



Department  
of Energy &  
Climate Change

# Energy efficient products - helping us cut energy use

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Any enquiries regarding this publication should be sent to [efficientproducts@decc.gsi.gov.uk](mailto:efficientproducts@decc.gsi.gov.uk).

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## Executive summary

European Union-wide (EU) standards and energy labels are making the appliances we buy for our homes more energy efficient. Energy labels indicate relative performance in terms of efficiency, steering consumers towards the most efficient models, while minimum performance standards progressively remove the least efficient products from the market. The Government has estimated that by 2020, the annual net savings to the UK economy resulting from these standards and labels will be in excess of £850 million per year, with reductions in greenhouse gas emissions of more than 7 million tonnes per year.

This report examines the effect and likely impacts of energy efficiency standards and labels for common products and appliances that the vast majority of homes contain: refrigerators, washing machines, televisions (TVs) and light bulbs.

It indicates that for 'workhorse' products such as white goods, energy efficiency is a key factor in purchasing decisions, but for goods such as consumer electronics (eg TVs) it is not.

The report shows that there have been reductions in both the purchase cost of key appliances and running costs (2013 prices) for selected white goods and TVs as a result of improved energy efficiency since the turn of the century.

The report examines the total cost of ownership of products for different energy labelling classes. While more efficient products will have reduced running costs compared to less efficient ones, these savings only offset differentials in purchase price for some products.

The report concludes with projected energy savings resulting from a replacement of the total UK stock of fridges, washing machines and TVs with appliances meeting current EU minimum standards. . For example, complete replacement of the washing machine stock is projected to save around 300 GWh per year by 2030 relative to no legislation

# 1 Introduction

European Union –wide standards and energy labels are making the appliances we buy for our homes more energy efficient.

- 1.1 Energy labels indicate relative performance in terms of efficiency, steering consumers towards the most efficient models, while minimum energy performance standards (MEPS) progressively remove the least efficient products from the market. So the next time a new washing machine, for example, is purchased to replace an existing one, it should be more energy efficient, and cost less to run, than the current one.
- 1.2 There is a wide and growing range of energy-using products covered by energy labels and/or minimum standards: in the home appliances for laundry, cooking, refrigeration, consumer electronic goods such as televisions (TVs), set-top boxes and external power supplies are covered. Heating, ventilation and cooling products for the home and business are covered, as is lighting in homes, businesses and out in the street.
- 1.3 The Government has estimated that by 2020, the annual net savings to the UK economy resulting from these standards and labels will be in excess of £850 million per year, with reductions in greenhouse gas emissions of more than 7 million tonnes per year<sup>1</sup>. These estimates assume products are replaced in line with normal replacement cycles for the product in question.
- 1.4 This report shows the effect of energy efficiency standards and labels for common products and appliances that the vast majority of homes contain: refrigerators (fridges) washing machines (washers), televisions and light bulbs.

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<sup>1</sup> DECC “Call for Evidence: Energy Efficiency” publication 12D/004

## 2 Buying new appliances

Before we look at the improvements in energy efficiency, we consider why people buy new domestic appliances and then the role of energy efficiency in their buying decisions.

### Why do people buy new appliances?

- 2.1 Broadly speaking buying decisions for new household appliances fall into two categories;
- Household appliances such as fridges and washing machines are considered to be “workhorse” products since they are typically purchased for a lifetime of heavy and prolonged use. They tend to be replaced when they break down – on average replacement is after 12.5 years for a fridge and for 12 years for a washing machine.
  - On the other hand, goods such as televisions are considered to be more “up-to-date” products and many consumers look to upgrade TVs periodically to the latest technology in a fast-moving market, on average every 7.5 years.

### How do people choose their new appliances?

- 2.2 Again, the choice of a new product seems to be influenced by its purpose - whether the product is “workhorse” or “up-to-date”;
- For workhorse appliances energy consumption is a key consideration, as is brand. Evidence from a 2013 Mintel report<sup>2</sup> on washers in the UK suggests that people are highly aware that buying a washing machine with a better energy rating could save them money on their utility bills. Energy efficiency is reported to be the main consideration for fridges, according to a 2014 Mintel report<sup>3</sup>. A trustworthy brand ranks second, especially among older consumers who have developed a lifetime relationship with certain brands and will call on this knowledge.
  - Figures 1 and 2 (both courtesy of Mintel) show the top reasons for buying new laundry and refrigeration appliances respectively.

