

# Made in China

How the UK could import higher energy bills

August 2017

## EXECUTIVE SUMMARY

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Six months into the two-year process that will see the UK leave the European Union, the nation faces a litany of choices about which laws, rules and regulations it will retain once outside the jurisdiction of European lawmakers. Within the energy sector, participation within the Internal Energy Market and Euratom are grabbing headlines, yet the UK faces a huge number of decisions on how it will govern more mundane aspects of energy policy from March 2019.

EU-led energy efficiency regulations have played a large part in UK residential energy demand falling by nearly one-fifth from 1990 to 2014 (and £290 taken off the average dual fuel bill since 2008), as old energy-hungry appliances have been replaced by less wasteful alternatives. Most dramatically perhaps, between 2000 and 2015, the amount of electricity consumed by incandescent light bulbs in the UK fell by 97%, as they were replaced by more efficient technologies such as LEDs. This innovation has bought new less wasteful consumer choices to the market much earlier than they would have likely been available.

At the same time as appliances have become less expensive to run, their average upfront cost has been falling. The price of an average washing machine fell by a quarter between 2004 and 2014, despite becoming significantly more efficient during this time.

Once outside the EU, Britain will be able to set its own standards on energy efficiency, potentially becoming less stringent than those on the Continent. New analysis by the Energy and Climate Intelligence Unit shows that loosening regulations on just eight products could add £90 to an average annual electricity bill, should less efficient Chinese appliances replace the current UK bestsellers and consumers return to old-style light bulbs. This would virtually undo the £100 savings linked to the Conservative Party's mooted pre-election price cap, and would be a stark increase, particularly to the 10% of UK homes already classified as fuel poor.

In addition to adding to household bills, a return to inefficient products would have a bullish effect on national energy demand. This analysis shows that should inefficient devices were to replace the current bestsellers in all 27 million UK homes, it would increase annual electricity consumption by around 3.5%. For comparison, EDF's £20 billion-plus Hinkley Point C nuclear power plant will provide around 7% of the UK's yearly power demand.

Loosening efficiency regulations may also undo stellar progress the UK has made on cutting carbon emissions, with previous ECIU research showing that since 1992 the UK leads the G7 in terms concurrent per-capita GDP growth and emissions reduction. Increasing energy efficiency is the cheapest and simplest means of cutting bills, boosting energy security and progressing towards the UK's carbon targets. Polls show measures that reduce energy waste are repeatedly supported by the clear majority of British voters.

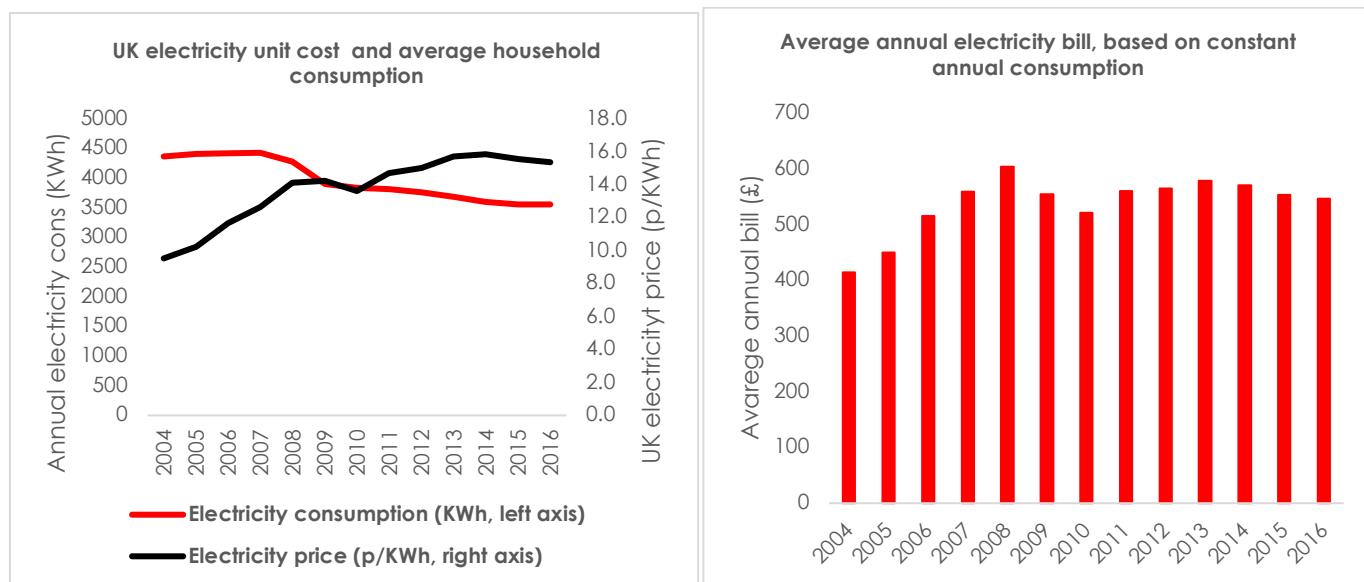
Across the world, there is a trend towards tighter regulations as the issue of energy waste becomes an ever greater priority in boosting productivity. Rowing against this tide could leave UK consumers and manufacturers vulnerable to low quality imports boosting bills and operating to different standards than those in export markets, in addition to creating extra bureaucratic burden across an already-stretched civil service. By effectively creating two different sets of product standards it would potentially increase the burden of 'red tape' on British businesses selling to domestic and EU markets.

