| | |
|---|---|
| **Title:** Impact Assessment of the draft Ecodesign for Energy-Related Products (External Power Supplies) 2020<br>**IA No:** BEIS012(C)-19-CG<br>**RPC Reference No:** RPC-4413(1)-BEIS<br>**Lead department or agency:** BEIS<br>**Other departments or agencies:** DEFRA | **Impact Assessment (IA)**<br>**Date:** 02/09/2019<br>**Stage:** Consultation<br>**Source of intervention:** Domestic<br>**Type of measure:** Secondary Legislation<br>**Contact for enquiries:** EPSconsultation@beis.gov.uk |

## Summary: Intervention and Options

**RPC Opinion:** Not Applicable

| **Cost of Preferred (or more likely) Option** (in 2016 prices, 2017 present value) | | | |
|---|---|---|---|
| **Total Net Present Social Value** | **Business Net Present Value** | **Net cost to business per year** | **Business Impact Target Status** |
| £221m | -£90m | £11m | Qualifying provision |

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

External power supplies have a substantial environmental impact and present significant potential for improvement in terms of energy performance due to the large number placed in the market each year. In January 2019, updated ecodesign requirements for external power supplies were adopted at EU level. Since these requirements will apply after exit day, they will not automatically apply in the UK if the UK leaves the EU without a deal on 31 October 2019. Under this scenario, UK regulation is required to ensure these requirements apply in the UK and the energy saving identified can be achieved.

**What are the policy objectives and the intended effects?**

Ecodesign legislation requires manufacturers of energy-related products to meet minimum requirements that result in the improvement of energy efficiency and environmental impacts of their products. This helps to achieve the UK's objectives of reducing energy bills for businesses and consumers, reducing $CO_2$ emissions cost-effectively, and minimising the adverse environmental impacts of products. Updating existing ecodesign requirements for external power supplies in line with what was agreed by the UK as a Member State at EU level before exit, is projected to further increase their energy efficiency and reduce $CO_2$ emissions. This will also ensure a level playing field for businesses through consistent regulatory requirements with the EU and the US.

**What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)**

The preferred option has been assessed against a Do Nothing option.

Option 1 - Do Nothing. There is significant potential for energy efficiency improvements for external power supplies due to the numbers (c. 80m) sold each year in the UK. By not legislating, the UK would fall behind requirements set for the EU market and miss out on energy and carbon emission savings.

Option 2 - Update ecodesign requirements for external power supplies in line with what the UK agreed at EU level before exit. This would allow for the UK to realise the energy and carbon emission savings from these products, and, as EU requirements are in line with the US Level VI Efficiency Standard, foster greater regulatory equivalence.

Self-regulation has been considered. Industry has to date not proposed any self-regulation for this product group, nor expressed an interest in doing so during the consultation the Government held with stakeholders prior to agreeing the EU regulation on external power supplies. This option has therefore been discarded.

**Will the policy be reviewed?** Yes **If applicable, set review date:** 5 years from entry into force of the draft regulations

| | | | | |
|---|---|---|---|---|
| Does implementation go beyond minimum EU requirements? | | No | | |
| Is this measure likely to impact on trade and investment? | | Yes | | |
| Are any of these organisations in scope? | **Micro**<br>Yes | **Small**<br>Yes | **Medium**<br>Yes | **Large**<br>Yes |
| What is the $CO_2$ equivalent change in greenhouse gas emissions? (Million tonnes $CO_2$ equivalent) | | **Traded:**<br>-1.1 | **Non-traded:**<br>+0.1 | |

***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: Chris Skidmore MP Date: 08/07/2019

# Summary: Analysis & Evidence

Policy Option 2

**Description:** Update ecodesign requirements for external power supplies

**FULL ECONOMIC ASSESSMENT**

| Price Base Year 2020 | PV Base Year 2020 | Time Period Years 10 | Net Benefit (Present Value (PV)) (£m) | | |
|---|---|---|---|---|---|
| | | | **Low:** - | **High:** - | **Best Estimate:** |

| COSTS (£m) | Total Transition (Constant Price) Years | | Average Annual (excl. Transition) (Constant Price) | Total Cost (Present Value) |
|---|---|---|---|---|
| **Low** | - | | - | **-** |
| **High** | - | | - | **-** |
| **Best Estimate** | - | | 23 | **204** |

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

Manufacturing costs make up over 96% of all monetised costs which are based on UK sales figures for external power supplies, along with the estimated additional costs for manufacturers to meet the increased energy performance requirements. These additional costs are assumed to be passed onto consumers through the supply chain but are offset by lower energy bills. Further costs (making up 4%) are from increased heating requirements to replace the reduced heat emitted by more efficient external power supplies.

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

All non-monetised costs are assumed to be negligible compared with the manufacturing costs outlined above. Considered in this assessment are the following: transitional/familiarisation costs of understanding the requirements; distributional impacts (although lower energy costs will offset the increased price of products); and enforcement and compliance costs (enforcement action would be undertaken by the Office for Product Safety and Standards (OPSS) which is already responsible for the implementation and enforcement of ecodesign regulations in the UK).

| BENEFITS (£m) | Total Transition (Constant Price) Years | | Average Annual (excl. Transition) (Constant Price) | Total Benefit (Present Value) |
|---|---|---|---|---|
| **Low** | - | | - | **-** |
| **High** | - | | - | **-** |
| **Best Estimate** | - | | 56 | **469** |

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

Net energy savings are expected to account for 91% of all monetised benefits leading to reduced energy bills for consumers (commercial and domestic). Additional monetised savings are attributed to environmental benefits, in particular, the reduction in greenhouse gas emissions (8%) and air quality improvements (1%).

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

A key non-monetised benefit is that requirements for external power supplies will be consistent with those in the EU and US, creating a level playing field. Additional benefits include a likely increase in innovation due to UK manufacturers having to make substantive improvements to their products, although the volume of UK manufacturing is assumed to be small.

**Key assumptions/sensitivities/risks** **Discount rate (%)** 3.5%

Quantified costs and benefits have been provided by the Energy Using Products Policy model (see Annex 2). Sensitivities in the key input variables include product costs, sales/stock, use (hours/year), energy use and lifespan. The model assumes all costs appear at the point of purchase and are independent of sales. Non-monetised costs and benefits as well as modelling assumptions are considered to, collectively, have a positive effect on NPV. Figures in the Business Assessment below are based on the worst-case scenario, subject to change post consultation.

**BUSINESS ASSESSMENT (Option 2)**

| Direct impact on business (Equivalent Annual) £m (2020 prices, 2020 present value): | | | | | | Score for Business Impact Target (qualifying provisions only) £m: |
|---|---|---|---|---|---|---|
| **Costs:** | 23 | **Benefits:** | 10 | **Net:** | 13 | 63 |

# Contents

# 1. Problem Under Consideration and Rationale for Intervention

## 1.1. Overview

1. The ecodesign framework sets minimum energy performance and environmental requirements that energy-related products need to meet to be placed on the market. This pushes industry to improve the energy efficiency and reduce the environmental impact of products and thereby removes the worst products from the market. Ecodesign requirements are currently in place for 28 energy-related product groups including domestic products such as washing machines and TVs as well as commercial and industrial products such as professional refrigeration and power transformers.

2. Ecodesign requirements have historically been set at an EU level through the Ecodesign legislative framework[1]. In January 2019, the UK, as a Member State, voted in favour of new ecodesign requirements for external power supplies[2] that will replace existing external power supply requirements set out in regulation (EC) No. 278/2009[3]. The Government consulted with stakeholders and carried out a cost-benefit analysis (CBA) – showing the substantial environmental impact within the UK and the potential for improvement in terms of energy performance - prior to voting in favour of the requirements.

3. As the new EU regulation will apply from 1 April 2020, i.e. after exit day, they will not automatically apply in the UK if the UK leaves without a deal on 31 October 2019.

4. This Impact Assessment examines the proposal to make product specific regulations (the draft Ecodesign for Energy-Related Products (External Power Supplies) regulations 2020), in the event of a no-deal, using powers set out in the Ecodesign for Energy-Related Products Regulations 2010, as amended by the Ecodesign for Energy-Related Products and Energy Information (Amendment) (EU Exit) Regulations 2019[4]. The draft

[1] Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0125.

[2] Laying down ecodesign requirements for external power supplies pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulation (EC) No 278/2009. Available at: http://ec.europa.eu/transparency/regcomitology/index.cfm?do=search.documentdetail&Dos_ID=17083&DS_ID=60023&Version=2.

[3] Commission Regulation (EC) No 278/2009 of 6 April 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for no-load condition electric power consumption and average active efficiency of external power supplies. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1521115659437&uri=CELEX:32009R0278.

regulations set out external power supply requirements that are in line with what the UK, as a Member State, agreed at EU level in January 2019.

5. This is consistent with the Government's commitment in the Clean Growth Strategy to keep step with equivalent product standards wherever possible and appropriate, or even exceed them where it is in the UK's interest to do so, following EU exit[5].

## 1.2. External Power Supplies

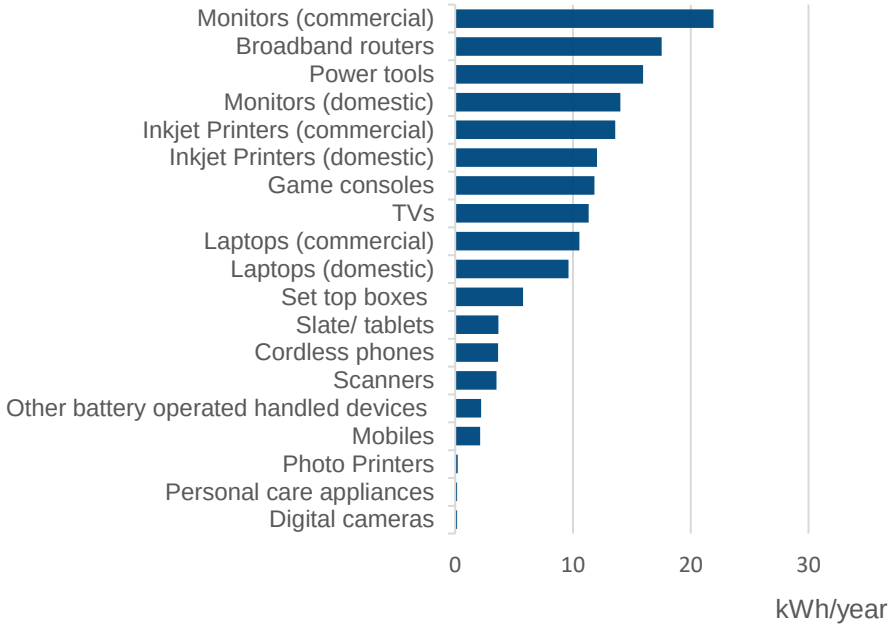
6. External power supplies convert alternating current (AC) power input from the mains into lower voltage direct current (DC) or AC output for use by electronic circuits. They come in a separate physical enclosure to the end-use product, connected by some form of cable, and are used to power a large variety of household and office products, such as mobile and cordless phones, notebook computers and printers. Annex 1 provides a more technical description.