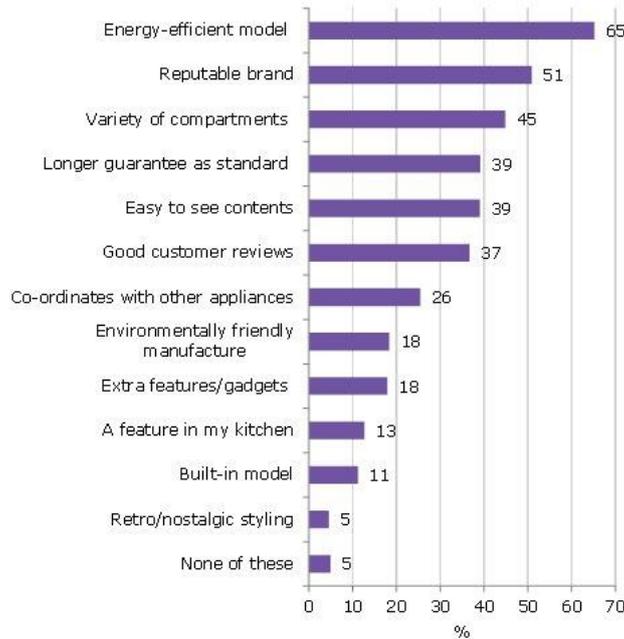
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<sup>2</sup> GMI/Mintel “Washers and dryers – UK”, June 2013

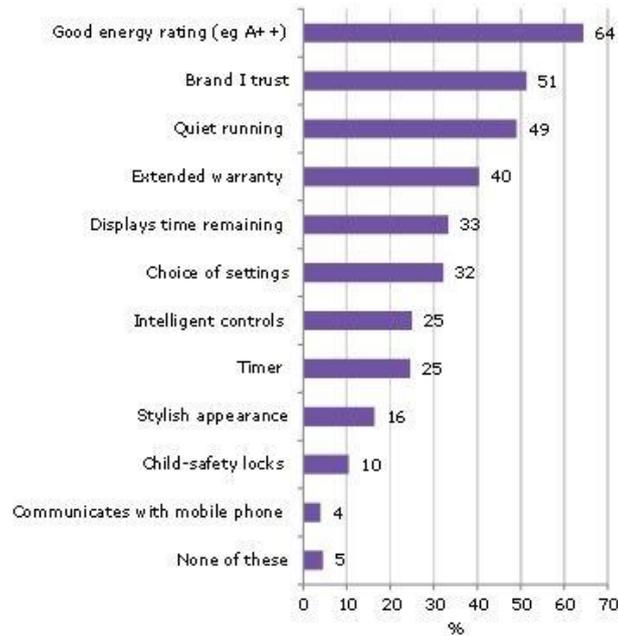
<sup>3</sup> GMI/Mintel “Fridges and freezers – UK”, April 2014

- For consumer electronics, such as TVs, energy efficiency is not a main factor. Evidence from a Mintel report<sup>4</sup> suggests that many consumers will upgrade a television out of choice rather than out of necessity, and buy according to functionality and features.

**Figure 1 Factors influencing the choice of refrigeration appliances (source: Mintel)**



**Figure 2 Factors influencing the choice of laundry appliances (source: Mintel)**



<sup>4</sup> GMI/Mintel “Televisions – UK”, November 2013

## 3 Appliances are getting more energy efficient

To illustrate the improvements in energy efficiency and reduced consumption of electricity, we show the typical costs of new appliances and the running costs for a machine bought in 2013, compared to equivalent products purchased in the past.

3.1 For each type of appliance we compare the purchase and running costs for an average model that was purchased one ‘model lifetime’ ago – for example 12.5 years ago for a fridge having an average replacement rate of 12.5 years. The costs are expressed in 2013 prices (shown in the tables as “2013£”), and for the ‘old’ appliance assume that the product has been stored and opened in 2013, and run alongside the 2013 model for the same period into the future. Future electricity costs are derived from Government projections<sup>5</sup> to 2030. Future savings in energy costs are not discounted.

### More efficient refrigerators

3.2 In the UK, we use various types of refrigeration appliances - refrigerators, freezers and fridge-freezers. Freezers and fridge-freezers are, on the whole, increasing in size, so we look at an under-the-worktop model fridge to ensure a like-for-like comparison.

3.3 Table 1 shows that purchase prices have dropped in real terms (ie taking inflation into account). The energy consumption (assumed to be operating continuously throughout the economic lifetime) of the 2013 machine is around half that of one purchased in 2000. Overall, the lifetime cost of purchase and operation of a refrigerator has decreased significantly.

