer's sales once compliant will not incur extra compliance costs.

Table A2 is based on information provided by MTP estimating current and future compliance rates for each of the 4 product types. It is currently estimated that 10% of SD SSTB-no hard drive-1 tuner-no display units (Type 1) are currently compliant whereas none of the other three types are compliant. As the deadline for compliance with the requirements of the IM approaches in 2010 (for the product types in columns 2 and 4) and 2012 (for product types in columns 3 and 5) compliance levels are estimated to increase over the preceding years at different rates for different types of products.

Sales made by companies which make their products compliant earlier will not need to be made compliant in the fifth year after they are made compliant since it has been assumed that producers will have fully adapted their production processes after one production cycle of 4 years and they will not incur additional compliance costs. For example, 10% of sales of SD SSTB-with hard drive-2 tuners-1display units are made compliant in 2009. Companies selling these products are assumed to have fully adapted their production processes by 2012 and as a result, 10% of the overall sales in 2013 will not need to be adapted to become compliant and will not incur compliance costs, leaving 90% of overall sales to be adapted to be made compliant. Therefore, 90% of sales of this type of unit in 2013 have had compliance costs applied giving a total compliance cost for 2013 for this type of unit of £5,855,000. Consequently, in the following years, as more companies complete their production cycles and fully adapt production processes, a lower percentage of sales will need to be adapted to be made compliant and therefore fewer products will incur compliance costs.

Table A5: Testing costs														
Units going to testing per year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Lower bound	43	43	22	22	22	22	22	22	22	22	22	22	22	
Upper bound	60	60	30	30	30	30	30	30	30	30	30	30	30	
Costs														
UNDISCOUNTED														
Lower bound	40,000	40,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	**301,000**
Upper bound	56,000	56,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	**417,000**
DISCOUNTED														
Discount factor	*1*	*0.96618*	*0.933511*	*0.901943*	*0.871442*	*0.841973*	*0.813501*	*0.785991*	*0.759412*	*0.733731*	*0.708919*	*0.684946*	*0.661783*	*D*
Lower bound	40,000	39,000	19,000	18,000	18,000	17,000	16,000	16,000	15,000	15,000	14,000	14,000	13,000	254,000
Upper	56,000	54,000	26,000	25,000	24,000	23,000	23,000	22,000	21,000	20,000	20,000	19,000	18,000	351,000
Notes; Assumes £930 per test. Number of units tested 2008-2009 is two per model (legislation requires one to be tested and additional units if this fails) and from 2010 only one unit is tested as compliance rate increases.														

Box A1: Supply Chain Issues and Competitive Position

Despite differences in the function, value, specification, and brand of each STB encompassed by the proposed Implementing Measure, the production process, manufacturing characteristics and market structure of each product group can be described as relatively similar. In a globalised economy, this means that components are supplied and products assembled in any part of the world to benefit from scale economies in costs as well as offering the manufacturer the flexibility to pick and choose from the world's best or cheapest producers in terms of quality, price, or ethical/environmental concerns.

Supply chains for STB, as for other electrical and electronic equipment, are characterised by the inclusion of various tiers of equipment suppliers, producing components and products under contract to, independently of, or owned by a particular final product manufacturer. In some cases, manufacturers have little involvement in the design, innovation or marketing of a product (Original Equipment Manufacturers or OEMs). In other cases, a manufacturer may design its own product, set its own specifications to suppliers, and market its own array of brands (Original Design Manufacturers or ODMs). Other manufacturers (Electronic Manufacturing Services or EMS) produce devices, components, or complete products under contract to OEM or ODM manufacturers. Consequently, individual manufacture supply chains can vary in terms of the amount of production undertaken in-house or outsourced at each stage, as well as in the complexity and extent of the supply chain in terms of the number of tiers and suppliers involved. Impacts on the ability and costs of manufacturer to produce a specific product can therefore be passed upstream to suppliers or downstream to retailers and end consumers.

The industry sector for STB is similar to the TV sector with most of the same main players – Bush, Goodmans, Grundig, LG, Panasonic, Sharp Sony, Thomson and Toshiba. The additional players are Amstrad, Pace, TVonics, Technika Humax and supermarket own brand such as ASDA's – Onn and Durabrand. There are a variety of other brands, such as Astratec, Pacific, Metronic, Siemssen and Strato.

The majority of the products are manufactured outside of the UK with the most from the far east (China) some in France (Sagem), Hungary (Philips). Tvonics, Amstrad and Pace all manufacture in the UK but the last two only currently supply CA (complex) SSTBs so outside of this scope.