7. More than 80 million external power supplies are sold in the UK annually, often as part of a package with another product, such as a laptop or mobile phone. The average UK household has five to ten of these products powering a variety of electronic devices[6]. External power supplies have an increasing prevalence and collectively consume a significant amount of energy. Research conducted by the US Environmental Protection Agency indicates that external power supplies are only about 50% to 70% efficient with approximately one-third to one-half of the electricity that flows through external power supplies being consumed in the product itself[7]. Since the UK and US markets are considered to be similar, efficiency levels are expected to be comparable across both countries.

8. Estimated annual energy usage of external power supplies by product is shown in Figure 1 and is expected to vary significantly by product. The external power supply for digital cameras had the lowest estimated energy usage at less than 0.2 KWh/year in 2020 and those for commercial monitors the most at nearly 22 kWh/year.

[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1521115659437&uri=CELEX:32009R0278.chment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf.
[5] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf.
[6] Global External AC-DC Power Supply Market 2018, Forecast to 2023, Abstract, August 2018. Available at wiseguyreports.com.
[7] Energy Star: External Power Supplies. Available at: https://www.energystar.gov/index.cfm?c=archives.power_supplies.

***Figure 1: Estimated annual energy usage (kWh/year in 2020) of external power supplies by product[8]***




9. The European Commission's most recent Preparatory Study on external power supplies concluded that there is significant potential for further energy savings from external power supplies by 2030[9], even though only small energy savings can currently be achieved per product. The energy efficiency potential lies in the significant quantities traded each year.

10. For the past several years, various international organisations have issued different standards regarding external power supply efficiency and standby power consumption requirements. In 2014, the US Department of Energy (US DOE) formalised their newest mandatory standard and the EU's voluntary Code of Conduct version 5 took effect. The US DOE regulations came into effect in 2016 and require external power supplies sold in the US to comply with Level VI efficiency standards (also known as Candidate Standard Level VI or CSL VI). In early 2019, the European Commission legislated to revise its ecodesign requirements for external power supplies in alignment with the US efficiency standard - the most ambitious standard to date - meaning the products can be used and sold globally. The UK, as an EU Member State, was in favour of this alignment with the US, and voted in favour of this regulation.

[8] Estimates from US DOE database and internal modelling.
[9] Review Study on Commission Regulation (EC) No. 278/2009 External Power Supplies. First review available at: https://www.eup-network.de/fileadmin/user_upload/EPS_Review_Study_Draft_Final_Report.pdf and additional review available at: https://www.eup-network.de/fileadmin/user_upload/2015/EPS_Review_Additional_Assessment_up-dated_Final_Report.pdf

# 2. Policy Objective

11. Ecodesign requirements help to reduce the energy and resource consumption of energy-related products by setting minimum mandatory requirements on energy efficiency and material efficiency. This removes poor performing products from the market and drives the market towards more energy and material efficient products, thereby promoting a sustainable environment through regulation.

12. Taken together with energy labelling requirements, which allow consumers to choose the most energy efficient products, this policy represents a cost-effective way to reduce energy bills and carbon emissions. Current estimates from BEIS show that existing ecodesign and energy labelling requirements will save around £100 for the average dual-fuel household on their energy bills in 2020.

13. Setting ecodesign requirements for external power supplies are key to making the UK more energy efficient and supporting innovation, contributing in particular to the objectives set out in the Clean Growth Strategy[10] ('improving our homes' and 'accelerating clean growth') and the Industrial Strategy[11] (improving 'business environment'). Doing so will in particular:

    a. minimise energy bills for households and businesses;
    b. reduce greenhouse gas emissions;
    c. reduce the adverse environmental impacts of products;
    d. create a level playing field for industry through consistent regulatory requirements with the EU and US markets; and
    e. drive innovation and support the transition to a low carbon economy.

14. The EU conducted a review on the performance of the current requirements as set out in regulation (EC) No. 278/2009 and estimated significant energy savings would be achieved[12]. However, these requirements no longer capture the energy savings potential due to improved performance linked to technological progress. Further, requirements in

[10] Clean Growth Strategy available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf
[11] Industrial Strategy available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf
[12] Annual energy savings of approximately 10 TWh/year by 2020 at EU level. See: http://ec.europa.eu/transparency/regcomitology/index.cfm?do=search.documentdetail&Dos_ID=17083&DS_ID=60780&Version=1

other parts of the world (i.e. in the US) have become more stringent which indicates there is potential to secure further energy savings.

# 3. Description of Options Considered

15. For the purpose of this consultation stage Impact Assessment, two policy options – (1) Do Nothing and (2) set requirements equivalent to those agreed by the UK at EU level before EU exit – have been considered. The preferred option of (2) setting requirements in line with the revised EU requirements that the UK agreed and helped shape before exit has been assessed against the Do Nothing option.

16. Under the Ecodesign for Energy-Related Products Regulations 2010, as amended by the Ecodesign for Energy-Related Products and Energy Information (Amendment) (EU Exit) Regulations 2019, the Secretary of State must not regulate an energy-related product that is subject of self-regulation that meets certain non-exhaustive criteria relating to the effectiveness of such self-regulation. Industry have, to date, not proposed any self-regulation or voluntary scheme that meets these criteria and, during consultation with industry prior to agreeing the EU regulation on external power supplies, no desire for self-regulation was expressed.

17. Further, research suggests that voluntary agreements around energy efficiency are best considered for products which are not regulated in other economies or where regulation is not practical[13]. Since mandatory requirements are practical and indeed already exist in the US and EU, we have ruled out self-regulation as a possible option.

18. We are not proposing at this point in time to exceed the EU requirements as we have yet to determine the technical potential for going further and the associated carbon and bill savings to be gained. To do so, we would need to engage extensively with stakeholders to gather the evidence required and ensure more ambitious requirements offer a significant additional net benefit to the UK. Given the new EU requirements apply from 1 April 2020 and our priority, in the event of a no deal, would be to provide clarity and continuity to stakeholders, we have ruled out, at this point, setting more ambitious UK requirements but will keep this under review. In any case, we are satisfied that our preferred option would align us with the most ambitious global standard to date, i.e. the

[13] "Effectiveness of Energy Efficiency Voluntary Agreements", The Policy Partners and SQ Consult, 2017. Available at: https://www.iea-4e.org/document/408/effectiveness-of-energy-efficiency-voluntary-agreements

US Level VI Efficiency Standard and consider it unlikely that going further would provide cost-effective energy savings.

19. The policy options under consideration are, therefore:

**Option 1** – Do Nothing: no update would be made to the existing ecodesign requirements for external power supplies in the UK.

**Option 2** (preferred option) – Update existing ecodesign requirements for external power supplies, in line with those that will apply in the EU from 1 April 2020, as agreed by the European Commission and Member States, including the UK, before EU exit.

Under Option 2, manufacturers will have to:

- produce external power supplies which do not consume more than the maximum values set out in the draft regulations when it is plugged in but not connected to any device;
- produce external power supplies which meet the minimum average active efficiency (i.e. average efficiency when power is supplied to a device that is being used) set out in the draft regulations;
- state the output power, output voltage and output current on the nameplate of a product;
- provide in their instruction manuals for users and on free access websites the information set out in the draft regulations, including input AC frequency, output voltage, output current, output power, average active efficiency, efficiency at low load (10%) and no-load power consumption; and
- provide in the technical documentation required for the assessment of the conformity of the product the information set out in the draft regulations.

All these requirements will apply from 1 April 2020, meaning that manufacturers will have to ensure the external power supplies they place on the UK market from that date comply with the above requirements. External power supplies already on the market by then that comply with existing regulation (regulation (EC) No. 278/2009) can continue being sold.

20. Option 2 is our preferred option. Under this option, existing external power supply requirements will be updated in line with the revised EU requirements that the UK agreed and helped shape before exit. Agreement at the EU level was reached at the end of a lengthy consultative process including:
    - a Preparatory Study[9] – at EU level - which explored the potential scope of any regulation, markets, users, technologies, the environment and economics, design and scenarios. This process involved several stakeholder meetings with relevant interested parties, including from the UK;
    - a Consultation Forum – at EU level - attended by Member State representatives and other representatives from manufacturers, retailers, consumers and environmental groups, including from the UK;
    - notification[14] of the draft EU regulation to the World Trade Organisation (WTO) for a period of 60 days;
    - publication of the draft EU regulation for external power supplies on European Commission's feedback mechanism portal[15]; and
    - a Regulatory Committee where the EU regulation was discussed and voted on by Member State representatives including the UK[2].

21. The volume of expertise feeding into the studies, along with wide consultation, reduces the risk of the revised EU requirements being disproportionate or unrealistic. In particular, the Government consulted with UK stakeholders and carried out a cost-benefit analysis prior to voting in favour of the revised EU requirements. The final cost-benefit analysis showed a net positive impact in the UK.

22. The Do Nothing option has also been considered and the impacts assessed. Under this scenario, the current external power supply regulation (regulation (EC) No. 278/2009) will continue to apply in the UK but the updated requirements adopted by the UK and other Member States in January 2019 will not apply if the UK was to leave the EU without a deal on 31 October 2019. The impacts of the UK and the EU having different ecodesign requirements have been taken into account when assessing the Do Nothing option.

[14] External power supply WTO notification. Available at: http://ec.europa.eu/growth/tools-databases/tbt/en/search/?tbtaction=search.detail&Country_ID=EU&num=605&dspLang=en&basdatedeb=&basdatefin=&baspays=&basnotifnum=&basnotifnum2=&bastypepays=ANY&baskeywords=ecodesign.
[15] European Commission feedback mechanism. Available at: https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2018-5145982_en.

# 4. Monetised and Non-monetised Costs and Benefits

## 4.1. Summary of Costs and Benefits

23. Table 1 outlines the key costs and benefits that have been identified as relevant. The final column indicates how it has been considered in this Impact Assessment. A 10-year appraisal period (2020/21 to 2029/30) was chosen in light of the range of lifespans for external power supply products. Figure 6 in Annex 2 shows the typical lifetime distributions of the key products. While the average is around three years, 10 years represents the timescale over which most of the existing stock of external power supplies will be replaced with a model that is compliant under the new requirements and the full energy savings realised.

24. The draft regulations will impose a real cost on external power supply manufacturers that must be financed in some manner. For the purposes of this Impact Assessment, we assume that manufacturers operate in competitive markets (based on the large number of manufacturers, see Annex 1) and the increased cost is passed on to the end consumer. This may be achieved through a marginal increase in the price of all products that are impacted, or through a more substantial increase to a sub-set of products that the manufacturer produces. If markets are not competitive, manufacturers may choose to absorb the increase in cost through reduced profits. However, we have no evidence that this will occur and therefore do not assume this to be the case for the purpose of this Impact Assessment.

25. Internal desk-based research and industry experts suggest that most external power supplies sold in the UK are imported meaning some of the costs may be met by businesses outside of the UK. Despite this, it remains the case that under competitive market conditions, the increased costs would be passed on to UK consumers, as discussed above. It is therefore assumed that all increased manufacturing costs will be incurred by UK consumers.