## INTRODUCTION

Energy demand in the UK is falling. Since 2001, the total amount of energy consumed by each person in the UK has fallen by 24%, driven largely by a downturn in the use of energy in homes and industry across the country.<sup>1</sup> Total residential energy use fell by 19% between 1990 and 2014, despite a 12% increase in the number of households, a 10% population growth and an increase in average property size over the same period.<sup>2</sup>

Analysis has shown that, despite higher fossil fuel prices causing the unit cost of gas (and therefore) electricity to become generally more expensive over the past decade, household bills have actually fallen as overall consumption has dropped:<sup>3</sup> average household electricity use has now fallen to a level last seen before 1970.<sup>4</sup> Energy efficiency measures have shaved an average of £290 from annual household bills since 2008, buffering the effects of increasing energy commodity prices over the past decade, which remain outside the control of national governments.

Running contrary to a good deal of the popular discourse around energy, these findings should be music to the ears of ordinary working families up and down the UK, particularly at a time when household budgets are coming under increasing pressure from the effects of rising inflation.<sup>5</sup>



**Figure 1:** UK retail electricity costs and annual domestic consumption (left) and average annual electricity bill (right). **Source:** Committee on Climate Change, BEIS.

Changes in commercial energy use are largely a result of the shift from an industrial to a service-based economy. Services currently make up nearly 80% of the British economy, a proportion comparable to that in other G7 nations.<sup>6</sup> In the domestic sector, however, the downturn in energy

<sup>1</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/573269/ECUK\\_November\\_2016.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/573269/ECUK_November_2016.pdf)

<sup>2</sup> [http://energypost.eu/europe-can-deliver-energy-efficiency/#\\_ftn1](http://energypost.eu/europe-can-deliver-energy-efficiency/#_ftn1)

<sup>3</sup> <https://www.theccc.org.uk/publication/energy-prices-and-bills-report-2017/>

<sup>4</sup> <https://www.publications.parliament.uk/pa/cm201516/cmselect/cmenergy/552/552.pdf>

<sup>5</sup> <https://www.ft.com/content/0f9d3b98-50e1-11e7-bfb8-997009366969>

<sup>6</sup> <http://eciu.net/reports/2017/uk-leads-g7-in-per-capita-growth-emission-cuts>

consumption has (counterintuitively) coincided with a dramatic increase in the number of appliances and electronic devices in our homes. This ‘decoupling’ is largely due to the increasing prevalence of energy efficient products – a move driven by mainly by tightening regulation – that has allowed energy use (and therefore energy bills) to fall.

As the UK’s withdrawal from the EU moves closer, political pressure groups and media campaigns are calling for the ‘slashing of red tape’,<sup>7</sup> with one newspaper positioning for the removal of measures designed to promote decarbonisation of the economy partly by reducing energy consumption.<sup>8</sup>

Energy efficiency standards cover upwards of 50 different appliances in more than 80 countries.<sup>9</sup> There is a global movement towards higher standards, enabling products to fulfil the same tasks with equal or better performance, but consume less energy in doing so. Typically formed of two parts – labels that allow consumers to make an informed decision at the point of purchase, and standards that force manufacturers to update or discontinue poorly performing products – energy efficiency schemes have become the cornerstone of numerous national and international energy programmes. This has led to falling household energy consumption in many developed and developing nations.

Focussing on domestic appliances, as this report will do, it is clear that a roll-back of standards could increase energy costs faced by UK households. More than 10% of British households are currently affected by fuel poverty, therefore any increase in energy bills that result from increased consumption could lead to unwelcome societal effects.<sup>10</sup>

Scrapping or weakening regulations in the UK would run contrary to the tightening of standards around the world, especially the EU which is set to introduce new standards in the forthcoming Winter Package.<sup>11</sup> Far from standing still, manufacturers who wish to sell into the European market will have to keep up with the new EU standards. These will become tighter over time and are anticipated to knock €465 (around £395) from household bills by 2020.<sup>12</sup>

Polling conducted by the National Federation of Womens Insitutes and the ECIU in 2015 found nine out of ten (87%) British people support regulations to increase the energy efficiency of domestic appliances such as ovens and fridges,<sup>13</sup> while a separate survey of Conservative voters showed 85% were in favour of maintaining or improving energy efficiency of household devices.<sup>14</sup> These figures not only show the disparity between calls to loosen energy efficiency regulation and public opinion, but are also likely to become increasingly important as the UK government decides how to act democratically when using its freshly reclaimed control of household product standards.

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<sup>7</sup> <https://iea.org.uk/media/may-should-attach-sunset-clauses-to-eu-red-tape/>

<sup>8</sup> <http://www.telegraph.co.uk/news/2017/03/27/cut-eu-red-tape-choking-britain-brexit-set-country-free-shackles/>

<sup>9</sup> Achievements of appliance energy efficiency standards and labelling programs, IEA, 2016.

<sup>10</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/557400/Annual\\_Fuel\\_Poverty\\_Statistics\\_Report\\_2016 - revised 30.09.2016.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/557400/Annual_Fuel_Poverty_Statistics_Report_2016 - revised 30.09.2016.pdf)

<sup>11</sup> <https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>

<sup>12</sup> <https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficient-products>

<sup>13</sup> <http://eciu.net/press-releases/2015/oven-energy-makeover-to-slash-1-1bn-from-brits-bills>

<sup>14</sup> <http://green.brightblue.org.uk/blog/2017/5/4/a-manifesto-for-green-conservatism>

An influential Select Committee of MPs has warned that the UK “could become a dumping ground for energy inefficient products” were formal standards to diverge from those in Europe.<sup>15</sup> This report analyses the possible effect of weaker standards on domestic electricity bills, and outline the effects that could arise from failing to keep pace with energy efficiency measures that come into place once the UK is no longer a member of the European Union.

