| Title: Impact Assessment of Proposed Ecodesign Requirements for Electronic Displays<br>RPC Reference No: RPC-5004(1)-BEIS<br>Lead department or agency: BEIS<br>Other departments or agencies: DEFRA | Impact Assessment (IA)<br>Date: 30/09/2020<br>Stage: Consultation<br>Source of intervention: Domestic<br>Type of measure: Secondary legislation<br>Contact for enquiries:<br>Policy Lead: Lucy Birt (Lucy.Birt@beis.gov.uk)<br>Analyst Lead: Chris Nash (Chris.Nash@beis.gov.uk) |
|---|---|
| **Summary: Intervention and Options** | RPC Opinion: Not applicable |

| **Cost of Preferred (or more likely) Option** (in 2016 prices, 2017 present value year) | | | |
|---|---|---|---|
| **Total Net Present Social Value** | **Business Net Present Value** | **Net cost to business per year** | **Business Impact Target Status** Qualifying provision |
| £3.1m | £3.2m | -£0.4m | |

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

Electronic displays have a substantial environmental impact and present significant potential for improvement in terms of energy performance as large numbers are placed on the market annually. In December 2018 the UK, as a Member State, voted in favour of new and updated ecodesign requirements for electronic displays. These requirements will not automatically apply in Great Britain after the transition period ends on 31st December 2020. However, the measures carry significant benefits in relation to realising the Government's Carbon Budget and Net Zero targets and implementing them in UK law means that we can reap these benefits after the end of the Transition Period. Therefore, separate GB legislation is required for the associated energy savings of these requirements to be realised. The costs and benefits of the proposed GB ecodesign requirements for electronic displays has been analysed separately but are included here in the same impact assessment.

**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 Carbon Dioxide ($CO_2$) emissions, minimising the adverse environmental impacts of products and ensuring effective regulation for businesses and consumers. Updating existing ecodesign requirements for electronic displays is projected to further increase energy efficiency savings, reduce the UK carbon footprint, and increase innovation and investment into the production of more energy efficient products.

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

The preferred option (Option 2) has been assessed against a Do Nothing option.

Option 1 - Do Nothing. There is significant potential for efficiency improvements for electronic displays due to the numbers of products (**20**m) sold each year in the UK. By not legislating, the UK miss out on the associated energy and carbon emission savings.

Option 2 - Update ecodesign requirements for the products to reflect what the UK agreed at EU level as a Member State in December 2018. This would make it possible for the UK to realise the energy and carbon emission savings from improvements to the energy efficiency of electronic displays, contributing to the Government's Carbon Budget and Net Zero targets, and maintaining high environmental product standards.

Self-regulation was considered, however during the consultation the Government held with stakeholders before agreeing the EU regulations on electronic displays, industry did not propose any self-regulations, nor expressed an interest in doing so. This option has therefore been discarded.

**Will the policy be reviewed?** It **will** be reviewed. **If applicable, set review date: 3** years from application of the draft electronic displays regulations.

| | | | | |
|---|---|---|---|---|
| Does implementation go beyond minimum EU requirements? | | No | | |
| Is this measure likely to impact on international trade and investment? | | No | | |
| Are any of these organisations in scope? | **Micro** Yes | **Small Yes** | **Medium Yes** | **Large Yes** |
| What is the $CO_2$ equivalent change in greenhouse gas emissions? (Million tonnes $CO_2$ equivalent) | | **Traded:** -0.03 | **Non-traded:** +0.01 | |

***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: Rt Hon Kwasi Kwarteng MP Date: 04/08/2020

**Description:** Update ecodesign requirements for electronic displays

**FULL ECONOMIC ASSESSMENT**

| **Price Base Year** 2021 | **PV Base Year** 2021 | **Time Period Years** 10 | **Net Benefit (Present Value (PV)) (£m)** | | |
|---|---|---|---|---|---|
| | | | **Low (-20%): 3.12** | **High (+20%): 4.68** | Best Estimate: **3.90** |

| **COSTS (£m)** | **Total Transition** (Constant Price) | Years | **Average Annual** (excl. Transition) (Constant Price) | **Total Cost** (Present Value) |
|---|---|---|---|---|
| **Low (-20%)** | - | | - | 9.0 |
| **High (+20%)** | - | 10 | - | 13.6 |
| **Best Estimate** | - | | 5.5 | **11.3** |

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

Manufacturing costs, along with the estimated additional costs for manufacturers to meet the increased energy performance requirements, make up 100% of all monetised costs which are based on UK sales figures for electronic displays. These additional costs are assumed to be passed onto consumers through the supply chain but are offset by lower energy bills.