The supply chain described above and the market structure leads to a number of characteristics of manufacturing industry, namely:

- Competitors – Companies often purchase components and even complete products from one another. Several products placed on the market can therefore be produced by the same manufacturer (e.g. Alba supplies the Bush and Goodmans brand), or contain some common components.
- Joint Ventures – The huge costs and risks of investing in a large production facility for the next generation of products in a highly competitive market, often draws manufacturers together in order to share risk and cost burdens. Joint ventures allow the creation of larger production facilities and thus all parties to benefit from greater economies of scale. Examples include Motorola and Linux to create a Linux based TV STB (although this may be categorised as a complex STB) operating from 2002.
- Regional Focus – large and expensive production facilities, plus competitive pressures on price, can result in production taking place in only a few global locations per manufacturer. For items which can be transported at low cost due to size and weight, such as SSTBs, a significant proportion of the supply chain can therefore be located in a low labour cost country and a handful of manufacturing plants to supply the world. The UK, therefore, imports many such goods, rather than produce them domestically. In cases e.g. where significant regional differences in product design exist, the final assembly and manufacturer of the product can often take place in a regional hub. Consequently, a manufacturer located in the EU is likely

to supply the complete European market from a single location. However, this does not stop many components being traded and produced globally.

With respect to UK manufacturers' competitive position in relation to manufacturers in other EU Member States, the proposed Implementing Measure and its associated requirements would be implemented across the EU; manufacturers in all EU Member States would be required to make their products compliant to the same standards. This would mean that all products previously non-compliant and being sold on the UK market (whether manufactured in the EU or externally) would be required to undergo the same adaptation process and incur the same costs in order to do so. Therefore, UK manufacturers would not be in a less competitive position than their EU and worldwide competitors when it comes to the UK and EU markets.

There might be a possible negative impact for UK manufacturers placing products in overseas markets which are not subject to the same requirements However, there are other global, national and regional initiatives to reduce consumption of STB while on use and more generally, initiatives to reduce standby and off-mode losses which are comparable with the requirements of the Implementing Measure. Examples include:

- NDS's initiative to reduce the power consumption of STBs. NDS Limited[7] is a company providing technologies and interactive applications for digital pay TV since 1990. Its R&D team is working with STB manufacturers and platforms to develop innovative solutions to reduce power consumption. The initiative also includes an auto standby solution initiated in 2007 in order to switch inactive devices into standby overnight;
- The IEA 1W initiative that seeks to reduce power consumption in standby to 1W by 2010, adopted by the G8 Summit in 2006;
- Australia's Standby Power Strategy 2002 – 2012, which has a voluntary 1W target for standby for 2007, becoming mandatory in 2012. We believe there is also a legislative proposal under discussion to introduce Minimum Energy Performance Standards (MEPS) for digital STBs sold in Australia and New Zealand[8];
- Korea's policy "Standby Korea 2010", which has a voluntary 1W policy for 2005-7, preparation for a mandatory 1W policy for 2008-9 and implementation of the mandatory 1W from 2010.

These initiatives and others indicate a global convergence in policy and requirements for standby and off-mode losses and wider STB considerations which should lead to a level playing field across the word for UK manufacturers, removing any competitive disadvantage that might be either perceived or real.

Table A6: Air quality Damage Costs per GWh in £2008

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1,384	1,412	1,440	1,469	1,498	1,528	1,559	1,590	1,622	1,654	1,687	1,721	1,755

[7] See http://www.nds.com/about_nds/about_nds.html for more information about the company

[8] in EnergyConsult Pty Ltd (2007): Equipment Energy Efficiency Committee Cost-Benefit Analysis: Minimum Energy Performance Standards and Alternative Strategies for Set-top Boxes, Discussion Draft for stakeholder comment issued under the auspices of the Ministerial Council of Energy, available at www.energyrating.com.au/library/pubs/200703-cost-benefit-analysis-stb.pdf

Table A7: Projections of benefits 2021 – 2030			
Year	Energy Savings/ £ million	Carbon savings/ £ million	Air Quality Savings/ £ million
2021	51.75	13.49	2.06
2022	52.82	13.63	2.14
2023	53.89	13.76	2.22
2024	54.96	13.90	2.29
2025	56.03	14.03	2.37
2026	57.09	14.17	2.45
2027	58.16	14.31	2.53
2028	59.23	14.44	2.61
2029	60.30	14.58	2.69
2030	61.37	14.71	2.76
Total 2021-2030	**565.60**	**141.02**	**24.12**