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<sup>15</sup> <https://www.parliament.uk/business/committees/committees-a-z/commons-select/business-energy-industrial-strategy/inquiries/parliament-2015/brexit-energy-climate-change-inquiry-16-17/>

## **WEAKER STANDARDS, HIGHER BILLS?**

Leaving the EU provides the UK with the opportunity to take back control of laws affecting the sale of electrical products, rules that have been in existence for upwards of a decade (and were shaped in a large part by UK government lobbying) yet whose future is less certain within the UK. Backsliding on these standards runs the risk of increasing the number of energy hungry products on sale in UK stores, putting in jeopardy progress on energy efficiency made in recent years.

Although diverging from European standards may be touted as an opportunity for UK-based manufacturers to target new markets, it should be stressed that there is nothing the production of low efficiency standards for export at the moment – the products just cannot be sold in the UK.

Dozens of developed and developing countries around the world have energy efficiency standards in place, going some way toward minimising geographical differences in product efficiencies. However, gaps still remain, with requirements seen in countries with a high trade surplus often trailing other developed regions.<sup>16</sup>

China is the world's major exporter of goods, accounting for nearly 14% of total global exports by value in 2015.<sup>17</sup> Electrical products are a vital part of the Chinese export economy, many of which adhere to standards that are different to those in the UK. This report will investigate the possible effect on household electricity bills should a series of products available in China (but that currently fall outside of regulations in place in the UK) replace the best-selling appliances in British homes.

This report will focus on just seven of the most common domestic goods, identifying the closest possible specification to the UK best seller. The goods selected are both ever present in British homes and common place in China. They are governed by energy efficiency standards in both countries, avoiding skewed results that could arise from the comparison of products that are unregulated in one market. While some appliances (such as dishwashers, toasters and kettles, for example) are widespread in the UK, they are niche products in China, in the same way that domestic air conditioners and rice cookers are rare in the UK, therefore these products are excluded. Additionally, this report will consider the effect of loosening standards on household lighting, identifying the cost of moving back from low-energy and LED bulbs to their less efficient predecessors.

A survey of best-selling products in the UK identified the appliances shown in Table 1, which also includes information on product specifications (such as TV screen size or washing machine capacity) and energy consumption.<sup>18</sup> Annual energy costs are estimated from current standard variable tariffs offered by the 'Big Six' energy companies.

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<sup>16</sup> <https://www.iea.org/publications/freepublications/publication/achievements-of-appliance-energy-efficiency-standards-and-labelling-programs.html>

<sup>17</sup> <http://stat.wto.org/CountryProfile/WSDBCCountryPView.aspx?Country=CN>

<sup>18</sup> Survey of amazon.co.uk carried out in May 2017, best selling products identified and energy efficiency statistics obtained from supplier websites.

<b>Product</b>	<b>Details</b>	<b>Annual energy use</b>	<b>Annual running cost</b>
Washing machine	Hotpoint WMBF742P 7kg <sup>19</sup>	192 KWh/year	£30.22
Fridge-freezer	Russell Hobbs RH50FF144B 156L <sup>20</sup>	205 KWh/year	£32.27
Television	Sony Bravia KD55XD8005 55" <sup>21</sup>	129 KWh/year	£20.30
Laptop computer (high performance)	ASUS UX490UA <sup>22</sup>	14 KWh/year	£2.20
PC monitor	ASUS VS248HR 24" <sup>23</sup>	47.5 KWh/year	£7.47
Microwave	Daewoo KOR7LBKC <sup>24</sup>	165 KWh/year	£25.97
TV set-top box	Humax H3 <sup>25</sup>	13 KWh/year	£2.04
	<b>Total per year:</b>	<b>745 KWh/year</b>	<b>£120.47/year<sup>26</sup></b>

**Table 1:** Average annual energy consumption and running costs of best-selling products in the UK. Please see Appendix for more information.

Table 1 shows the average running costs of these seven ubiquitous items is £120 per year, or around 21% of the average domestic electricity bill, which is composed of both a variable component – tracking the amount of electricity consumed – and a daily standing charge.<sup>27</sup> For simplicity of comparison, the daily charge is not factored into the calculations present in this report.

The increasing pace of globalisation over recent decades has led to some international convergence of product standards; it is easier to make one model on scale and sell in markets around the world than multiple models for different regions. However, there remains a disparity between some inefficient products for sale in China and those that adhere to UK/EU standards.

A comparison of the UK best-sellers with inefficient products available for sale in China shows a stark difference in annual electricity consumption. Figure 2 shows the potential difference in annual energy use should these products replace those in Table 1 (See appendix for more information).

19 [https://www.amazon.co.uk/Hotpoint-WMBF742P-Washing-Machine-Aquarius/dp/B00XNERT40/ref=zg\\_bs\\_3618681\\_2?encoding=UTF8&psc=1&refRID=Z7GAZ1SAPT6FBYFMCZXB](https://www.amazon.co.uk/Hotpoint-WMBF742P-Washing-Machine-Aquarius/dp/B00XNERT40/ref=zg_bs_3618681_2?encoding=UTF8&psc=1&refRID=Z7GAZ1SAPT6FBYFMCZXB)

20 [https://www.amazon.co.uk/Russell-Hobbs-Freestanding-Reversible-RH50FF144B/dp/B00271A6OM/ref=zg\\_bs\\_10706361\\_2?encoding=UTF8&psc=1&refRID=A4WZJG7NHGXRG512GJ84](https://www.amazon.co.uk/Russell-Hobbs-Freestanding-Reversible-RH50FF144B/dp/B00271A6OM/ref=zg_bs_10706361_2?encoding=UTF8&psc=1&refRID=A4WZJG7NHGXRG512GJ84)