**Table 1 Purchase prices and running costs for an ‘Old’ Refrigerator versus ‘New’ Refrigerator, both run from 2013 to 2025**

	‘Old’ Refrigerator	‘New’ Refrigerator	<i>Savings in...</i>
<b>Replacement rate</b> <sup>a</sup>	12.5 years	12.5 years	
<b>Year purchased</b>	2000	2013	
<b>Purchase Price</b> (in 2000£)	£236.00 <sup>b</sup>	N/A	N/A
<b>Purchase Price</b> (in 2013£)	£317.23 <sup>c</sup>	£187.00 <sup>d</sup>	£130.23
<b>Electricity consumption</b> <sup>e</sup>	225 kWh/yr	114 kWh/yr	111 kWh/yr
<b>Period of Use</b>	Jan 2013 – June 2025	Jan 2013 – June 2025	
<b>Lifetime Electricity costs</b> <sup>f</sup> (in 2013£)	£534.19	£269.85	£264.33
<b>Lifetime costs</b> (in 2013£)	£851.42	£456.85	£394.99

(Superscript references are to data sources in Annex 1)

<sup>5</sup> DECC: Annex F to “Updated Energy and Emissions Projections 2013” publication 13D/231

## More efficient washing machines

- 3.4 Table 2 compares purchase and operating costs for a washing machine hypothetically purchased in 2001 and used from 2013 alongside a machine purchased in 2013; annual energy consumption is based on 260 washes per year (which is the figure underpinning the energy label for washing machines).
- 3.5 The purchase price has decreased since 2001 (in 2013 prices) and energy consumption has reduced by around 15%. Again lifetime costs are lower for a 2013 machine compared to one from 2001.

**Table 2 Purchase prices and running costs for an ‘Old’ Washing Machine versus New, both run from 2013 to 2024**

	‘Old’ Washing Machine	‘New’ Washing Machine	Savings in...
<b>Replacement rate</b> <sup>a</sup>	12 years	12 years	
<b>Year purchased</b>	2001	2013	
<b>Purchase Price</b> (in 2001£)	£303.00 <sup>b</sup>	N/A	
<b>Purchase Price</b> (in 2013£)	£404.42 <sup>c</sup>	£321.00 <sup>d</sup>	£83.42
<b>Electricity consumption</b> <sup>e</sup>	208 kWh/yr	191 kWh/yr	28 kWh/yr
<b>Period of Use</b>	Jan 2013 – Dec 2024	Jan 2013 – Dec 2024	
<b>Lifetime Electricity costs</b> <sup>f</sup> (in 2013£)	£472.58	£434.26	£38.32
<b>Lifetime costs</b> (in 2013£)	£876.99	£755.26	£121.73

(Superscript references are to data sources in Annex 1)

## More efficient televisions

- 3.6 For TVs, there have been significant changes in screen technology and functionality, so the ability to compare like-with-like is more difficult. TV screens have generally become bigger and the purchase price and consumer purchase decisions are affected significantly by changes in product functionality, features and attributes other than energy efficiency.
- 3.7 Table 3 shows the costs associated with the purchase and running of an average television purchased in 2005 but operated from 2013, against a 2013 TV. The usage assumptions for both old and new televisions are 1,700 hours per year in on mode and 4,200 hours per year in standby mode.

**Table 3: Purchase prices and running costs ‘Old’ Television versus ‘New’, both run from 2013 to 2020**

	‘Old’ Television	‘New’ Television	Savings in...
<b>Replacement rate</b> <sup>a</sup>	7.5 years	7.5 years	
<b>Year purchased</b>	2005	2013	
<b>Purchase Price</b> (in 2005£)	£402.16 <sup>b</sup>	N/A	
<b>Purchase Price</b> (in 2013£)	£487.50 <sup>c</sup>	£365.00 <sup>d</sup>	£122.50
<b>Electricity consumption</b> <sup>e</sup>	202 kWh/yr	171 kWh/yr	31 kWh/yr
<b>Period of Use</b>	Jan 2013 – June 2020	Jan 2013 – June 2020	
<b>Lifetime Electricity costs</b> <sup>f</sup> (in 2013£)	£270.65	£229.95	£40.70
<b>Lifetime costs</b> (in 2013£)	£758.15	£594.95	£163.20

(Superscript references are to data sources in Annex 1)

## More efficient lighting

- 3.8 In recent years, compact fluorescent lights (CFL), and increasingly light emitting diode (LED) lighting have been replacing incandescent bulbs in our homes; this move has largely been driven by EU standards. These standards have restricted manufacturers from placing further incandescent bulbs on the market for domestic use, but existing stocks remain available for sale (and those marked as for special purposes can still be placed on the market).
- 3.9 Table 4 compares the purchase and running costs of an incandescent bulb, a compact fluorescent lamp (CFL) and a light emitting diode (LED), each of the same luminous power<sup>6</sup> (700 lumen or nearest possible value). The period of comparison chosen is from 2013 (the most recent year for which sales data is available) to 2030 (the last year of Government’s electricity price forecasts). It is assumed that each type of lamp is used for 5 hours/day, and that when it fails it is replaced by another of the same type; lifetimes of each type of bulb are taken from industry data.
- 3.10 Table 4 shows that the total cost of incandescent bulbs over the period is around 5 times higher than for CFLs or LEDs. Although the LED costs significantly more to purchase, the running costs are lower compared to incandescent bulbs. And while the costs of operating LEDs and CFLs are broadly the same, the LED lamp will still have several years of remaining lifetime.