**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); resource efficiency (considered disproportionate - energy savings were modest); 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 in the UK).

| **BENEFITS (£m)** | **Total Transition** (Constant Price) Years | | **Average Annual** (excl. Transition) (Constant Price) | **Total Benefit** (Present Value) |
|---|---|---|---|---|
| **Low (-20%)** | **-** | | **-** | **12.2** |
| **High (+20%)** | **-** | 10 | **-** | **18.2** |
| **Best Estimate** | **-** | | **7.8** | **15.2** |

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

Net energy savings are expected to account for 88% of all monetised benefits leading to reduced energy bills for consumers (commercial and domestic). Reduction in $CO_2e$ and improved air quality levels account for the remaining monetised benefits.

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

A key non-monetised benefit is that requirements will create open and fair competition with the EU. Additional benefits include a likely increase in innovation due to UK manufacturers having to make substantive improvements to their products.

| **Key assumptions/sensitivities/risks** | 3.5% |
|---|---|

Most quantified costs and benefits have been provided by the Energy Using Products Policy model (described in Annexes 2 & 3). 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 Net Present Value (NPV).

**BUSINESS ASSESSMENT (Option 2)**

| **Direct impact on business (Equivalent Annual) £m:** | | | **Score for Business Impact Target (qualifying provisions only) £m:** |
|---|---|---|---|
| **Costs:** | **Benefits:** | **Net:** | |
| 0.26 | 0.73 | -47 | -2.34 |

# Table of Contents

# 1 Problem under consideration and the rationale for intervention

1. The ecodesign framework sets minimum energy performance standards (MEPS) and other environmental requirements that energy-related products (ERPs) must meet to be placed on the market. This pushes industry to improve the energy efficiency and reduce the environmental impact of products, thereby removing the worst performing 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, and commercial ones such as professional refrigeration and power transformers.
2. Ecodesign requirements have historically been set at a European Union (EU) level through the Ecodesign legislative framework[1]. In December 2018, the UK, as a Member State, agreed and voted in favour of new ecodesign regulations for electronic displays ("electronic displays")[2]. The new electronic displays regulations will update and replace ecodesign requirements set out in existing regulations[3]. The UK Government consulted stakeholders and carried out an internal cost-benefit analysis (CBA) for both products prior to agreeing and voting in favour of these requirements which showed the substantial environmental impact within the UK and the potential for improvement in terms of energy performance and resource efficiency.

3. Whilst EU requirements on ecodesign for electronic displays will not apply in the Great Britain after the transition period ends, the proposed GB regulations reflect what the UK agreed and supported at EU level.

4. The UK has always taken a leading role in pushing for both ambitious and realistic product requirements, and these new ecodesign requirements reflect this. The UK voted in favour of the new EU requirements as a Member

[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] Ecodesign Regulation (EU) 2019/2021 on electronic displays. Available at: https://eur-lex.europa.eu/eli/reg/2019/2021/oj
[3] Ecodesign Regulation (EU) No 642 /2009 on televisions. Available at: https://eur-lex.europa.eu/eli/reg/2009/642/oj

State following a UK specific cost benefit analysis and informal consultation with stakeholders. Furthermore, the measures carry significant benefits in relation to realising the Government's Carbon Budget and Net Zero targets and implementing them in GB law means that we can reap these benefits after the end of the Transition Period. This approach also reflects the commitment made in the Clean Growth Strategy to maintain common high standards or go further where it is in the UK's interests.

5. This Impact Assessment examines the proposal to make product specific regulations, to be in place after the transition period, using powers set out in regulation which will be retained in UK law after the transition period:

6. the Ecodesign for Energy-Related Products Regulation 2010, as amended by the Ecodesign for Energy-Related Products and Energy Information (Amendment) (EU Exit) Regulations 2019.[4];

7. The proposed product specific regulations (referred to in this document as the draft regulations) reflect what the UK agreed and supported as a Member State at EU level in December 2018.

8. This is consistent with the Government's intention to uphold common high product standards wherever possible and appropriate, or even exceed them where it is in the UK's interests to do so, following the end of the transition period.

9. The draft Regulations will apply in Great Britain only. In accordance with the Northern Ireland Protocol ("NI protocol"), EU Ecodesign and Energy Labelling Regulations will continue to apply in Northern Ireland post-transition period. The costs and benefits in this Impact Assessment are currently calculated on a UK basis. The effect of the NI protocol will be included in the final version of this impact assessment following consultation

# 2 Policy objective

10. Ecodesign requirements help to reduce the energy and resource consumption of energy-related products by setting minimum mandatory

[4] The Ecodesign for Energy-Related Products and Energy Information (Amendment) (EU Exit) Regulations 2019 No. 539. Available at: http://www.legislation.gov.uk/uksi/2019/539/contents/made

requirements on energy efficiency and resource efficiency. This removes poor performing products from the market and drives the market towards more energy and resource efficient products, thereby promoting a sustainable environment through regulation.