21 [https://www.amazon.co.uk/d/Home-Cinema-TV-Video/Sony-KD55XD8005-Android-Freeview-PlayStation-B01IF52BE4/ref=zg\\_bs\\_560864\\_1?encoding=UTF8&psc=1&refRID=A1QJ20FT5TE1B0HTJWWH](https://www.amazon.co.uk/d/Home-Cinema-TV-Video/Sony-KD55XD8005-Android-Freeview-PlayStation-B01IF52BE4/ref=zg_bs_560864_1?encoding=UTF8&psc=1&refRID=A1QJ20FT5TE1B0HTJWWH)

22 <https://www.asus.com/us/Laptops/ASUS-ZenBook-3-Deluxe-UX490UA/>

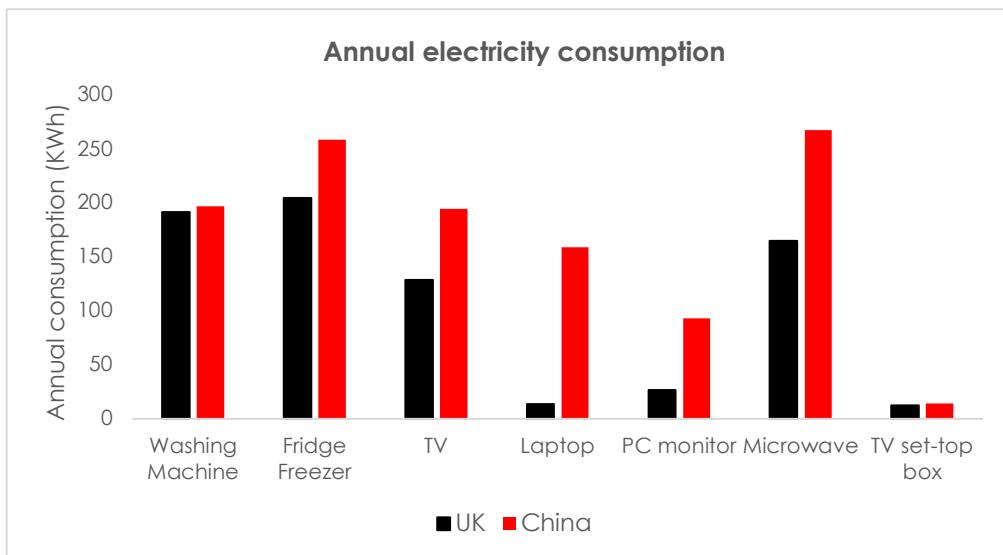
23 [https://www.amazon.co.uk/ASUS-VS248HR-Gaming-Monitor-DVI-D/dp/B014RKZ81O/ref=zg\\_bs\\_428652031\\_1?encoding=UTF8&psc=1&refRID=Z8M62RM4SD6AS0VZQX33](https://www.amazon.co.uk/ASUS-VS248HR-Gaming-Monitor-DVI-D/dp/B014RKZ81O/ref=zg_bs_428652031_1?encoding=UTF8&psc=1&refRID=Z8M62RM4SD6AS0VZQX33)

24 Annual energy use estimated based on 800W power rating

25 <http://uk.humaxdigital.com/product/h3/>

26 Based on 15.74 p/KWh charge, average of 'Big Six' SVT tariffs in May 2017. Bills paid by monthly direct debit and based on average annual energy use with single meter rate.

27 <https://www.ofgem.gov.uk/publications-and-updates/infographic-bills-prices-and-profits>



**Figure 2:** Annual electricity consumption of selected goods, UK best sellers compared with 'inefficient products' identified on Top 10 China.<sup>28</sup> Standardised consumption patterns used.

Assuming the same tariff used to calculate running costs in Table 1, the suite of inefficient Chinese products would cost a household £186.52 per year, an increase of more than £66 compared to the UK best-sellers. The largest disparities can clearly be seen in laptop computers, microwaves and PC monitors, while the running costs of washing machines and TV set-top boxes would be expected to remain largely unchanged.

The scale of the savings on offer is in spite of relatively low uptake of energy efficient products in the UK, especially compared with other European countries. Market survey data show that the UK lags behind many European peers in market share of high efficiency appliances, with the main driver in the UK identified as purchase price and/or the use of special offers and discounts, compared with efficiency or national income in other countries.<sup>29</sup>

In addition to burdening households with higher bills, the use of less efficient products would increase the amount of electricity that needs to be generated in the UK to keep homes and businesses powered. Should all 27 million UK homes revert to these inefficient appliances, the extra drain on the network would be approximately 11.9 terawatt hours (TWh), an increase of around 3.5% on annual power demand. For comparison, EDF's Hinkley Point C nuclear power plant is expected to generate 25.2 TWh per year.<sup>30</sup>

Since the turn of the millennium, the average electricity consumption of the seven appliances featured in this report has fallen dramatically (Figure 3). Running a fridge-freezer in 2015 requires almost 40% less electricity than it did 15 years prior, while the energy consumption of an average washing machine has fallen by more than 25% between 2004 and 2015.<sup>31</sup> This is startling progress for two of the most energy-hungry appliances found in homes up and down the country. Set-top boxes and PC monitors also posted efficiency improvements upwards of 30% over the same time