***Table 1: Summary of costs and benefits of updating the ecodesign requirements for external power supplies (Option 2)***

| Group | Type of cost/benefit | Included in CBA or described qualitatively? |
|---|---|---|
| **Business/ industry** | **Costs** | |
| | Transitional (one-off) costs of implementing the policy, including familiarisation costs of understanding the requirements. These are likely to be minimal, however, as requirements already exist, and updated requirements will align with the US Level VI Efficiency Standard. | Described qualitatively (although assumed to be passed on to consumers and therefore accounted for in the cost-benefit analysis). |
| | Increased manufacturing costs including any such transitional costs. These are assumed to be passed onto consumers - any increase in costs however would be offset by energy savings. | Included in cost-benefit analysis. |
| | **Benefits** | |
| | External power supply requirements consistent with EU requirements (and US), creating a level playing field and greater regulatory equivalence. | Described qualitatively. |
| | Possible increased innovation leading to longer lasting, more efficient products in order to compete in the global market. | Described qualitatively. |
| **Consumers (including businesses who purchase products)** | **Costs** | |
| | Higher price of products at the point of purchase (although offset by lower energy bills). | Included in cost-benefit Analysis. |
| | Reduction in consumer choice (if some product types are removed from the market) yet this is balanced against the benefit above of innovation, leading to new products on the market. | Described qualitatively. |
| | Distributional impacts – vulnerable consumers may suffer, due to the potential additional cost of more energy efficient products yet this is offset by a reduction in energy bills. | Described qualitatively. |
| | **Benefits** | |
| | Lower energy bills over the lifetime of the product due to increased energy efficiency performance. | Included in cost-benefit analysis. |

| Group | Type of cost/benefit | Included in CBA or described qualitatively? |
|---|---|---|
| **Wider society** | **Costs** | |
| | Enforcement costs of imposing requirements. Costs are assumed to be negligible compared with the costs of products especially since ecodesign requirements already exist for external power supplies. | Described qualitatively. |
| | **Benefits** | |
| | Lower electricity system costs – due to a reduction in energy use of the products. | Included in cost-benefit Analysis. |
| | Carbon savings/reduction in greenhouse gas emissions. | Included in cost-benefit Analysis. |
| | Air quality improvements. | Included in cost-benefit Analysis. |
| | Possible creation of new jobs driven by the need to innovate and improve. | Described qualitatively. |

26. Table 2 provides the high-level costs and benefits of Policy Option 2 according to the costs and benefits outlined above. Option 2 (costed against the Do Nothing option) shows a Net Present Value of £264m with a benefit-cost ratio of 2.3:1. Electrical energy savings are expected to be around 5,000 GWh over the appraisal period (2020/21-2029/30) amounting to 1 million tonnes of $CO_2$e. More detail is provided in the sections which follow.

***Table 2: Estimated Costs and Benefits of Policy Option 2, 2020/21 to 2029/30***

| Costs/Benefits | Value (£m) |
|---|---|
| Costs to manufacturers (assumed to be passed onto consumers) | 197 |
| Costs of increase in non-traded $CO_2$e emissions (extra heating) | 7 |
| **Total Costs (A)** | **204** |
| Value of energy savings (net) | 428 |
| Value of reduction in $CO_2$e emissions | 37 |
| Net benefits of air quality improvements | 4 |
| **Total Benefits (B)** | **469** |
| **Net Present Value (B–A)** | **264** |
| **Benefit Cost Ratio (B/A)** | **2.3** |

Data in the main body of this Impact Assessment are presented in 2020 prices and present value (and, therefore differ from those on the front page which are 2016 prices and 2017 present values).

## 4.2. Option 1: Do Nothing

27. The Do Nothing option does not represent a policy change and will therefore have no direct impact on manufacturers although there will be an indirect impact from not having a level playing field – potentially impacting on competitiveness and innovation. For those that sell solely in the UK, the current external power supply regulation (regulation (EC) No. 278/2009) will continue to apply in the same way as before EU exit. UK manufacturers that export, however, will face different regulations outside of the UK to those inside.

28. The main reason why this option has not been pursued further is that, without regulation, manufacturing decisions and consumer behaviour is likely to be dictated by costs more than energy efficiency[16]. This may be especially true for external power supplies which, individually, do not consume much energy and are largely sold as a component of a primary product such as a mobile phone or laptop. Purchasing decisions are likely, therefore, to be based on the merits of the primary product rather than of its external power supply component specifically. Further, it is known that people tend to assess energy use by the size of the product[17], i.e. the larger the product, the more energy it is thought to use which is not always the case. Energy usage of smaller products – such as external power supplies – is often, therefore, underestimated so unlikely to be a primary focus of consumers.

29. As a result, UK manufacturers will be less incentivised to innovate and produce products that comply with EU requirements as focus is likely to be shifted to price competition over increasing efficiency. Introducing regulations under Option 2 would address this market failure of negative externalities and result in significant carbon emission and energy bills savings (see Section 4.3) which are key objectives behind this policy.

30. Under the Do Nothing option, there may be scope for assuming that manufacturers would comply with the new EU requirements once they come into force due to economies of scale and the ease of meeting the requirements of just one EU/US standard and/or because energy consumption is viewed as an important factor for such products. This would have the effect of the UK having the same requirements as the EU without regulation. If this was to occur, broadly the same costs would still apply as under Option 2 (since enforcement and compliance costs are negligible compared with overall

[16] "Decision making in energy efficiency investments – a review of discount rates and their implications for policy making", Ruben J. Kubiak, European Commission Directorate-General for Energy.
[17] See, for example, "Understanding the human dimensions of a sustainable energy transition", Linda Steg, Goda Perlaviciute, and Ellen van der Werff, 2015 and references therein. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4469815/ .

costs). We consider the risk of businesses not complying with EU requirements, however. For non-UK manufacturers who fail to plan and adjust to the new EU regulation, there may be excess supply of products that do not comply with the new EU requirements. Thus, temporarily those products may reach the UK market and have carbon and energy bill savings impacts. However, we expect this to be minimal.

### 4.3. Option 2 (Preferred Option): Update Ecodesign Requirements for External Power Supplies

31. A cost-benefit analysis (CBA) is shown below. These calculations are sourced from the BEIS Energy Using Products Policy (EUPP) model[18] which takes into consideration the costs and benefits associated with updating existing ecodesign requirements for external power supplies.

32. The modelling takes into consideration different sub-technologies, using:

- forecasted sales/stock figures;
- estimates for additional costs arising from producing products compliant with new/updated regulations under Option 2 compared with Option 1;
- forecasted level of usage (in hours/year);
- estimates for the energy usage (in kWh), again for products compliant with the regulations under Option 2 compared with Option 1; and
- the expected lifespan of products (before a replacement is required).

33. High-level descriptions of the modelling approach are outlined in the following sections along with the outputs. A more detailed description is provided in Annex 2, along with the key modelling assumptions. Outlined below are the costs and benefits which have been monetised.

34. The cost-benefit analysis was based on three separate models, separately examining the impact of the regulatory changes on both small and large domestic external power supply products, as well as commercial ones.

35. Since the external power supply market is a global one, we expect that the US Department of Energy Level VI efficiency standards - in force since 2016 - will have an impact on the performance of external power supplies sold into the EU and UK. The Option 1 scenario of the models therefore includes the impact of the existing ecodesign

[18] See Annex 2 for an in-depth description of the model.

requirements, the EC's Code of Conduct on Energy Efficiency of External Power Supplies and the US DOE Level VI efficiency standards.

36. The numbers below in Table 3 and Table 4 show the effects of the proposed revision to the existing ecodesign requirements for external power supplies compared with Option 1 (Do Nothing). Low and high scenarios of ±10% have been presented as indicative variances from the central estimate. A more in-depth sensitivity analysis is, however, provided in Section 5.1. Figure 2 and Figure 3 show the cumulative costs/benefits and energy savings respectively for the central estimate.

***Table 3: Discounted costs summary for external power supplies (2020 prices)***

| | **Low [-10%], (£m)** | **Central, (£m)** | **High [+10%], (£m)** |
|---|---|---|---|
| Costs to manufacturers (assumed to be passed onto consumers) | 177 | 197 | 217 |
| Total costs of increase in non-traded $CO_2e$ emissions | 7 | 7 | 8 |
| **TOTAL** | **184** | **204** | **225** |

Note that the total costs of an increase in non-traded $CO_2e$ emissions take into account the extra heating that is required to replace the reduced heat emitted by more energy efficient products – called the Heat Replacement Effect (HRE).

***Table 4: Discounted benefits summary for external power supplies (2020 prices)***

| | **Low [-10%], (£m)** | **Central, (£m)** | **High [+10%], (£m)** |
|---|---|---|---|
| Value of energy savings | 385 | 428 | 471 |
| Value of reduction in $CO_2e$ emissions | 33 | 37 | 41 |
| Net benefits of air quality improvements | 4 | 4 | 4 |
| **TOTAL** | **422** | **469** | **516** |

Figures have been rounded so may not appear to sum correctly.

***Figure 2: Estimated electrical energy use under Options 1 (Do Nothing) and 2 (updating ecodesign requirements for external power supplies) and the cumulative energy savings of implementing Option 2.***

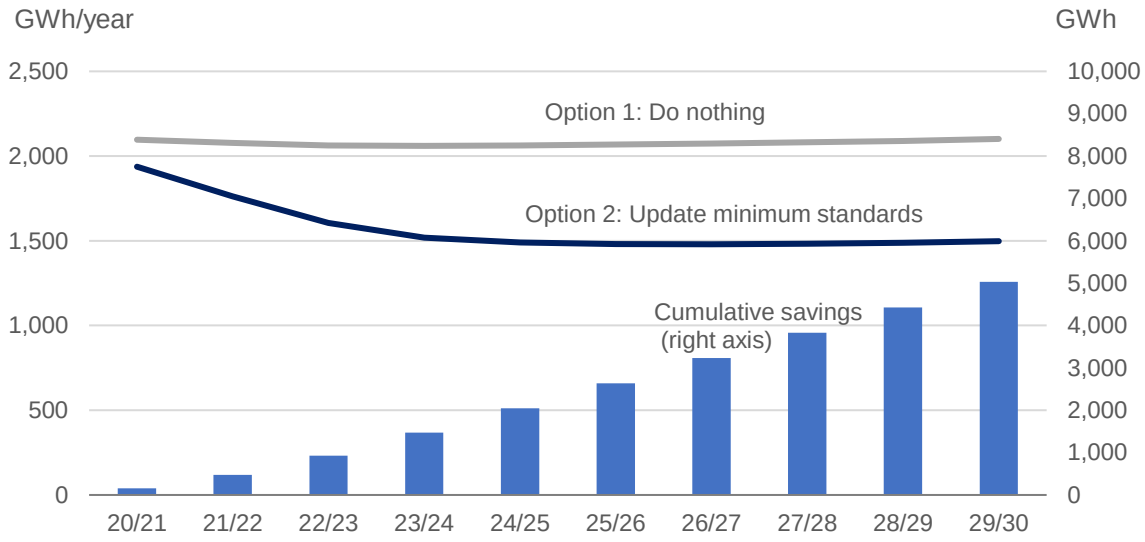
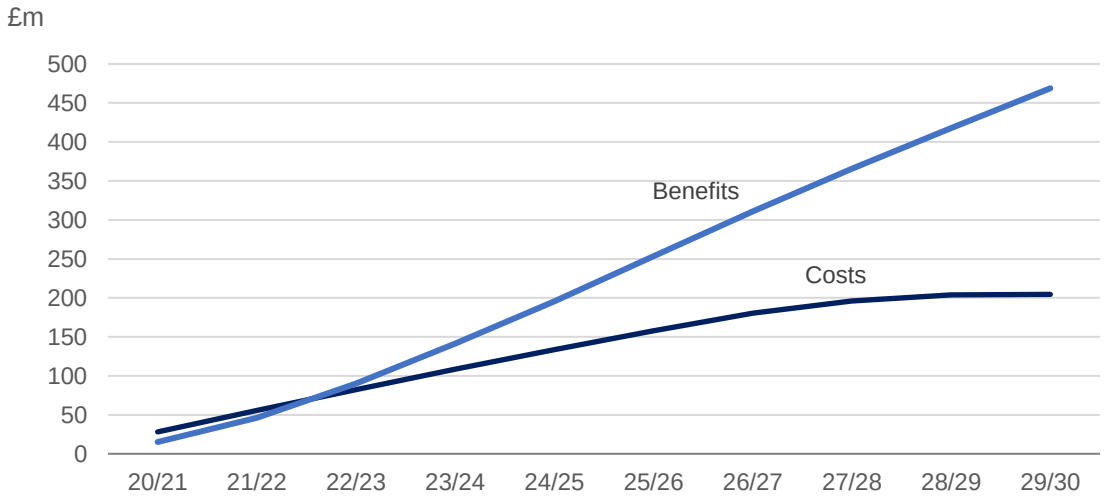