<sup>6</sup> Luminous power (or luminous flux) is a measure of the amount of light given out by the lamp as perceived by the human eye. The unit of luminous power is the lumen. By contrast, watts are the unit of electrical power going into the lamp.

**Table 4 Total purchase and running costs of incandescent, CFL, LED lighting, 2013-30**

	<b>Incandescent</b>	<b>CFL</b>	<b>LED</b>
<b>Lumen rating (lumen) <sup>a</sup></b>	700	715	806
<b>Lifetime (hours) <sup>b</sup></b>	1,000	10,000	50,000
<b>Usage (hours/yr), assuming 5hrs/day, 365days/yr</b>	1,825		
<b>Lifespan (years)</b>	0.55	5.48	27.40
<b>Period</b>	Jan 2013 – Dec 2030		
<b>No. lamps required over Period</b>	33	4	1
<b>Unit Purchase Price <sup>c</sup> (in 2013£)</b>	£2.91	£3.92	£9.30
<b>Total Purchase Costs (in 2013£)</b>	£96.03	£15.68	£9.30
<b>Power rating (Watts) <sup>a</sup></b>	60	12	13
<b>Electricity consumption (kWh/yr)</b>	109.5	21.90	23.73
<b>Lifetime Electricity costs <sup>d</sup> (in 2013£)</b>	£391.15	£78.23	£84.75
<b>Total costs 2013 – 2030 (2013£)</b>	<b>£487.18</b>	<b>£93.91</b>	<b>£94.05</b>

(Superscript references are to data sources in Annex 1)

## 4 Buying the most efficient appliances

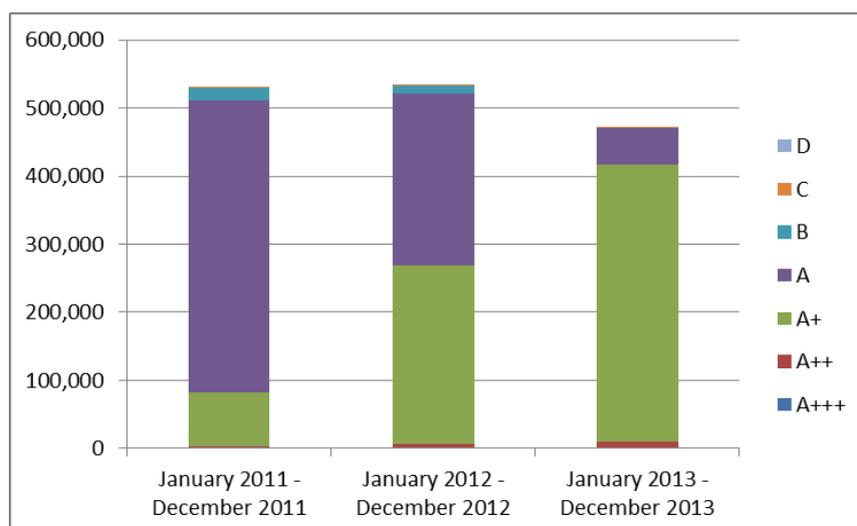
Energy labels indicate the most efficient models of a particular appliance type, on what is called the ‘A-G’ scale. The label shows the efficiency rating as one of seven classes between ‘A’ and ‘G’ for some appliances, and between ‘D’ and ‘A+++’ for others.

Here we explore whether the most efficient appliances are worth buying in terms of potential running costs.

### Refrigerators

- 4.1 In July 2010, the minimum standard for a new refrigerator to be put into the supply chain was an ‘A’ rated machine, and from July 2012 only ‘A+’ or better new machines could be placed on the market. Lower rated machines could still be purchased so long as they were in the supply chains before the minimum standards came into effect, so it was still possible to obtain a ‘C’ rated appliance in 2013.
- 4.2 Figure 3 shows the recent trends in purchases of fridges by energy label class, and show that sales of classes ‘A’ and below are falling, while those of ‘A+’ and better are increasing from less than 20% of the market in 2011 to more than 80% by 2013.

**Figure 3: Refrigerator sales by energy efficiency class, 2011 – 2013**  
(source: GfK Panelmarket, GB)



- 4.3 Table 5 shows the average purchase costs, energy consumption and running costs, for the most (‘A+++’ rated ) and least efficient (‘C’ rated) fridges available for sale in 2013.