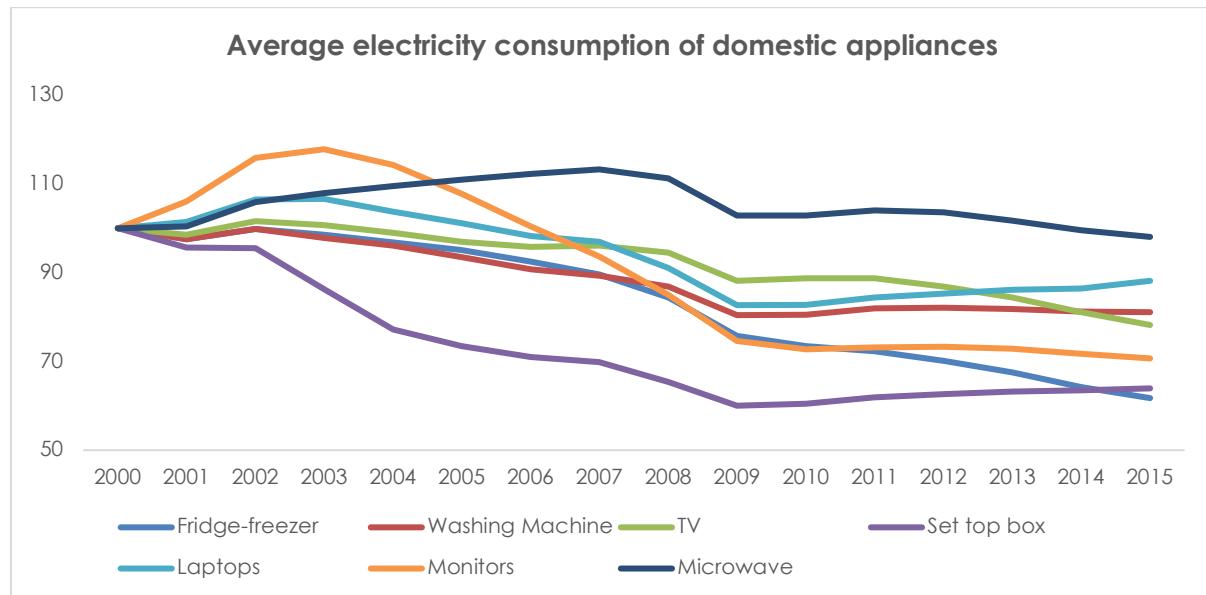
<sup>28</sup> <http://www.top10.cn/english.html>, See Appendix for more information on the Top10 programme.

<sup>29</sup> <https://blog.gfk.com/2016/04/energy-efficiency-the-rise-of-the-a-team-in-domestic-appliances/>

<sup>30</sup> [http://eciu.net/assets/ECIU\\_Hinkley\\_What-if.compressed.pdf](http://eciu.net/assets/ECIU_Hinkley_What-if.compressed.pdf)

<sup>31</sup> <http://www.topten.eu/uploads/File/Market-Monitoring-2016-EN-Topten.eu.pdf>

period, while the improvement in efficiency from microwaves was slowest, largely due to an increase in wattage of available products during the first decade of the century.



**Figure 3:** Average annual electricity consumption of domestic goods (2000=100). **Source:** BEIS.<sup>32</sup>

The slow rate of replacement of domestic appliances – generally only upgraded when they break and cannot be economically repaired – results in a lag between the implementation of policy and households seeing the results in their bank balances. The benefits from improvements in light bulb efficiency are more immediately visible, with some old-style bulbs wearing out after just eight months of regular use.<sup>33</sup>

The energy consumption of LED bulbs is up to 90% lower than that of their incandescent ancestors.<sup>34</sup> Analysis has shown that switching the most commonly used bulbs in households to LEDs throughout could save £24 per year on electricity bills, although anecdotal evidence shows that this can be far higher.<sup>35,36</sup> While it is true that upfront cost of LED bulbs is greater than lower-efficiency alternatives, prices have fallen dramatically over the past five years, and with far-longer lifetimes the cost of needing to replace one is a distant prospect. IKEA sells LED bulbs that start at £1.95 for a pack of two; the equivalent of 98p each.<sup>37</sup>

Between 2000 and 2015, the amount of electricity consumed by incandescent lighting fell by 97% (Figure 4), as halogen and energy saving bulbs replaced them. This reduced the total electricity consumption of domestic lighting by around a third.<sup>38</sup>

<sup>32</sup> <https://www.gov.uk/government/statistics/energy-consumption-in-the-uk>

<sup>33</sup> Based on incandescent bulb failing at lower end of lifetime range, used for an average of three hours per day. [http://www.thelightbulb.co.uk/resources/light\\_bulb\\_average\\_rated\\_life\\_time\\_hours/](http://www.thelightbulb.co.uk/resources/light_bulb_average_rated_life_time_hours/)