***Figure 3: Cumulative costs and benefits of Option 2***




Note that the modelling includes cost-scaling whereby, towards the end of the appraisal period, costs reduce year-on-year. This considers products whose costs would be incurred but benefits only partially realised during the appraisal period.

37. The draft regulations for external power supplies deliver an estimated net present value of £264m and is expected to save around 5,000 GWh of electrical energy and 1 million tonnes of $CO_2e$ over the appraisal period (2020/21 to 2029/30). Annual energy savings

amount to around 600 GWh a year by the end of the appraisal period, similar to the total annual UK domestic energy usage on vacuum cleaners[19].

38. Annual energy savings (the difference between the estimated energy use of the two options) increase year-on-year at the start of the appraisal period (Figure 2) as the non-compliant stock gradually gets replaced by external power supplies which meet the requirements under Option 2. Once the stock has largely been replaced (by around 2025/26), annual energy savings remain broadly static. Additional costs under Option 2 occur at the point of purchase only, whereas the energy saving benefits are accrued over the lifetime of the product. This results in cumulative costs exceeding benefits (Figure 3) during the early part of the appraisal period, only providing a positive net present value (where benefits exceed costs) from 2022/23 onwards. It is also the reason why the modelling scales down costs towards the end of the appraisal period (as shown in Figure 3). Not scaling would result in all of the costs, yet only part of the benefits, being considered for products purchased towards the end of the appraisal period, negatively affecting the net present value.

39. Removing the discount factor (3.5%) gives average annual costs of £23m and benefits of £56m. Given that around 80 million external power supplies are sold in the UK each year, the additional cost to purchase a more efficient product is only around 30 pence (in 2020 prices). That becomes even more negligible when you consider that external power supplies are often sold as part of a package with another product, such as a laptop or mobile phone, where the external power supply makes up only a small percentage of the total cost.

### 4.3.1. Non-Monetised Costs and Benefits

40. This section examines the additional costs and benefits that, for proportionality reasons, have not been monetised. To indirectly take these into account in the CBA, sensitivity analysis has been undertaken in Section 5.1.

**Transitional Impacts**

41. Generally, transitional (one-off) costs of implementing the policy, include familiarisation costs of understanding the requirements, and are inclusive of training staff and setting up

[19] Based on estimates provided for 2017 in Table 3.08 of Energy Consumption in the UK, 2018 update, Available at: https://www.gov.uk/government/statistics/energy-consumption-in-the-uk

IT. Specifically for this legislation, there would be costs associated with the requirements to provide, on websites and instruction manuals, the following information:

- manufacturer's name or trademark, commercial registration number, and address;
- model identifier;
- input voltage;
- input AC frequency;
- output voltage;
- output current;
- output power;
- average active efficiency;
- efficiency at low load (10%); and
- no load power consumption.

42. Further, manufacturers would have to declare the following information in the technical documentation required for the assessment of the conformity of the product with the requirements in the draft regulations:
    - root mean square output current;
    - root mean square output voltage;
    - active output power;
    - root mean square input voltage;
    - root mean square input power;
    - total harmonic distortion of the input current;
    - true power factor;
    - power consumed;
    - active mode efficiency; and
    - average active efficiency.

43. Given that the draft regulations would be an amendment of existing regulation, transitional costs are expected to be minimal as the general processes are already established. In particular, manufacturers are already required to provide technical details to the market surveillance authority and the above information would be readily available to them. The EU's additional assessment of their review study into the regulation for

external power supplies[20] concluded that additional costs such as approbation, changes in packaging, marking, etc. would be negligible. Furthermore, the report found that the majority of external power supplies follow a continuous process of re-design, rarely remaining unchanged for more than a year meaning that updates to manuals and documentation would likely be a regular activity in any case.

44. Comparatively then, these costs will be small in relation to overall costs and benefits of the policy option. Monetising such costs is, therefore, considered disproportionate. However, any such costs may fall disproportionately on to smaller businesses and are therefore considered in the Small and Micro Business Assessment (Section 6.2).

**Enforcement and Compliance Costs**

45. Enforcement and compliance costs are not easily quantified. Enforcement action would be undertaken where the market surveillance authority (Office for Product Safety and Standards, OPSS) believed there was sufficient risk-based justification to do so, in line with their enforcement policy[21]. Additional costs are, however, considered minimal given that requirements already exist for external power supplies and would continue to apply under the Do Nothing option.

46. As suggested in HM Government's OIOO (One-In, One-Out) Methodology[22], the cost and benefits calculated have assumed 100% compliance since we have no evidence to suggest it would be otherwise. Lack of compliance would, however, impact on both costs and savings. Given the uncertainty, and the scale of the impact, differing levels of compliance are implicitly investigated through the Sensitivity Analysis (Section 5.1).

**Distributional Impacts**

47. In setting ecodesign requirements for external power supplies, the EU Commission took distributional impacts into account. A key constraint in setting requirements is that they should have no significant negative impact on consumers as regards to the affordability and the life cycle cost of the product[1]. Although more efficient products may have marginally higher up-front cost, consumers will see savings from their energy bills.

[20] Additional Assessment in the Frame of the Review Study on Commission Regulation (EC) no. 278/2009 External Power Supplies, 2014. Available at: https://www.eup-network.de/fileadmin/user_upload/2015/EPS_Review_Additional_Assessment_up-dated_Final_Report.pdf
[21] OPSS enforcement policy, May 2018. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712141/safety-and-standards-enforcement-enforcement-policy.pdf.
[22] HM Government's OIOU (One-In, One-Out) Methodology, July 2011. Available at: http://ec.europa.eu/smart-regulation/refit/admin_burden/best_practice_report/docs/5.pdf.

**Further Impacts**

48. We have not attempted to monetise, under Option 2, the potential benefits of increased innovation due to UK manufacturers being required to improve efficiency. It was considered disproportionate to quantify this given the complexity and the uncertainty in the level of innovation that might be achieved.

49. For the same reasons, it was considered disproportionate to attempt to quantify the additional benefit, under Option 2, of creating a level playing field with EU and US manufacturers (in particular for ease of trade with the EU and the US) or, similarly, the costs, under Option 1, of manufacturers having different requirements to comply with.

# 5. Sensitivities, Risks and Assumptions

50. Most of the quantified analysis in this Impact Assessment has been provided through the Energy Using Products Policy model. Costs and benefits were monetised and discounted in line with HM Treasury's Green Book and supplementary guidance on valuing energy use and greenhouse gas emissions. This section outlines the sensitivity of the model to changes in the input variables as well as the evidence gaps that have been identified within this Impact Assessment.

## 5.1. Sensitivity Analysis

51. Annex 2 provides an overview of the model used for the CBA and, as expected, several considered modelling assumptions have been made which carry varying levels of uncertainty. Table 5 below indicates how a 10% change in each variable affects the overall costs/benefits.

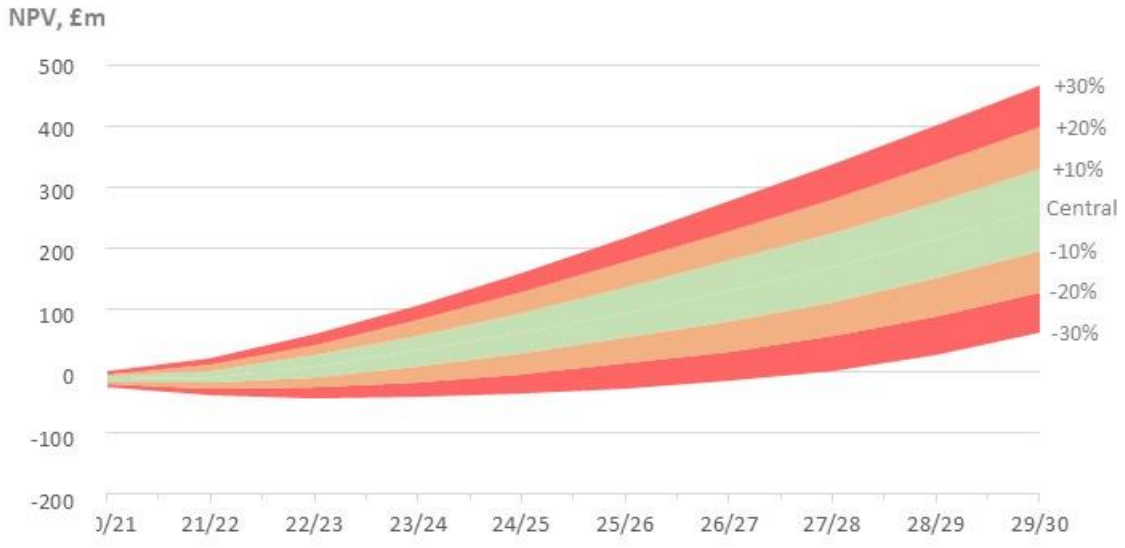
***Table 5: Outline of the sensitivity of the model by variable***

An illustrative change of ±10% in the variables is used as an example in the table.

| Variable | Impact on Costs | Impact on Benefits | Comment |
|---|---|---|---|
| Cost (£) | A ±10% change in the cost of products has a ±10% change in overall costs. | None. | The model assumes costs and sales/stock figures are independent, therefore, a change in the cost of products has no impact on the volume of products sold/in stock. Benefits therefore remain unaffected. |
| Sales/Stock | A ±10% change in sales/stocks has a +/- 10% change in overall costs. | A ±10% change in sales/stocks has a ±10% change in overall benefits. | Overall costs and benefits are directly proportional to the size of the sales/stock. |
| Use (hours/year) | None. | A ±10% change in costs has a ±10% change in overall benefits. | The number of hours in a year a product is used has no effect on costs (since use does not affect the lifetime in the model nor on sales/stocks) but is directly proportionate to the overall energy use, and hence benefits. |
| Energy Use (kW) | None. | A ±10% change in the energy use of the product has a ±10% change in overall benefits. | The power used by a product has no effect on costs (to buy the product) but is directly proportionate to the overall energy use, and hence benefits. |
| Lifespan | Related. | Related. | The products' lifespan in the model affects both the costs and benefits but not proportionately. The shorter the lifespan, the greater the costs and benefits (due to the older stock being replaced more quickly). |

52. A range of costs and benefits were considered to model potential divergence in the actual input variables from those estimated by the model. These consider both divergence in future values from those estimated as well as un-monetised costs and benefits, including compliance. Figure 4 below indicates the impact on the net present value over the appraisal years with up to 30% adjustments from the central costs and benefit estimates. Note that the extremities of the bands constitute a 10/20/30% increase (decrease) in costs along with a 10/20/30% decrease (increase) in benefits.