11. This policy represents a cost-effective way to reduce energy bills and carbon emissions. Current estimates from the Department for Business, Energy & Industrial Strategy (BEIS) show that existing ecodesign requirements will lead to savings of 8 million tonnes of $CO_2$ in 2020. Existing requirements are also estimated to save households £100 on their energy bills in 2020 for the average dual-fuel household[5].

12. Updating ecodesign requirements for electronic displays 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[6] ('accelerating clean growth' and 'helping business become more productive') and the Secretary of State's priorities for BEIS. Doing so will in particular:

- minimise energy bills for businesses;
- reduce greenhouse gas emissions;
- reduce the adverse environmental impacts of products;
- ensure effective regulation for industry; and
- drive innovation and support the transition to a low carbon economy.

# 3 Background and options considered

## 3.1 Background

13. Electronic displays are currently regulated under the EC No 642/2009 for Ecodesign which came into force from August 2010. Only televisions and television monitors were within scope for these regulations.

[5] BEIS estimates – savings in relation to having no products policy measures

[6] 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

14. Several reviews assessing the performance of the Ecodesign regulations for televisions and television monitors were conducted by the EU since 2011.[7] The various evaluations showed that further energy savings could be achieved by:

a) reviewing minimum energy efficiency requirements to reflect technological progress;

b) improving the definitions for the scope to include a greater range of products within electronic displays; and

c) improving testing methods.

## 3.2 Options considered

15. For this consultation stage Impact Assessment, two policy options have been considered: (1) Do Nothing and (2) update requirements to reflect what the UK agreed at EU level as a Member State in December 2018. The preferred option of (2) setting requirements which reflect what the UK agreed at EU level as a Member State, has been assessed against the Do Nothing option.

## 3.3 Rejected Options

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 the subject of self-regulation. For a product to be the subject of self-regulation it must meet certain non-exhaustive criteria which evaluate the effectiveness of such self-regulation. Industry representation, to date, has not proposed any self-regulation or voluntary scheme that meets these criteria.

17. No desire for self-regulation from electronic displays sector was expressed during the EU's consultation process prior to the approval of EU regulations in December 2018. Electronic displays have been regulated in the

[7] Centre for Strategy & Evaluation Services CSES, Evaluation of the Ecodesign Directive (2009/125/EC), Final Report, March 2012. Available at: https://www.eceee.org/static/media/uploads/site-2/ecodesign/products/ecodesign-directive-evaluation-functioning/cses-ecodesign-draft-final-report-sections-1-3-3.pdf

UK through ecodesign since 2009. Continuing this approach provides clarity and continuity for UK businesses.

18. With mandatory requirements already in place, there is also a risk of free riders reintroducing inefficient products back into the market if a voluntary agreement replaced these mandatory requirements. Free riders would be those who do not sign up to the voluntary agreement but benefit from effects without paying for them. While those who sign up to the voluntary agreement would be required to comply with the relevant requirements, free riders (those who do not sign up to the voluntary agreement) may benefit from this market shift by reintroducing inefficient products back into the market. This option was therefore discarded.

19. 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[8]. Since mandatory requirements are practical and indeed already exist in the USA and EU for electronic displays, we have ruled out self-regulation in GB as a possible option.

20. We are not proposing at this point in time to exceed the ecodesign requirements for electronic displays which reflect what the UK agreed at EU level as a Member State, 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 that more ambitious requirements offer a significant additional net benefit to the UK. Given the new EU requirements apply from 1 March 2021 for electronic displays we have ruled out, at this point, setting more ambitious GB requirements for electronic displays in order to provide clarity and legal certainty to stakeholders, and realise the associated energy and carbon savings the requirements would bring. We are actively exploring how to set better ecodesign and energy labelling regulations in GB in the future, including where it would be beneficial to exceed EU standards. We have included a small number of questions in the

[8] "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

consultation to seek stakeholder views on setting better regulations for electronic displays in the future however this Impact Assessment does not include analysis of the potential impacts of future policy.

21. The draft regulations include review provisions for electronic displays of no later than 3 years from the application dates of the draft regulations. This will allow the Government to consider more ambitious requirements considering technological progress while also allowing sufficient time for all provisions to be implemented and to understand market penetration.

## 3.4 Option 1 – Do Nothing

22. Under Option 1 no changes would be made to the existing ecodesign requirements for electronic displays.

23. The main reason why this option has not been pursued further is that, without regulation, manufacturing decisions and consumer behaviour would likely be dictated by performance and cost rather than energy efficiency or resource efficiency. Several market failures show this to be the case and the associated negative externalities are described below.