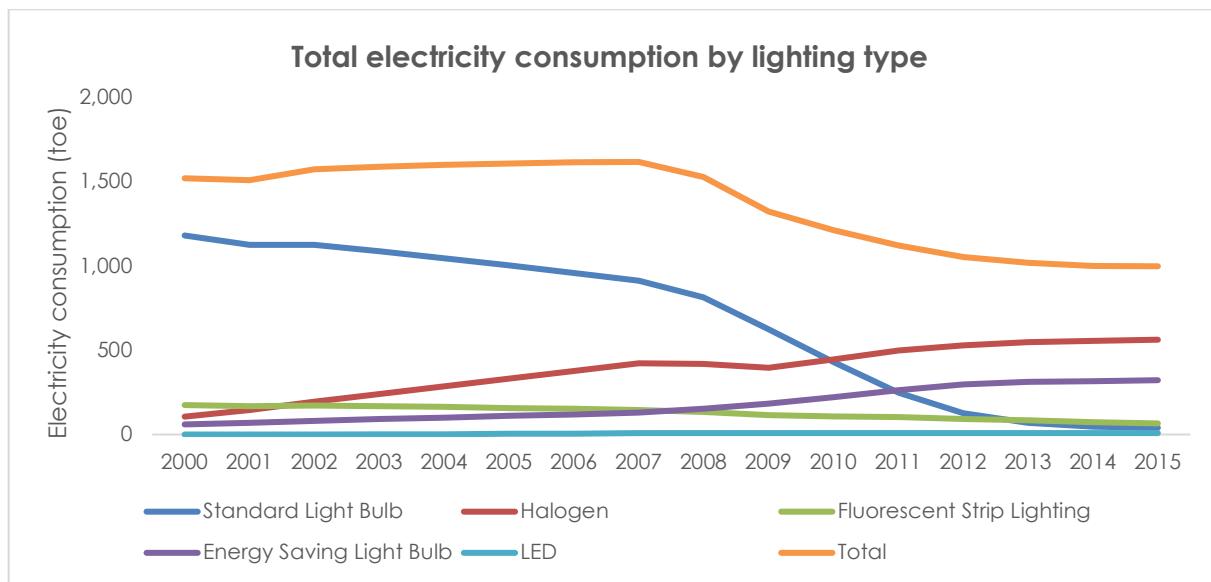
<sup>34</sup> [https://www.thelightbulb.co.uk/resources/the\\_ultimate\\_guide\\_to\\_led\\_light\\_bulbs/](https://www.thelightbulb.co.uk/resources/the_ultimate_guide_to_led_light_bulbs/)

<sup>35</sup> <http://www.greenpeace.org.uk/sites/files/gpuk/Keeping-the-lights-on-LEDs-report-cover.pdf>

<sup>36</sup> <http://www.telegraph.co.uk/finance/personalfinance/household-bills/10756999/How-to-save-240-a-year-with-LED-lightbulbs.html>

<sup>37</sup> <http://www.ikea.com/gb/en/products/lighting/light-bulbs-accessories/led-bulbs/>

<sup>38</sup> <https://www.statista.com/statistics/283178/energy-efficient-light-bulb-sales-revenue-in-the-united-kingdom-uk/>



**Figure 4:** Total electricity consumption of lighting by type. **Source:** BEIS Energy consumption in the UK.<sup>39</sup>

Adding the extra costs of reverting to old-style bulbs to the possible savings from the range of common appliances detailed earlier increases the potential increase in household expenditure to £90. This suggests that the vast majority of the £100 savings on energy bills that was suggested would result from the Conservative Party manifesto plans to cap energy bills could be undone.

Another salient point is the rate at which real purchase prices of domestic goods is falling. For example, across the EU-21 nations, the average cost of a washing machine fell by a quarter between 2004 and 2014, despite becoming significantly more efficient during this time.<sup>40</sup> Critics of energy efficiency policies often point to higher purchase costs, offsetting efficiency gains, yet this is increasingly not the case.<sup>41</sup>

It is important to consider the long-term savings on offer from improving energy efficiency – in contrast to the short term effects of direct market interference such as a price cap – with the benefit of well-implemented policy benefitting households for decades to come.<sup>42</sup> As work by the Committee on Climate Change has shown, taking an ‘efficiency first’ attitude to energy policy can more than offset the effects of rising fuel costs and outlay on new power generation capacity.<sup>43</sup>

Finally, these findings are almost certainly an underestimate, as they do not include the bearish effect on wholesale energy markets that rise from cutting demand. Removing load from the system will lead to lower wholesale costs – as the use of more expensive power stations is avoided – therefore the amount households are required to pay for each KWh of power will fall. In the UK, the wholesale price comprises around 40% of electricity bills,<sup>44</sup> and suppression of this cost compounds the effect on bills, which are a function of both volume and price. Cutting demand

<sup>39</sup> <https://www.gov.uk/government/statistics/energy-consumption-in-the-uk>

<sup>40</sup> Achievements of appliance energy efficiency standards and labelling programs, IEA, 2016.

<sup>41</sup> [http://www.green-alliance.org.uk/resources/Better\\_products\\_by\\_design.pdf](http://www.green-alliance.org.uk/resources/Better_products_by_design.pdf)

<sup>42</sup> [https://ec.europa.eu/energy/sites/ener/files/documents/final\\_report\\_on\\_study\\_on\\_costs\\_and\\_benefits\\_of\\_eeos\\_0.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/final_report_on_study_on_costs_and_benefits_of_eeos_0.pdf)

<sup>43</sup> <https://www.theccc.org.uk/publication/energy-prices-and-bills-report-2017/>

<sup>44</sup> <https://www.ofgem.gov.uk/consumers/household-gas-and-electricity-guide/understand-your-gas-and-electricity-bills>

also lowers the costs of capacity markets, systems through which power plants are remunerated for availability instead of output, which can squash retail prices further.<sup>45</sup>

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<sup>45</sup> [https://ec.europa.eu/energy/sites/ener/files/documents/final\\_report\\_on\\_study\\_on\\_costs\\_and\\_benefits\\_of\\_eeos\\_0.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/final_report_on_study_on_costs_and_benefits_of_eeos_0.pdf)

## THE BIGGER PICTURE

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The trend of falling energy consumption of domestic appliances sits within a UK-wide move toward improving efficiency and cutting waste. The cheapest KWh of energy is that which is not used, therefore energy efficiency has become a popular idea within Whitehall. However, since the demise of the Green Deal,<sup>46</sup> the UK lags behind other developed nations on ambitious, home-grown, energy efficiency policy.

In addition to cutting household bills in the short term, effective energy efficiency measures can save billions on infrastructure investment; as reducing the amount of electricity we consume correlates to the amount of energy we need to generate, and therefore the number of power stations that need to be built. This can save vast amounts of infrastructure spending; building a 1GW gas power station can cost upwards of £1 billion, with nuclear construction costs roughly an order of magnitude higher.<sup>47</sup> This is cash that will eventually be recouped from consumers via energy bills.