***Figure 4: Chart showing the range of the net present value (NPV) over the appraisal period with up to 30% adjustments from the central cost and benefit estimates***




The green area shows the range of NPV where costs/benefits vary up to 10% from the central estimates, orange within 20% and red, 30%.

53. Table 6 below provides more detailed costs for the +/- 20% scenario (the orange areas in Figure 4) compared with the central estimates.

***Table 6: Costs, benefits and NPV for external power supplies under high (+20%) and low (-20%) scenarios over the entire appraisal period (2020/21 to 2029/30).***

| All values are in 2020 prices (£m) | |
|---|---|
| Low (-20%) costs | 164 |
| **Central Costs** | **204** |
| High (+20%) costs | 245 |
| Low (-20%) benefits | 375 |
| **Central Benefits** | **469** |
| High (+20%) benefits | 563 |
| Low NPV (high costs, low benefits) | 130 |
| **Central NPV** | **264** |
| High NPV (low costs, high benefits) | 399 |

54. Under the high costs (+20%) and low benefits (-20%) scenario (Low NPV), there would be an estimated NPV of £130m over the appraisal period (2020/21 to 2029/30) compared with £264m under the expected scenario. This would arise from, say, a 20% increase in costs of the products under Option 2 compared with the Do Nothing, along with a combined 20% decrease in the expected energy savings from the legislation (due to, for example, a 20% reduction in the expected annual energy use). A reduction in costs by 20% and a similar proportional increase in energy savings would, however, deliver a NPV of around £399m.

55. An increase in costs of around 40%, together with a 40% decrease in benefits, represents the tipping point at which the NPV becomes negative. The next section examines the likelihood of such a divergence.

## 5.2. Risks

56. This section outlines the potential risks associated with the costs and benefits of the policy along with possible mitigations.

### 5.2.1. Cost and Benefit Estimates

57. The main risks identified with the analysis in this Impact Assessment relate to the cost and benefit estimates, in particular, whether the costs identified could be higher and/or benefits lower than expected, resulting in the NPV becoming negative.

58. The risks around each variable have been considered in Annex 3 through the assumptions log along with mitigations where relevant. The following high-level results can be drawn from the log:
    - **2 low** risk assumption have been identified: average use and lifespan of products.
    - **6 medium** risk assumptions have been identified: sales, demand, energy consumption, prices and costs.
    - **1 high** risk assumption has been identified: sales figures which, again, is high risk because of the impact that it has on costs and benefits outputs. However, risk is mitigated by sales figures affecting both costs and benefits proportionately.

59. Along with the sensitivity analysis in the underlying model (outlined in Section 5.1), we consider the net-loss scenarios to be unlikely for the following reasons:
    - Figures assume all costs will be incurred by UK consumers. In reality, some costs may be absorbed by non-UK businesses (manufacturers and/or retailers in the supply chain) which will reduce the costs to the UK.
    - Future sales figures are, perhaps, the most uncertain of the input variables. However, as described in Annex 2, these affect both costs and benefits in the same proportion. While any such changes may well affect the scale of the NPV, they alone should not result in the NPV becoming negative.
    - Similarly, lower than 100% compliance figures would likely affect costs as well as benefits. Although some consumers may still end up buying products which do not meet the requirements, they are likely to do so at a lower cost.
    - The costs included do not include those incurred by businesses potentially adhering to multiple requirements (under Option 1) or the additional benefits that ease of trade with the EU under this option would bring. Further, there are additional benefits of Option 1 with respect to innovation and increasing competitiveness, in line with the UK's Industrial Strategy. While hard to monetise, their impact (of increasing the NPV for Option 2) cannot be ignored when considering these scenarios.
    - The energy consumption modelled under Option 1 does not consider a potential increase in stock of less efficient products entering the UK market under this scenario. The realised benefits of Option 2 are, therefore, likely to be an underestimate.
    - Although future energy costs are uncertain, changes would affect both options considered in the cost-benefit analysis.

- The model does not account for the link between costs and sales. However, if the manufacturing costs were higher than expected the possible corresponding reduction in sales would constrain the scale of the impact on the overall costs.

### 5.2.2. Non-monetised Costs and Benefits/Missing Evidence

60. Section 4.3.1. outlines those costs and benefits which were considered disproportionate to monetise. The possible impact of these are also outlined in the previous section where we would expect most to increase the NPV.

61. Perhaps the biggest evidence-gap in this assessment is around the impact the policy would have on small and micro businesses. This is considered in Section 6.2.

# 6. Direct Costs and Benefits to Business Calculations

## 6.1. Equivalent Annual Net Direct Cost to Business

### 6.1.1. Direct Costs and Benefits to UK Businesses

62. We currently have limited evidence around the volume of external power supplies that are manufactured within the UK. Since this has a significant impact on the figures provided in this section, we will be actively seeking more evidence from stakeholders during the consultation process. Given the uncertainty, we have used the worst-case scenario for UK-businesses for the Equivalent Annualised Net Direct Cost to Business (EANDCB) and Business Impact Target (BIT) scores here and on the summary pages of this assessment. Subject to further evidence, these figures may be updated in the final stage Impact Assessment.

63. This section considers the costs and benefits of the proposal to UK businesses. It is restricted to UK-based manufacturers of external power supplies and UK businesses purchasing external power supplies. The proposed requirements do not apply to products manufactured in the UK and exported since manufacturers are only obliged to meet the requirements of the country they are exporting to.

64. As per the guidance from the Department of Business, Energy and Industrial Strategy[23], we consider only the *direct* costs to businesses here. These then include manufacturing costs which, elsewhere, are assumed to be passed onto consumers.

65. For UK-based manufacturers selling within the UK, the direct costs determined to be in scope are the:
    - **Ongoing costs of producing policy-compliant products**. These include the increased variable costs of, for example, more expensive component parts and/or more advanced/expensive manufacturing processes.
    - **Short-term, transitional costs of changing manufacturing processes and becoming familiar with the regulations**. Manufacturers will have to invest resources (staff costs) into understanding how this affects them as well as the physical resources required to adhere to the regulation, including testing equipment and new IT/software purchases. As per Section 4.3.1, these costs are not monetised here as they are considered negligible in this case.

66. For UK business consumers, we also consider their purchase costs to be direct business costs since the requirements will increase the cost of their external power supply purchases. However, these business consumers will also see reduced energy costs. Since these energy savings would be automatic through use of their compliant purchases – and not from a change in behaviour – we also consider these to be direct. When considering business purchases from UK manufacturers, we need only consider either the manufacturing or purchase costs to avoid double-counting.

67. A household consumer purchasing an imported external power supply will result in no direct costs to UK businesses as the related manufacturing costs will be borne outside of the UK. However, for a household purchase of an external power supply manufactured in the UK, as above, the associated manufacturing costs would be considered direct.

68. Reduction in greenhouse gas emissions and improvement in air-quality are assumed to be benefits for the wider society and have, therefore, not been considered for businesses. Further, as outlined in Annex 2, the heat replacement effect is not considered for the non-domestic sector so this too has not been considered.

[23] Business Impact Target: statutory guidance, 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776507/Busines__Impact_Target_Statutory__Guidance_January_2019.pdf

69. Table 7 below summarises the direct costs to businesses that are considered in-scope depending on the purchasing sector (household/business) and the location of the manufacturer (UK/non-UK).

***Table 7: Direct UK business costs for external power supplies sold in the UK***

| | | Purchasers | |
|---|---|---|---|
| | | **Household** | **Business** |
| **Manufacturers** | **UK** | • Manufacturing costs | • Manufacturing costs (=purchasing costs if these are passed on)<br>• Energy savings |
| | **Non-UK** | • None (no UK businesses are affected) | • Purchasing costs<br>• Energy savings |

70. Total direct costs for UK businesses are largest when all external power supplies purchased in the UK are manufactured in the UK since all manufacturing costs are included (for both domestic and non-domestic purchases). They are lowest when all are manufactured outside of the UK since the only direct costs in that case are those incurred by businesses purchasing external power supply products.

### 6.1.2. Other Costs and Benefits to Business

71. Other benefits of Option 2 to manufacturers (see Section 4.3.1) include having a level playing field with EU and US manufacturers and a likely increase in innovation, raising competitiveness. Since these are indirect impacts, they have not been considered here.

### 6.1.3. Total Costs and Benefits to Business

72. The EUPP model used for this Impact Assessment separately models domestic and non-domestic external power supplies (see Annex 2 for more details). We can, therefore, calculate the estimated direct costs as per Table 7 above. The model suggests that £89m (21%) of the total energy savings and £55m (28%) of purchasing costs come from business' external power supply purchases. A large area of uncertainty is, however, around the proportion of external power supplies purchased in the UK that are imported. Prior to consultation, therefore, we consider a range. Table 8 below splits out the total costs and benefits into those which fall directly to businesses under two extreme

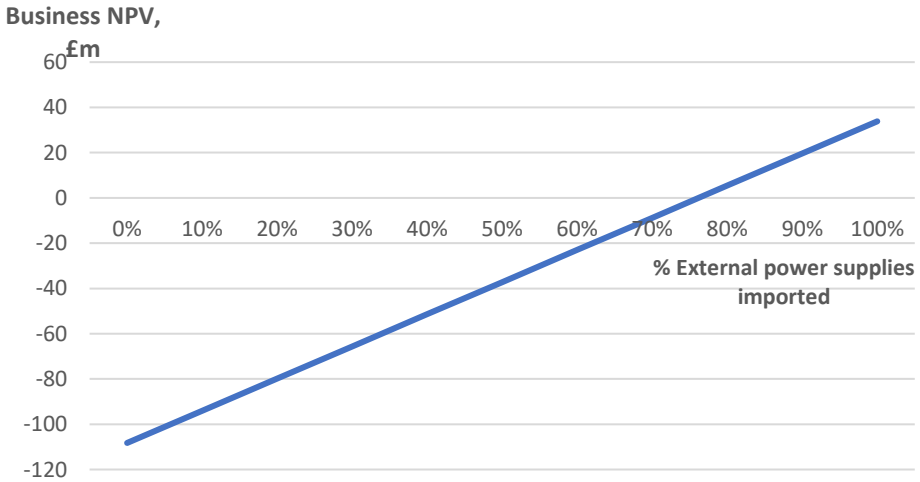
scenarios: 100% of external power supplies purchased in the UK being imported and 0%. A chart showing the full range is shown in Figure 5.