**Table 5 Purchase and running costs of refrigerators of different energy label ratings**

	(C) Refrigerator	(A+) Refrigerator	(A++) Refrigerator	(A+++) Refrigerator
<b>Replacement rate</b> <sup>a</sup>	12.5 years			
<b>Year purchased</b>	2013			
<b>Purchase Price</b> <sup>b</sup> (in 2013£)	£229.00	£178.00	£402.00	£406.00
<b>Electricity consumption</b> <sup>c</sup>	232 kWh/yr	122 kWh/yr	90 kWh/yr	72 kWh/yr
<b>Period of Use</b>	Jan 2013 – June 2025			
<b>Lifetime Electricity costs</b> <sup>d</sup> (in 2013£)	£550.81	£290.12	£213.67	£170.94
<b>Lifetime costs</b> (in 2013£)	£779.81	£468.12	£615.67	£576.94

(Superscript references are to data sources in Annex 1)

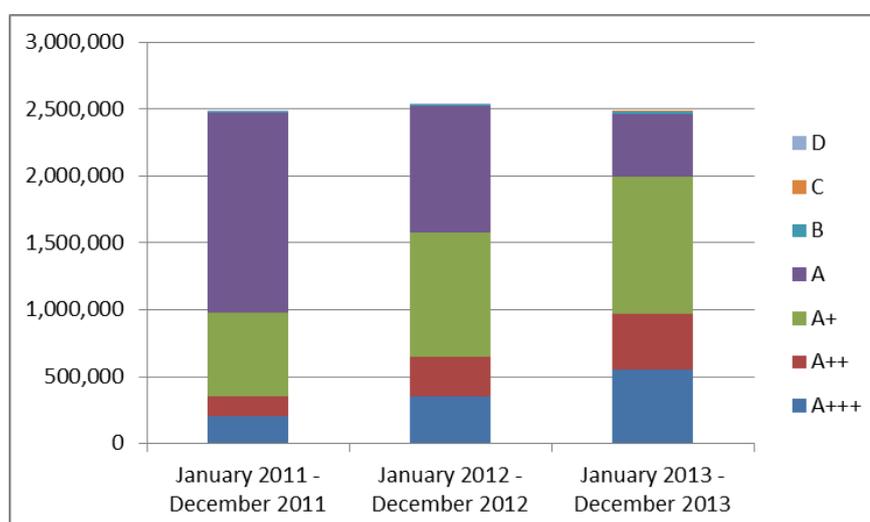
4.4 This suggests that in 2013 the purchase of an 'A+' rated refrigerator would have given the lowest lifetime costs, though 'A+' and 'A++' fridges have lower running costs. 'C' rated appliances would cost more both in terms of purchase price as well as operating costs.

## Washing machines

4.5 In December 2011, the minimum standard for a new washing machine to be put into the supply chain was an 'A' rated machine, and from December 2013 only 'A+' or better new machines could be placed on the market. Lower rated machines could still be purchased so long as they were in the supply chains before the minimum standards came into effect, so it was still possible to obtain a 'C' rated appliance in 2013.

4.6 Figure 4 shows the recent trend in sales by label class – machines with an 'A' or lower rating are being displaced in favour of 'A+' and better.

**Figure 4: Washing machines sales by energy efficiency class, 2011 – 2013**  
(source: GfK Panelmarket, GB)



- 4.7 Table 6 shows the average purchase costs, energy consumption and running costs, for the most and least efficient available for sale in 2013.
- 4.8 As with fridges, the 'A+' rated appliances offer the least overall lifetime cost; although the running costs of the 'A++' and 'A+++' machines are lower, they cost more to purchase. But there are significant savings of 'A+' and better appliances over the 'C' rated models.

**Table 6 Purchase and running costs of washing machines of different energy label ratings**

	(C) Washing Machine	(A+) Washing Machine	(A++) Washing Machine	(A+++) Washing Machine
<b>Replacement rate</b> <sup>a</sup>	12 years			
<b>Year purchased</b>	2013			
<b>Purchase Price</b> <sup>b</sup> (in 2013£)	£320.00	£264.00	£342.00	£453.00
<b>Electricity consumption</b> <sup>c</sup>	110 kWh/yr	100 kWh/yr	88 kWh/yr	77 kWh/yr
<b>Period of Use</b>	Jan 2013 – Dec 2024			
<b>Lifetime Electricity costs</b> <sup>d</sup> (in 2013£)	£249.43	£227.64	£200.82	£174.06
<b>Lifetime costs</b> (in 2013£)	£569.43	£491.64	£542.82	£627.06

(Superscript references are to data sources in Annex 1)

- 4.9 The most efficient products are often associated with better design, performance and functionality, so buying such products can bring additional benefits just associated with energy efficiency.