Research has shown that a nationwide switch to LED lighting – including all domestic, commercial, public sector and external lighting – could remove up to 8 GW of demand from the UK's electricity grid.<sup>48</sup> This is more than the combined capacity of the two nuclear power stations planned at Hinkley Point C and Moorside, with construction costs expected to run upwards of £40 billion.<sup>49,50</sup> It is also around 50% of the coal power station capacity that the government is aiming to retire by 2025.<sup>51</sup>

The cost of investment needed in the UK's electricity system has been estimated at more than £100 billion.<sup>52</sup> The main component of this figure is the construction of new generating equipment – power stations, wind farms and solar panels – with upgrades to transmission and distribution networks the next largest outgoing. Yet, in the shadow of such vast expenditure, effective energy efficiency schemes continue to evade British politicians.

A report by Frontier Economics argues the case for energy efficiency measures to be considered infrastructure investments, stating “[d]omestic energy efficiency investments can free up energy sector capacity just as effectively as delivering new generation plant, networks or storage would.”<sup>53</sup> Outlining support from leading business associations, the report calls for increased governmental intervention in efficiency schemes, with a programme to make British buildings more efficient and deliver a net £8.7 billion benefit to the UK. Separate analysis has shown 39 TWh of efficiency savings that could be realised by 2030, corresponding to a 10% fall in annual power demand.<sup>54</sup> Achieving these goals would require a change in tack from recent attempts to improve energy efficiency, namely the market-led Green Deal brought into effect by the coalition

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<sup>46</sup> <https://www.gov.uk/government/news/green-deal-finance-company-funding-to-end>

<sup>47</sup> <http://eciu.net/reports/2016/keeping-the-lights-on>

<sup>48</sup> <http://www.greenpeace.org.uk/sites/files/gpuk/Keeping-the-lights-on-LEDs-report-cover.pdf>

<sup>49</sup> <https://www.theguardian.com/business/2017/jan/27/uk-exit-eu-atomic-treaty-brexit-euratom-hinkley-point-c>

<sup>50</sup> <https://www.ft.com/content/a82c99f8-5245-36a8-976d-19651f515628>

<sup>51</sup> <https://www.carbonbrief.org/uk-plans-to-close-last-coal-plant-by-2025>

<sup>52</sup> <https://www.bloomberg.com/news/articles/2016-06-28/next-brexit-test-finding-136-billion-to-keep-u-k-s-lights-on>

<sup>53</sup> <http://www.energysavingtrust.org.uk/sites/default/files/reports/Energy%20efficiency%20as%20infrastructure%20September%20Final.pdf>

<sup>54</sup> [http://www.green-alliance.org.uk/resources/Kickstarting\\_nrgawatts.pdf](http://www.green-alliance.org.uk/resources/Kickstarting_nrgawatts.pdf)

government and the decision to abandon the target of all new homes to be zero carbon from 2016 onwards.<sup>55</sup>

It is also probable that savings seen today will increase in magnitude in the years ahead. Governmental forecasts show that the retail price of electricity is expected to increase by nearly 30% by 2030.<sup>56</sup> This is partly driven by the need to revamp and modernise the majority of the UK's electricity grid and also by an expected upturn in the cost of underlying fuels, such as oil and gas. As such, the effect on household bills from efficiency measures implemented today is likely to be amplified in the years to come, increasing household savings and overall net benefit to society.

Missed savings from failing to keep pace with the onset of new regulations, both in EU markets and beyond, would compound the impact of forecast increases in fuel prices. The UK is currently amid a multi-billion pound smart meter rollout, installing new gas and electricity meters in all 27 million UK homes that will enable the increased use of smarter, connected and more efficient technology. These meters will give citizens the option to take more control over their energy use, opening the door to increased dialogue between consumers and suppliers. As such, the savings realised by citizens of countries that maintain progress on standards would increase, with a relative decrease in savings seen if the UK abandoned efficiency standards.

In addition to saving money, using less energy is the simplest approach to cutting emissions. Falling demand country-wide is one of the reasons the UK leads many of its peers in terms of overall emissions reduction, a trend bolstered by the move away from coal-fired generation within the power sector.<sup>57</sup> Since 1990, UK greenhouse gas emissions have fallen by 42%, with trade body EnergyUK describing efficiency measures as "central" to the UK achieving emissions reductions targets outlined in the Climate Change Act.<sup>58</sup>

From a high of 181 million tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e) in 1991, total residential emissions have fallen by more than 38%, to 112 MtCO<sub>2</sub>e in 2015, governmental data show (Figure 5). As stated earlier, this fall is despite an increase in both population and the number of households, and the increased prevalence of electronic devices and appliances in UK homes. The largest contribution towards this decline has been the move away from coal-fired electricity generation in recent years. Although harder to accurately quantify, the effect of falling energy consumption also plays a role in this trend.