***Table 8 Summary of total costs and those directly impacting on UK businesses***

| Costs/benefits | Total (£m) | Of which direct business costs (£m) if… | |
|---|---|---|---|
| | | 100% imported | 0% imported |
| Costs to manufacturers/business purchasers | 197 | 55 | 197 |
| Costs of increase in non-traded $CO_2e$ emissions (extra heating)[24] | 7 | 0 | 0 |
| **Total Costs (A)** | **204** | **55** | **197** |
| Value energy savings (net) | 428 | 89 | 89 |
| Value of reduction in $CO_2e$ emissions | 37 | 0 | 0 |
| Net benefits of air quality improvements | 4 | 0 | 0 |
| **Total Benefits (B)** | **469** | **89** | **89** |
| **Net Present Value (B–A)** | **264** | **34** | **-108** |

Note that totals may not appear to add up due to rounding.

***Figure 5: Direct net present value to UK businesses for different scenarios of the rate of external power supply imports***




73. Initial desk-based research and industry experts suggest that most external power supplies are imported into the UK. Without firm evidence at this stage, however, we consider the worst-case scenario for UK businesses, i.e. that 0% are imported into the

[24] For household users, it is assumed that extra heating is required to replace the reduced heat-loss of more efficient products. For non-domestic users it is, instead, assumed that any extra heating is offset by reduced cooling costs. See Annex 2 for more details.

UK and all are manufactured within the UK. Using the BEIS Impact Assessment Calculator, the provisional Equivalent Annualised Net Direct Cost to Business (EANDCB) of the preferred policy option (Option 2) is set out in Table 9 below, alongside the Business Net Present Value and Business Impact Target Score.

***Table 9: EANDCB and Business Net Present Value for Option 2 (under the 0% imported scenario)***

| | **2020 Prices, 2020 present value (£m)** |
|---|---|
| Business Net Present Value | -108 |
| Equivalent Annualised Net Direct Cost to Business (EANDCB)[25] | 13 |
| Score for Business Impact Target (BIT) | 63 |

74. We will actively look to address the uncertainty around the scale of UK imports during the consultation process since this significantly affects the EANDCB and BIT score above.

## 6.2. Small and Micro Business Assessments (SaMBA)

75. The UK market is dominated by small and micro sized businesses (defined as having up to 49 Full Time Equivalent (FTE) and 10 FTE employees respectively[26]), making up 98% of all businesses in 2018.

76. While the exact number of such businesses affected by the draft regulations is uncertain, Table 10 below shows the breakdown for manufacturing and for those specifically manufacturing computer-related items.

[25] The Equivalent Annual Cost is calculated by dividing the net present value through an annuity rate. This rate can be calculated using the formula: a = (1+r)/r * [1- 1/(1+r)^ t], where r is the interest rate (3.5%) and t is the number of years over which the NPV has been calculated (10). See HM Government's OIOU (One-In, One-Out) Methodology[22].
[26] BEIS Better Regulation Framework Manual, February 2018. Available at: https://www.gov.uk/government/publications/better-regulation-framework.

***Table 10: Number and proportion of manufacturing businesses (local units, VAT traders and/or PAYE employers) in the UK that are small and micro-sized, 2018[27]***

| | Micro (<10 employees) | Small (10-49 employees) | Total |
|---|---|---|---|
| All manufacturing | 99,360 (75%) | 24,440 (18%) | 132,525 |
| Of which… manufacture of computer, electronic and optical products; and electrical equipment | 6,920 (70%) | 2,075 (21%) | 9,850 |

77. Given the above figures, it could be estimated that over 90% of businesses affected by the regulatory changes in general would be small or micro in size. Separate data from 2016, suggests that around 15% of all turnover in the manufacturing sector is generated by small and micro businesses[28]. However, as noted previously, desk-based research and industry experts suggest that most external power supplies are imported into the UK. We cannot, however, rule-out small or micro UK businesses being affected.

78. Due to the lack of evidence – in particular around the specific market share for those producing external power supplies in the UK given that many are thought to be imported – the expected impact is only qualitatively discussed below and noted as an area for improved evidence in the consultation that will take place in Autumn 2019.

79. Such businesses are likely to be disproportionately affected by the transitional costs associated with Option 2, in particular, around testing and, where possible, amending their products to make them compliant. There are also likely to be fewer alternative products for them to market or recoup losses from if a product was to fall outside of the acceptable efficiency range. Similarly, however, they may also be disproportionately affected by Option 1 (Do Nothing) as smaller businesses might find it harder to capitalise on the lower levels of regulation in the UK compared with elsewhere, for example, through scaling-up production or bargaining with suppliers.

80. To mitigate the impact on small and micro businesses, possible options could be considered including:
    - phasing the transition period; or
    - providing an exemption.

[27] ONS: UK business: activity, size and location 2018. Available at: https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/ukbusinessactivitysizeandlocation/2018. Considered UK Local Units in VAT and/or PAYE based Enterprises. All manufacturing includes SIC codes 10-32. Manufacture of computer; electronic and optical products and electrical equipment includes SIC codes 26 and 27.
[28] ONS: Analysis of enterprises in the UK in the Manufacturing Sector by employment and turnover size bands for 2016. Available at: https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/adhocs/007135analysisofenterprisesintheukinthemanufacturingsectorbyemploymentandturnoversizebandsfor2016.

81. Given the potentially large proportion of businesses affected that are small or micro in size, both a phasing in of the transition period and providing an exemption are likely to greatly reduce the efficacy of the policy, preventing the objectives being reached and reducing the NPV. This would also potentially cause confusion among small and micro manufacturers placing their products both on the UK and EU markets as two different rules would apply. The exact scale of the impact on, for example, the energy savings lost is unknown, however, since there is no known evidence as to the size of the market owned by these businesses. The quantitative impact this will have on reducing the NPV is therefore unknown.

82. The consultation process will aim to gather views from stakeholders to better aid the understanding around the impact the policy – as well as the Do Nothing option – would have on all types of businesses.

# 7. Wider Impacts

83. Table 11 below summarises the wider social and environmental costs and benefits, some of which have, while others have not, been considered in this assessment.

***Table 11: Impacts considered and included in our assessment***

| Does your policy option/proposal have an impact on…? | Assessed? | Section |
|---|---|---|
| **Statutory equality duties** | | |
| Statutory Equality Duties Impact Test guidance | No | - |
| **Economic impacts** | | |
| Competition Assessment Impact Test guidance | Yes | Annex 4 |
| Small and Micro Business Assessment | Yes | Section 6.2 |
| **Environmental impacts** | | |
| Greenhouse Gas Assessment Impact Test guidance | No | - |
| Wider Environmental Issues Impact Test guidance | Yes | Annex 5 |
| **Social impacts** | | |
| Health and Well-being Impact Test guidance | No | - |
| Human Rights Impact Test guidance | No | - |
| Justice Impact Test guidance | No | - |
| Rural Proofing Impact Test guidance | No | - |
| **Sustainable development** | | |
| Sustainable Development Impact Test guidance | No | - |

84. Of the above assessments, only three have been identified as worth exploring further:

- Competition Assessment Impact Test guidance;
- Small and Micro Business Assessment; and
- Wider Environmental Issues Impact Test guidance.

85. Of the remaining seven additional assessments, no additional analysis has been conducted for the following reasons:

- Environmental impacts have already been costed and included in our CBA. Sustainable development has also been considered qualitatively. This policy is directly related to energy efficiency and warrants more in-depth consideration.
- Regulating energy-related products has no direct or indirect effect on statutory equality duties.
- Of the social impact tests available, none are directly related to the regulation of energy-related products and do not appear relevant to this assessment.

# 8. Summary and Implementation Plan

## 8.1. Summary

86. Under the Do Nothing option, manufacturers are likely to compete on price, neglecting energy efficiency. Policy Option 2 addresses this market failure by updating ecodesign requirements for external power supplies, equivalent to those agreed by the UK at EU level before EU exit.

87. The main analysis used in this appraisal is taken from the Energy Using Products Policy model. The model is explained in detail in Annex 2, including assumptions and sensitivities.

88. The benefits identified are as follows:

- reduced energy costs due to improved energy efficiency;
- consistency between UK and EU requirements and UK and the US, creating a level playing field;
- likely increase in innovation due to manufacturers having to produce more efficient products;
- carbon savings/reduction in greenhouse gas emissions; and
- improved air quality.

89. The costs identified are as follows:

- Increased manufacturing costs to produce more efficient products are expected. This is inclusive of transitional costs and assumed to be passed onto consumers through the supply chain resulting in increased prices.
- Transitional (one-off) costs of implementing the policy, including familiarisation costs of understanding the requirements.
- Possible reduction in consumer choice if some product types are removed from the market, however, these are likely to be replaced by new, more efficient products.
- Distributional impacts should be expected. Vulnerable consumers may be adversely affected due to the additional cost of more energy efficient products yet will be compensated by lower energy bills.
- Enforcement costs of imposing requirements are also considered but have a net zero cost.

90. Quantified costs and benefits give a NPV of £264m over the appraisal period (2020/21 to 2029/30).

## 8.2. Implementation and Delivery Plan for Option 2

91. OPSS within BEIS is the appointed Market Surveillance Authority responsible for the implementation and enforcement of ecodesign regulations in the UK, and as such is tasked to ensure manufacturers and their authorised representatives, or importers comply with the revised ecodesign requirements for external power supplies. They will do so through applying their enforcement policy[21] which is to undertake risk-based enforcement activities, including supporting legitimate and well-intentioned businesses through the provision of advice and guidance as well as employing sanctions where considered proportionate. This regime will ensure the estimated energy bill and carbon emission savings are realised and a level playing field for businesses is achieved.

92. The revised ecodesign requirements for external power supplies are proposed to apply from 1 April 2020, in line with the implementation dates agreed at EU level. The Government is carrying out a consultation whereby manufacturers and other stakeholders can comment on the Government's proposals. We are also working with trade bodies to ensure our intention to regulate is communicated to their members. Once the regulations are made, OPSS will issue a notice informing manufacturers and importers of the new regulations. As the proposed ecodesign requirements are equivalent to what the UK, as a member state, agreed at EU level in January 2019, where the requirements were already consulted on, we anticipate a good level of awareness among manufacturers.

93. In light of technological progress for external power supplies, the Government will review the draft regulations five years from entry into force to allow sufficient time for all provisions to be implemented and show an effect on the market.

94. As set out in the Ecodesign for Energy-Related Products Regulations 2010, as amended by the Ecodesign for Energy-Related Products and Energy Information (Amendment) 2019, the proposed requirements will be brought forward using secondary legislation subject to the negative resolution procedure and will as such automatically become law without parliamentary debate unless there is an objection from either House of Parliament.

# Annex 1 Detailed Description of External Power Supplies

A1. An external power supply is a device which meets all the following criteria:

- it is designed to convert alternating current (AC) power input from the mains power source input into lower voltage direct current (DC) or AC output;
- it is intended to be used with a separate device that constitutes the primary load;
- it is contained in a physical enclosure separate from the device that constitutes the primary load;
- it is connected to the device that constitutes the primary load via a removable or hard-wired male/female electrical connection, cable, cord or other wiring;
- it has nameplate output power not exceeding 250 Watts; and
- it is intended for use with electrical and electronic household and office equipment.