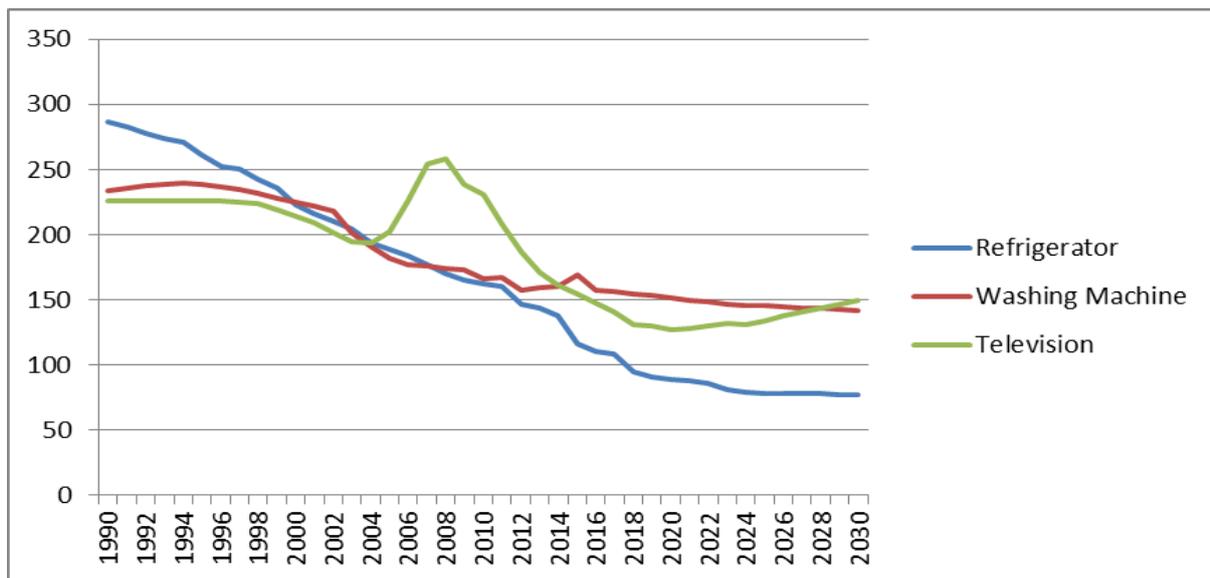
## 5 Changes to electricity consumption of appliances over time

Here we show the trends in consumption over time, and the influence of various policy measures.

### Trends in energy consumption

5.1 Modelling of the broad trend in energy consumption by refrigerators, washing machines and televisions in homes is shown in Figure 5<sup>7</sup>. The trends are influenced by a range of policy measures at the EU level dating back, for refrigerators, to the early 1990's. Standards have been, and are expected to continue to be, progressively tightened. Some of the key measures and steps are listed in Annex 2.

**Figure 5 Projected annual electricity consumption (kWh) by household appliance, 1990 – 2030**



- 5.2 Energy consumption from washing machines and refrigerators is projected to continue to decline, as they become more efficient.
- 5.3 For televisions, however there are various other factors influencing energy consumption. The peak in the annual electricity consumption by televisions is due to plasma screen technology, which supplanted cathode ray tube (CRT) technology in the 2000's but has since then declined in favour of liquid crystal display (LCD) and light emitting diode (LED) technologies. The projected upturn from the 2020's is a result of both the anticipated increase in the average numbers of TVs used in the home, and increasing screen size.

<sup>7</sup> Derived from Energy Using Product Policy (EUPP) Government Standard models

## 6 Energy savings from efficient appliances

We have estimated the impact of the effect of EU minimum energy performance standards, which progressively remove the least energy efficient products from the market. Our model looks at stocks and sales of the different products, and estimates energy savings resulting from EU legislation, compared to a business-as usual (BAU) scenario of no legislation.

### Energy savings from efficient refrigerators

6.1 A minimum standard of efficiency for new refrigerators being placed on the market was introduced in 2010 for refrigerators ('A' rated machines) and this was tightened to 'A+' rated machines in 2012. The stock of refrigerators is being replaced at about 8% per year, with total numbers in the UK stock increasing slowly, as the number of households increases (it is assumed that there is only one refrigerator per household). Table 7 shows the projected stocks and sales and energy savings that result from the standard. At the current rate of replacement, virtually all refrigerators in the UK housing stock would comply with the minimum requirements by 2030, with estimated energy savings of 320 GWh/year.