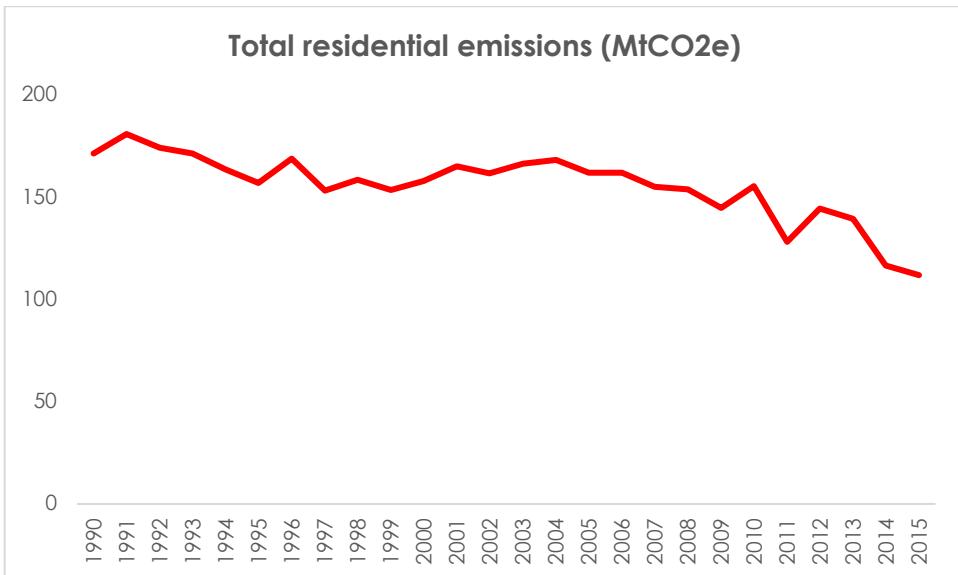
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<sup>55</sup> <https://www.publications.parliament.uk/pa/cm201516/cmselect/cmenergy/552/552.pdf>

<sup>56</sup> <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2016>

<sup>57</sup> [http://eciu.net/assets/Reports/ECIU\\_Conscious\\_Decoupling.pdf](http://eciu.net/assets/Reports/ECIU_Conscious_Decoupling.pdf)

<sup>58</sup> <http://www.energy-uk.org.uk/policy/energy-efficiency.html>



**Figure 5:** Total residential sector emissions (MtCO<sub>2</sub>e by final user, 1990-2015). **Source:** BEIS

Energy efficiency can lead to other non-monetary benefits, such as improved health and comfort due to reduced expenditure on bills, higher productivity resulting from lower outgoings on energy costs and increased energy security, a function of reducing demand.

Overall, energy efficiency programmes represent the lowest of low-hanging fruit. Perennially ignored or poorly delivered, maintaining and improving efficiency standards could have sizeable and noticeable benefits on households up and down the country.

## **CONCLUSION**

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This report shows that, should EU-derived standards be repealed or loosened sufficiently, the increased running costs of just eight household products could add more than £90 to the average household bill, were inefficient Chinese products to undercut and replace current UK bestsellers. This would effectively cancel the benefits from capping energy bills that were proposed by Theresa May before the 2017 general election.

Loosening standards could also lead to negative long-term effects, such as an increased need for building new energy infrastructure, and undoing recent progress on cutting carbon emissions.

As the UK leaves the European Union it faces a profusion of choices, with the danger that energy efficiency measures will either be talked down by those who shout loudest, or be buried under the weight of other priorities. When leaving the EU, the UK has the option to maintain a live dialogue with EU efficiency rules, mainly by opting-in to the product standards improvement process in eco-design.

As this report shows, to help with an impending squeeze on living standards, maintaining pace with regulations across the Channel could ease the burden on UK households, in both the short and long term.

## APPENDIX

### Details of Chinese products used in comparison.

Product	Annual energy use	Annual running cost
Washing machine	197 KWh/year	£31.01
Fridge-freezer	259 KWh/year	£40.77
Television	195 KWh/year	£30.69
Laptop computer	159 KWh/year	£25.03
PC monitor	93 KWh/year	£14.64
Microwave	268 KWh/year	£42.18
TV set-top box	14 KWh/year	£2.20
<b>Total per year:</b>	<b>1185 KWh/year</b>	<b>£186.52/year</b>

**Table A1:** Annual energy consumption and running costs of inefficient products sold in China. **Source:** Top10 China, Data correct as of May 2017.<sup>59</sup>

### Product details.

Product	Details
Washing machine	7kg capacity, 180 cycles/year
Fridge-freezer	150-200 L capacity
Television	55" screen size, 1080 hours use/year, 842 hours standby/year
Laptop computer	'High performance' (>2 CPUs, >2GW RAM)
PC monitor	24" screen size, 2500 hours on/year
Microwave	20 L, 200 hours use/year
TV set-top box	1080 hours use/year, 842 hours standby/year

**Table A2:** Product details

Annual energy use and running cost statistics are calculated based on the same product parameters and usage standards in both UK and Chinese markets. Running costs are based on an average of UK standard variable electricity tariffs offered by the 'Big Six' suppliers; EDF, Npower, British Gas, SSE, Scottish Power and E.on in May 2017. Top10 China is the Chinese component of an independent, international programme to promote energy efficient products. Top10 provides information on the most efficient products for sale in a number of markets and compares them with inefficient alternatives. Top10 is neutral and outside the influence of manufacturers, with selection methodologies explained online.<sup>60</sup> Inefficient products selected through the Top10 China process present data of real-world appliances, however manufacturer and model details are not revealed due to organisation policy. Products are selected from the Chinese energy label database,<sup>61</sup> before being combined with pricing and market information gathered from manufacturers and distributors.<sup>62</sup> Before release, this report was peer-reviewed by Dustin Benton, Acting Deputy Director at Green Alliance, one of the UK's leading think tanks, and by Zhao Feiyan, Technical Officer at Top10 China.

59 Based on product data from top10 China: <http://www.top10.cn/?page=English>

60 [http://www.topten.info/english/services/about\\_topten.html](http://www.topten.info/english/services/about_topten.html)

61 <https://www.energylabel.gov.cn/html/standardMgt/productPublish.html>

62 <http://www.top10.cn/English/Selection-Criteria/drum-washing-machine.html>