A2. The following products are excluded from the draft regulations:

- voltage converters;
- uninterruptible power supplies;
- battery chargers;
- lighting converters;
- external power supplies for medical devices;
- active power over ethernet injectors;
- external power supplies placed on the market before 1 April 2025 solely as a service part or spare part for replacing an identical external power supply placed on the market before 1 April 2020, under the condition that the service part or spare part, or its packaging, is clearly marked 'External power supply to be used exclusively as spare part for' followed by the name of the primary load product with which it is intended to be used.

A3. The main manufactures of external power supplies are[29]:

- Delta (Eltek);
- Lite-On Technology;
- Acbel Polytech;
- Salcomp;
- Chicony Power;
- Emerson (Artesyn);

[29] Based on desk-based research.

- Flextronics;
- Mean Well;
- TDK Lambda;
- Phihong; and
- FSP Group.

# Annex 2 Modelling Approach and Key Assumptions

A4. This annex sets out the modelling approach used in this Impact Assessment, the detail of the costs and benefits analysed in the cost-benefit analysis as well as the key assumptions made.

## A2.1 The Model

A5. For 20 years, the UK has been developing end-use energy models to examine the likely impact from policy measures addressing energy consumption of Energy Using Products (EUP) such as lights and appliances. The model used in this Impact Assessment has gone through various iterations including via the Government's Market Transformation Programme (MTP) and, currently, the Energy Using Products Programme (EUPP). In 2012, the model underwent extensive peer-review which has led to further improvements and was awarded a rating of over 90% by BEIS's independent Modelling Integrity Team in June 2018 – the level required for all business-critical models.

A6. As well as provide energy saving estimates, the main purpose of the model is to assess, as here, the impact of policies around energy using products. Its outputs include the likely costs (in particular, higher costs resulting from the purchase of new products); and benefits (primarily in the form of energy and carbon savings from using more energy efficient products).

A7. The model uses a "bottom-up" approach, allowing detailed scenarios to be modelled for specific products such as the setting of minimum energy performance standards. Each product and scenario require specific inputs to be calculated/estimated, including:

- **stocks and/or sales** of EUP being modelled (including breakdown by technology type);

- the **lifespan** of the EUP;
- **energy consumption** of EUP (including by mode type and mode such as “on” or “standby”);
- the **level of usage** of EUP (hours/year); and
- **price** and value estimates, to calculate costs and benefits.

A8. Comparing the outputs of the model under different scenarios, the model quantifies the:

- **additional purchase/production costs** associated with new products (typically incurred by the consumer, and/or other groups such as industry or government);
- **benefits of energy savings** over the lifetime of the products from switching to more energy efficient products;
- **costs and benefits of non-monetary factors** such as improved air quality and a reduction in emissions; and
- **costs of the additional heating requirements** due to the heat replacement effect (HRE). This is the extra heating required in the colder months to replace the reduced waste heat loss from more efficient products. It is only considered for domestic products since, for non-domestic use, we assume it is cancelled out by reduced cooling costs in the warmer months.

## A2.2 Input Variables

### A2.2.1 Stocks and/or Sales

A9. The stock of EUPs refers to the number of products, along with their technical characteristics, owned by consumers and businesses during a given year. Flows into the stock include new purchases (sales) and flow out of the stock arise from disposals. Stock/sales figures are independent of other inputs, such as costs.

A10. The composition of the stock in terms of its energy efficiency and the level of usage of the products is also required to determine energy use from a particular class of EUPs. The average energy efficiency of the stock evolves according to the rate at which EUPs at one level of energy efficiency are replaced by EUPs of another level of energy efficiency. In the context of EUPs, the rate of increase in energy efficiency over time depends on the rate at which older, less energy efficient products are replaced by newer, more energy efficient products which, in turn, may be affected by the policy being assessed.

A11. If the data on the stock of EUPs from year to year are more complete than the data on new purchases (sales), then stock data and projections are used as an input to the model and sales in each year are calculated according to the rate of disposal and end-of-year stocks. This is called a "sales from stock" model. Alternatively, if the sales data are more complete than the stock data, then these figures are used as inputs and the stock is calculated as the sum of sales and disposals. This is called a "stock from sales" model.

### A2.2.2 Lifespan (years)

A12. The lifespan of a particular cohort of EUPs is modelled according to a normal distribution. Each cohort has a mean lifespan (the age at which half of the cohort is disposed of) and a corresponding standard deviation indicating the level of variance in that lifespan. The model considers the technical/economic lifespan, accounting for products being replaced before they are irreparable (for example, a mobile phone being replaced at the end of a fixed-term contract).

### A2.2.3 Costs (£)

A13. The following prices are considered in the model:

- the **purchase costs of new products** represent the per-unit cost of inflows to the EUP stock;
- **energy prices** which are applied to the energy savings relative to the counter-factual case;
- **carbon prices** to monetise the benefits of lower emissions as a result of the energy savings; and
- the **value of improved air quality** from the energy savings.

A14. Real prices are used as at the baseline year for the model and are discounted, as per Green Book guidance, at the social time preference rate of 3.5%[30].

### A2.2.4 Level of Usage (hours/year)

A15. The number of hours that each product is in use per year is estimated.

[30] The Green Book: Central Government Guidance on Appraisal and Evaluation, March 2019. Available at: https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent.

### A2.2.5 Energy Consumption (kW)

A16. In each year, energy demand is given by annual usage (hours/year) multiplied by the average efficiency of the stock. The annual usage figures can be differentiated by technology and operating mode (e.g. “on” versus “standby”) and may also differ over time. Estimates of greenhouse gas emissions are calculated from the energy demand figures by applying emissions factors to the series from the *Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal*[31].

## A2.3 Modelling Assumptions

A17. The model does not link costs and stocks/sales, i.e. if the cost of a product increases in the model, stocks/sales figures are unaffected and vice-versa. Similarly, the model assumes that a change in the price of energy will only lead to a change in the value of energy savings (and not the effective lifespan of products).

A18. The model does not address decisions about whether to replace a product before the end of its life, if it becomes cost effective to do so, or which of the candidate technology types is the preferred replacement choice.

A19. All manufacturing costs are assumed to be passed on to consumers through the price of the product.

## A2.4 Specific Modelling

A20. In this section, specific details are provided for the modelling of external power supplies.

A21. The draft regulations set minimum requirements in the areas of no-load power consumption and average active efficiency.

A22. Additionally, the draft regulations include requirements regarding information provided by manufacturers, their authorised representatives and importers. There are two target groups for the information:

[31] Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal, January 2018. Available at: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal.

- end users (to be informed by user manuals and free access websites); and
- authorities conducting conformity testing (to be informed by technical documentation).

A23. There are four categories of external power supplies, for which minimum requirements are defined. These are consistent with the US DOE CSL VI:

- AC-AC external power supplies (except low voltage and multiple voltage output external power supplies);
- AC-DC external power supplies (except low voltage and multiple voltage output external power supplies);
- low voltage external power supplies (output voltage of less than 6 volts and a nameplate output current greater than or equal to 550 milliamperes); and
- multiple voltage output external power supplies (converting input into more than one simultaneous output at lower DC or AC voltage).

A24. To take a more efficient approach to the modelling, the model was split into three sub-models, separated into domestic and non-domestic sectors. Domestic external power supplies were split again into ‘small’ and ‘large’ external power supplies. Non-domestic was limited to large external power supplies. A sub-technology sales weighted average energy demand value in terms of kWh/year was estimated for each model. This approach was more efficient to implement instead of a more granular approach, where a separate model for each sub-technology (such as mobile phones, laptops, televisions) would have been developed.

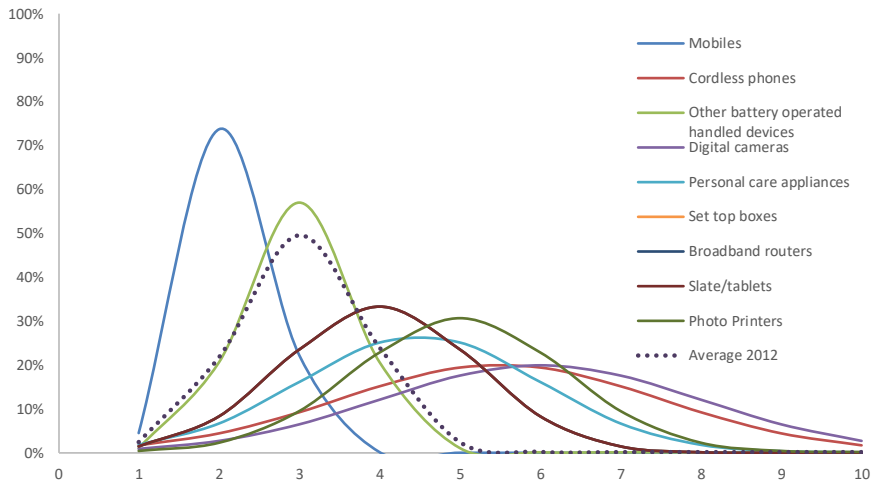
A25. The models are sales-based models (see paragraph A11), developed using a variety of sources outlined below. The average energy demand values were derived from a US DOE products database for external power supplies. The US and the UK external power supply markets are thought to be comparable in terms of options available. This is because both countries import products from a very similar set of manufacturers. Cost data were also available from the US DOE products database.

A26. The following table shows the high-level inputs into the model along with the sources behind the values.