**Table 7 Projected stocks, sales and energy savings for refrigerators 2010-2030**

	<b>Stock (millions)</b>	<b>Sales (millions)</b>	<b>Stock from units sold since 1 July 2010 (millions)</b>	<b>Sales since 1 July 2010 as % of stock</b>	<b>Energy savings – GWh (rounded)</b>
<b>2010</b>	9.9	0.40	0.4	4%	<b>7.7</b>
<b>2011</b>	10.0	0.80	1.2	12%	<b>22</b>
<b>2012</b>	10.1	0.8	2.0	20%	<b>29</b>
<b>2013</b>	10.2	0.8	2.8	27%	<b>46</b>
<b>2014</b>	10.3	0.8	3.6	35%	<b>56</b>
<b>2015</b>	10.4	0.8	4.4	43%	<b>67</b>
<b>2020</b>	10.9	0.9	8.3	76%	<b>160</b>
<b>2025</b>	11.4	0.9	10.8	95%	<b>250</b>
<b>2030</b>	11.8	1.0	11.8	100%	<b>320</b>

## Energy savings from efficient washing machines

6.2 For washing machines a minimum energy performance standard was introduced in December 2011, and tightened in December 2013. Again the stock is replaced at about 8% per year, meaning that by 2030 nearly all washing machines in UK households would meet the minimum standard. Table 8 shows the projected stocks, sales and energy savings for washing machines. By 2030, the energy savings are estimated at 310 GWh/year.

**Table 8 Projected stocks, sales and energy savings for washing machines 2011-2030**

	<b>Stock (millions)</b>	<b>Sales (millions)</b>	<b>Stock from units sold since Dec 2011 (millions)</b>	<b>Sales since Dec 2011 as % of stock</b>	<b>Energy savings – GWh (rounded)</b>
2011	21.3	0.15	0.15	1%	4.6
2012	21.6	1.8	2.0	9%	77
2013	21.8	1.9	3.9	18%	100
2014	22.1	1.9	5.7	26%	130
2015	22.3	1.9	7.6	34%	150
2020	23.6	2.0	16.7	71%	280
2025	24.6	2.0	22.9	93%	310
2030	25.6	2.1	25.4	99%	310

## Energy savings from televisions

6.3 Minimum energy performance standards for televisions were introduced in January 2010 and tightened in 2012. Approximately 13% of our televisions are replaced every year. In addition, the number of second (or third etc) televisions in each household is increasing so the overall stock is increasing. Table 9 shows the projected stocks, sales and energy savings for TVs. It is estimated that all the UK stock will meet the minimum standards between 2020 and 2025, saving an estimated 2300 GWh per year by 2030.

**Table 9 Projected stocks sales and energy savings for televisions 2010-2030**

	<b>Stock (millions)</b>	<b>Sales (millions)</b>	<b>Stock from units sold since Jan 2010 (millions)</b>	<b>Sales since Jan 2010 as % of total stock</b>	<b>Energy savings – GWh (rounded)</b>
2010	60.7	8.2	8.2	14%	190
2011	61.8	7.6	15.8	25%	310
2012	63.0	7.2	23.0	36%	440
2013	64.2	7.3	30.2	47%	610
2014	65.4	7.8	37.7	58%	800
2015	66.6	8.4	45.6	68%	1,000
2020	72.2	8.8	71.3	99%	1,900
2025	77.6	9.7	77.6	100%	2,100
2030	82.9	9.9	82.9	100%	2,300

## Annex 1 Data sources

Table 1

- a. Replacement rate: Government Service Briefing Note "BNCO01: Domestic Chest Freezers, Upright Freezers, Fridges and Fridge-freezers: Government Standards Evidence Base 2009: Key Inputs", last updated 2010;
- b. Purchase price of 'Old' Refrigerator (in year-2000 money): Mintel report, "Fridges and freezers", 2005 (covering 2000 - 2004);
- c. GDP deflators (to calculate year-2013 money):  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/269879/GDP\\_Deflators\\_Qtrly\\_National\\_Accounts\\_December\\_2013\\_update.csv/preview](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/269879/GDP_Deflators_Qtrly_National_Accounts_December_2013_update.csv/preview)
- d. Purchase price of New Refrigerator (in year-2013 money): GfK Panelmarket, GB sales data for Jan 2011 – Dec 2013;
- e. Electricity consumption: EUPP Government Standard Model evidence and calculations, June 2010
- f. Electricity prices used to calculate costs: DECC: Annex F to "Updated Energy and Emissions Projections 2013" publication 13D/231

Table 2

- a. Replacement rate: Government Service Briefing Note "BNW01: Combined Laundry: Government Standards Evidence Base 2009: Key Inputs", last updated 2010;
- b. Purchase price of Old Washing Machine (in year-2001 money): Mintel, April 2014;
- c. GDP deflators (to calculate year-2013 money):  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/269879/GDP\\_Deflators\\_Qtrly\\_National\\_Accounts\\_December\\_2013\\_update.csv/preview](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/269879/GDP_Deflators_Qtrly_National_Accounts_December_2013_update.csv/preview)
- d. Purchase price of New Washing Machine (in year-2013 money): GfK Panelmarket, GB sales data for Jan2011–Dec 2013;
- e. Electricity consumption: EUPP Government Standard Model evidence and calculations, April 2010
- f. Electricity prices used to calculate costs: DECC: Annex F to "Updated Energy and Emissions Projections 2013" publication 13D/231