***Table 1: Overview of the key inputs into the cost-benefit analysis for external power supplies.***

Note that, due to the high number of products considered in the modelling of external power supplies, only high-level details are provided here.

| Variable | Source(s) | Values/assumptions | |
|---|---|---|---|
| | | **Domestic products** | **Non-domestic products** |
| **Stocks/sales** (Same under both options) | [1] Ofcom Communication Market Reports<br>[2] MTP data<br>[3] vgChartz.com | To enable more accurate modelling, domestic external power supplies were modelled separately to non-domestic ones. In addition, large and small domestic products were, collectively, modelled separately meaning that three models were used to provide outputs for external power supplies.<br>Each model considered a range of devices to provide the key inputs. | |
| | [4] IFS DEFRA IA evidence, 2008<br>[5] Network Standby EUPP model 2016<br>[6] EUPP Displays model 2018<br>[7] Mintel 2012 & 2014<br>[8] EPS Preparatory Study, 2007 | For domestic external power supplies, the following devices were considered (where the sources for sales figures are provided in square-brackets):<br>**Large:**<br>• Scanners [8]<br>• Domestic monitors [5]<br>• TVs [5]<br>• Domestic ink-jet printers [5]<br>• Power tools [8]<br>• Games consoles [3,7]<br>• Domestic laptops [7].<br>**Small:**<br>• Mobiles [1,2]<br>• Cordless phones [1]<br>• Other battery-powered handled devices [3]<br>• Personal care appliances [8]<br>• Digital cameras [7]<br>• Set-top boxes [5]<br>• Broadband-routers [1]<br>• Slate/tablets [1]. | For non-domestic external power supplies, the following devices were considered (where the sources for sales figures are provided in square-brackets):<br>• Monitors [6]<br>• Ink-jet printers [5]<br>• Laptops [7]<br><br>It is assumed that all ink-jet printers and laptops come with an external power supply, so sales of products equate to sales of external power supplies. For monitors, 10% are assumed to require an external power supply. |

| Variable | Source(s) | Values/assumptions | |
|---|---|---|---|
| | | **Domestic products** | **Non-domestic products** |
| | | With the exception of TVs and monitors, it is assumed that all products come with an external power supply, so sales of products equate to sales of external power supplies. For TVs, it is assumed 25% required an external power supply and 10% for monitors. | |
| **Lifespan in years** (Same under both options) | [1] Expert assumptions | The average lifespan of each product was estimated [1] and a weighted average (based on the number of sales of each product) used to provide the single input for each of the models. As above, the lifespan of the external power supply is assumed to equate to the lifespan of the product itself.<br><br>The figure below illustrates the spread of the lifespan (in years) for the key devices:<br><br>***Figure 2: Distributions of lifespans for key external power supply devices***<br>  <br> | |

| Variable | Source(s) | Values/assumptions | |
|---|---|---|---|
| | | **Domestic products** | **Non-domestic products** |
| **Cost of product** (Different under each option) | [1] US Department of Energy Products Database | The costs were considered incremental, relative to an average product on the market, and were assumed to be proportional to the gap between the assumed energy efficiency in a given year against the option being considered (see energy consumption below). End-user costs were used as opposed to manufacturers' selling price to provide a high-end estimate. | |
| **Level of usage in hours/year** (Same under both options) | | Whereas this input variable usually defines the use (in hours per year) of the product, here that is defined under the energy consumption variable. Therefore, the usage value was set to 1 (yrs/yr). | |
| **Energy consumption in kWh/year** (Different under each option) | [1] US Department of Energy Products Database | A Business-As-Usual scenario was estimated [1], showing the additional costs of more efficient products which were assumed to be produced even without regulation.<br><br>Due to the availability of data (from [1]), the proportion of products aligning to each US Candidate Standard Level (CSL) level of efficiency (0-6) was estimated under each scenario, considering the changes in the requirements being introduced under Option 2. | |

### A2.4.1 Modelling Example

A27. This section includes an example of how the model calculates the costs and benefits using the key inputs outlined in the sections above. Small domestic external power supplies are considered as per Table 1 above. 2023 has been used as the example year where it should be noted that all figures are based on the average of all small domestic external power supplies. (All figures have been rounded.)

**Costs**

- Using data from a variety of sources (see Table 1), it was estimated that 2023 sales of small domestic external power supplies would be 64.6m broken down as follows:
    - Mobile phones – 42.1m
    - Cordless phones – 0.3m
    - Other battery-operated handles devices – 0.2m
    - Digital cameras – 1.7m
    - Personal care appliances – 1.5m
    - Broadband routers – 8.6m
    - Set-top boxes – 6.1m
    - Slate/tablets – 3.5m
    - Photo printers – 0.6m

- Due to the regulatory changes, additional costs of buying a small domestic external power supply (over those under Option 1 where there are no regulatory changes) are estimated, on average, to be £0.18 (2012 prices)[32]. This gives,

  **Total cost (2012 prices) = 64.6m units * £0.18 = £11.8m.**

- Converting to 2020 prices, however, gives,

  **Total cost (2020 prices) = £11.8m * 1.13[33] = £13.4m.**

- Since, in the main body of this assessment, costs have been provided with a present value year of 2020, these prices must be discounted at an annual rate of 3.5%[34] giving

  **Discounted cost = £13.4m * (1/1.035)^3 = £12.0m**

[32] US Department of Energy Products database. Available at: https://www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A*
[33] Table 19 (2020 price scaling factor, compared with 2012), Green book supplementary guidance, 2017.
[34] As per Green Book guidance: Discounting is used to compare costs and benefits occurring over different periods of time – it converts costs and benefits into present values. It is based on the concept of time preference, that generally people prefer to receive goods and services now rather than later.

- Costs in other years are calculated in the same way, taking into consideration the estimated number of sales and discounting the costs accordingly.

**Benefits:**

- Average annual energy consumption is estimated to be, on average, 1.54kWh/yr less under the regulations. Therefore,

  **Energy savings (in 2023 for those products purchased in 2023)**
  **= 1.54 kWh/yr * 64.6m units = 99.5m kWh/yr**

- Using the Green Book supplementary guidance:

  **Value of energy savings (discounted) =**
  **99.5m kWh * 0.101 £/kWh[35] * 1.05[36] * (1/1.035)^3 = £9.5m**

  **Value of reduction in $CO_2e$ emissions (discounted) =**
  **99.5m kWh * 0.255/1000 $tCO_2e$/kWh[37] * 27.0 £/tCO2[38] * 1.05[36] * (1/1.035)^3 = £0.6m**

  **Net benefits of air quality improvements (discounted) =**
  **99.5m kWh * 0.0019[39] £/kWh * 1.05[36] * (1/1.035)^3 = £0.2m**

  **Total benefits (of 2023 cohort in 2023, discounted) =**
  **£9.5m + £0.6m + £0.2m = £10.4m**

- Energy savings for this cohort (products purchased in 2023) were then applied in subsequent years reduced by the number of products which were estimated to have reached the end of their lifetime. This was calculated using a normal distribution with mean 2.9 and standard deviation 0.8. For example, when this cohort is 2.9 years old (2026), it is assumed that the annual energy savings will apply to only half of the 64.6m units and, after 4.5 years (two standard deviations after the mean), only 2%[40].

[35] Table 9 (Long-run variable cost, Central Estimate, Domestic, 2023), Green book supplementary guidance[33].
[36] Prices in the Green book are expressed in 2017 prices which then have to be converted to 2020 prices using Table 19 (2020 price scaling factor, compared with 2017), Green book supplementary guidance[33].
[37] Table 1 (Long-run marginal, Domestic, 2023), Green book supplementary guidance[33].
[38] Table 3 (Traded, Central estimate, 2023), Green book supplementary guidance[33].
[39] Table 15 (Electricity, National average. 2023), Green book supplementary guidance[33].
[40] Note that the model only deals with whole years. However, part-years have been included here for illustrative purposes.

- Note that, although these benefits are lower than the costs, total benefits from 2023 will include those cohorts of products purchased in earlier years and, correspondingly, benefits from the 2023 cohort will be realised in subsequent years.

# Annex 3 Assumptions log

***Table 2: Modelling assumptions log***

| Assumption | Description of Assumption | Risk level | Description of Risk Rating, and any mitigation actions |
|---|---|---|---|
| Sales | Historic sales data (1980-2008) comes from the 2008 models. | Medium | Risk is deemed medium as the source data is reliable yet the impact is high. Any divergence is implicitly considered in the sensitivity analysis. |
| | Sales from 2008 onwards come from the 2008 model iteration. | High | Risk is high as quality is medium and sales greatly impact the model outputs. However, risk is mitigated by sales figures affecting both costs and benefits proportionately. |
| Usage | Average usage set to 1 (yrs/yr). Unit = yrs/ year. | Low | Low to zero risk as the energy usage is incorporated in the energy efficiency assumption. |
| Demand | Average demand of external power supplies is taken from US DOE database with a reference year of 2009. It is assumed constant beforehand. | Medium | Medium risk because the data source is very reliable. Any divergence is implicitly considered in the sensitivity analysis. |
| | The new policy scenario assumes constant demand after policy introduction in 2020. | Medium | Medium risk is associated with uncertainty on precise values due to the quality of the source data. However, overall effect is limited by not going beyond any already defined best available technology (BAT). Any divergence is implicitly considered in the sensitivity analysis. |
| Consumption | The business as usual (BAU) scenario assumes that consumption would slowly decline and reach 2009 levels in year 2030. | Medium | |
| | The existing policy scenario assumes gradual change from 2012 policy values towards reaching values from New Policy's year 2021 in year 2050. | Medium | |
| Lifespan | External power supply lifespan is based on the average lifespan of the devices modelled. Numbers come from the 2008 modelling exercise. | Low | Risk is low as the source data is high quality and impact on the model outputs is relatively low, affecting both costs and benefits. |
| Price/Cost | The total reference cost of efficiency improvement is the cost of reaching CSL4 level efficiency from US DOE products database. | Medium | Risk is medium as the source is reliable, but the impact on the model outputs is important. Any divergence is implicitly considered in the sensitivity analysis. |

# Annex 4 Competition Assessment

A28. Considered in this assessment are the effects on competition from our preferred policy option (Option 2). The following questions were considered as to whether the option:

1. directly limits the number or range of manufacturers;
2. indirectly limits the number or range of manufacturers;
3. limits the ability of manufacturers to compete; and
4. reduces manufacturers' incentives to compete vigorously.

A29. It has been concluded that there are no adverse effects on competition from our policy option as none of the above conditions are satisfied.

# Annex 5 Wider Environmental Impacts Assessment

A30. Considered in this assessment are the effects on the wider environment from our preferred policy option. Each of the following questions were considered:

1. Will the policy option be vulnerable to the predicted effects of climate change?
2. Will the policy option lead to a change in the financial costs or the environmental and health impacts of waste management?
3. Will the policy option impact significantly on air quality?
4. Will the policy option involve any material change to the appearance of the landscape or townscape?
5. Will the proposal change 1) the degree of water pollution, 2) levels of abstraction of water or 3) exposure to flood risk?
6. Will the policy option change 1) the amount or variety of living species, 2) the amount, variety or quality of ecosystems?
7. Will the policy option affect the number of people exposed to noise or the levels to which they're exposed?

A31. The policy in question has direct benefits accruing from environmental savings. Relevant impacts have been explicitly included in the cost-benefit analysis. Others have not been included (such as the appearance of the landscape and the amount or variety of living species) as they are not in-scope for this policy. It has been concluded

that the extent to which environmental impacts are considered in the main body of this assessment is proportionate.

# Annex 6 Glossary of Terms

| | |
|---|---|
| AC | Alternating Current |
| BAT | Best Available Technology |
| BEIS | Department for Business, Energy and Industrial Strategy |
| CBA | Cost-benefit analysis |
| CGS | Clean Growth Strategy |
| CSL | Candidate Standard Level |
| DC | Direct Current |
| EANDCB | Equivalent Annual Net Direct Cost to Business |
| EC | European Commission |
| EEA | European Environment Agency |
| EPS | External Power Supplies |
| ErP | Energy-related Products |
| EU | European Union |
| EUP(P) | Energy Using Products (Programme/Policy) |
| FTE | Full Time Equivalent |
| HMT | Her Majesty's Treasury |
| HRE | Heat Replacement Effect |
| IA | Impact Assessment |
| NPV | Net Present Value |
| NPSV | Net Present Social Value |
| MTP | Market Transformation Programme |
| MSA | Market Surveillance Authority |
| OIOO | One-In, One-Out |
| ONS | Office of National Statistics |
| OPSS | Office for Product Safety and Standards |
| SaMB(A) | Small and Micro Business (Assessment) |
| SME | Small and Medium Enterprise |
| WTO | World Trade Organisation |
| US DOE | United States Department of Energy |