Table 3

- a. Replacement rate: Government Service Briefing Note "BNCE TV01: "Televisions (TVs) Government Standards Evidence Base 2009: Key Inputs", last updated 2010;
- b. Purchase price of Old Television (in year-2000 money): GfK Panelmarket, GB in Evidence Base (calculated average of all cathode-ray tube and panel TV sales);

- c. GDP deflators (to calculate year-2013 money):  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/269879/GDP\\_Deflators\\_Qtrly\\_National\\_Accounts\\_December\\_2013\\_update.csv/preview](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/269879/GDP_Deflators_Qtrly_National_Accounts_December_2013_update.csv/preview)
- d. Purchase price of New Television (in year-2013 money): GfK Panelmarket, GB sales data for Jan 2011 – Dec 2013;
- e. Electricity consumption: EUPP Impact Assessment Model evidence and calculations, February 2010
- f. Electricity prices used to calculate costs: DECC: Annex F to “Updated Energy and Emissions Projections 2013” publication 13D/231

Table 4

- a. Lumen rating, power rating: “Lighting the Future”, GE, 2011:  
[http://www.gelighting.com/LightingWeb/la/south/images/Guide\\_to\\_changing\\_to\\_energy\\_efficient\\_lamps\\_Brochure\\_EN\\_tcm403-12666.pdf](http://www.gelighting.com/LightingWeb/la/south/images/Guide_to_changing_to_energy_efficient_lamps_Brochure_EN_tcm403-12666.pdf)
- b. Lifetime: The Lighting Association, <http://www.thelia.org.uk/lighting-guides/lamp-guide>
- c. Purchase price: GfK Panelmarket, GB sales data, 2013
- d. Electricity prices used to calculate costs: DECC: Annex F to “Updated Energy and Emissions Projections 2013” publication 13D/231

Table 5

- a. Replacement rate: "BNCO01: Domestic Chest Freezers, Upright Freezers, Fridges and Fridge-freezers: Government Standards Evidence Base 2009: Key Inputs", updated 2010;
- b. Purchase price of washing machines (in year-2013 money): GfK Panelmarket, GB sales data for Jan 2011 – Dec 2013 for refrigerators in the height range 81 – 90 cm;
- c. Electricity consumption: EUPP Government Standard Model evidence and calculations, June 2010
- d. Electricity prices used to calculate costs: DECC: Annex F to “Updated Energy and Emissions Projections 2013” publication 13D/231

Table 6

- a. Replacement rate: Government Service Briefing Note "BNW01: Combined Laundry: Government Standards Evidence Base 2009: Key Inputs", last updated 2010;
- b. Purchase price of washing machines (in year-2013 money): GfK Panelmarket, GB sales data for Jan 2011 – Dec 2013, for full automatic washing machines;
- c. Electricity consumption: EUPP Government Standard Model evidence and calculations, April 2010
- d. Electricity prices used to calculate costs: DECC: Annex F to “Updated Energy and Emissions Projections 2013” publication 13D/231

## Annex 2 Key policy measures influencing standards

The trends shown in Figure 5 are influenced by a range of policy measures at the UK and EU level dating back to the early 1990's, including:

- 1992: EU Directive (92/75/EEC) Mandatory Energy Labelling Framework
- 1994: EU Directive (94/2/EC) on energy labelling of refrigerators and freezers
- 1999: EU Minimum Energy Performance Standards (MEPS) introduced
- 2002: UK Energy Efficiency Commitment and Carbon Emissions Reduction Target
- 2003: UK Government Buying Standards introduced
- 2005: EU Ecodesign directive introduced (2009/125/EC)
- 2009: EU New MEPS for refrigerators and freezers agreed
- 2010: EU Energy labelling framework directive (2010/30/EU)
- 2010: EU First level of MEPS under Ecodesign regulation for televisions come into effect
- 2010: EU First level of MEPS under Ecodesign regulation for refrigerators come into effect
- 2011: EU First level of MEPS under Ecodesign regulation for washing machines come into effect
- 2011: EU Energy labelling regulations for televisions and washing machines come into effect
- 2012: EU Second level of MEPS in Ecodesign regulation for televisions come into effect
- 2012: EU Second level of MEPS in Ecodesign regulation for washing machines come into effect
- 2013: EU Second level of MEPS in Ecodesign regulation for refrigerators come into effect.

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Department of Energy & Climate Change

3 Whitehall Place

London SW1A 2AW

[www.gov.uk/decc](http://www.gov.uk/decc)

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