- Without updating ecodesign requirements in line with technological progress manufacturers will be able to place products on the market with energy efficiencies far below what is reasonably achievable in the current landscape.
- Most end users often prioritise performance and low purchasing cost over reducing energy costs or increasing environmental savings during the use phase[9]. Without updating ecodesign requirements, consumers will not be able to purchase the most energy efficient products on the market.
- Split incentives between owners of electronic displays and clients, who cover energy costs, mean buyers have little concern about

[9] EuP Netzwerk Preparatory Studies. Available from: https://www.eup-network.de/product-groups/preparatory-studies/completed/ (see Lot 3 for electronic displays)

energy efficiency. This is especially true in landlord-tenant relationships.

- The prices of the products do not reflect the real environmental cost to society in terms of circular economy. Electronic displays contain flame retardants and other toxic chemicals. They are often designed with permanently fixed components, that make repair, reuse, and recycling by the end user difficult. In a Do Nothing scenario, the market will not be incentivised to design electronic displays in a manner that improves resource efficiency.

## 3.5 Option 2 (preferred option) – Update ecodesign requirements for electronic displays

24. Under Option 2, existing ecodesign requirements for electronic displays would be updated to reflect what the UK agreed as a Member State at EU level in December 2018. The draft regulations will apply from March 2021.

25. These draft regulations would apply from March 2021 for electronic displays. Manufacturers will have to ensure that products placed on the GB market from these dates comply with the draft regulations.

26. Electronic displays already placed on the GB market before March 2021 that comply with the existing regulations can continue to be sold.

27. Option 2 consists of updating existing ecodesign requirements reflecting what the UK agreed at EU level as a Member State in December 2018 and is our preferred option. The UK agreed and supported the new ecodesign requirements at EU level at the end of a lengthy consultative process. The process for electronic displays included:

- a preparatory study[10] – at an EU level – which explored policy options, markets, users, technologies, the environment, economics, and product design. This process involved several public EU wide stakeholder meetings in which the UK participated;

[10] Review of Ecodesign and Energy Labelling Regulations for Televisions and Draft Regulation for Electronic Displays: Discussion Paper. Available at: https://c2e2.unepdtu.org/wp-content/uploads/sites/3/2016/04/2014-11-eu-electronic-displays-paper.pdf

- an initial ecodesign working draft regulation shared with Member States and relevant stakeholders, (including UK stakeholders), for review prior to the Consultation Forum;
- a Consultation Forum, attended by Member State Officials, key manufacturers and Non-Governmental Organisations (including from the UK);
- a Regulatory Committee where the EU regulation was discussed and voted on by Member State Officials (including the UK).

28. Although the requirements were agreed at EU level, the UK Government consulted with UK stakeholders and carried out an internal Cost Benefit Analysis prior to voting in favour of the EU regulations. The volume of expertise feeding into the studies, along with a substantive EU consultation, also reduces the risk of these draft regulations being disproportionate or unrealistic

29. The UK is proposing to implement these requirements in GB law after the end of the transition period as they carry significant benefits in relation to realising the Governments Carbon Budget and Net Zero targets. This approach also reflects the commitment made in the Clean Growth Strategy to maintain existing high standards or go further where it is in the UK's interests.

30. The Do Nothing option has also been considered and the impacts assessed. Under this scenario, the current EU regulations for displays will be incorporated into GB law at the end of the transition period and would continue to apply in GB. Most of the new and updated requirements for agreed by the UK as a Member State at EU level in December 2018 would automatically apply in GB after the transition period. The impacts of GB and the EU having different ecodesign requirements have been taken into account when assessing the Do Nothing option.

# 4 Overview of costs and benefits

31. This section outlines the costs and benefits examined in this Impact Assessment, including the costs to businesses. High-level figures are provided, along with general arguments as to the costs and benefits considered (and not considered).

32. The draft Regulations will apply in Great Britain only. In accordance with the NI Protocol, EU Ecodesign and Energy Labelling Regulations will continue to apply in Northern Ireland post-transition period. The costs and benefits in this Impact Assessment are currently calculated on a UK basis. The effect of the NI protocol will be included in the final version of this impact assessment following consultation.

33. A 10-year appraisal period (2021/22 to 2030/31) was chosen considering the range of lifespans electronic displays. A typical electronic display has a lifespan between 4-6 years, so 10 years represents the timescale over which most of the existing stock of electronic displays will be replaced with a model that is compliant under the new requirements and the full energy savings realised. See section 5.2 for details on choosing different appraisal periods.

34. At present, we assume additionality of 25% for electronic displays in this Impact Assessment. Additionality reflects the adjustment we make to the overall costs and benefits of the policy intervention to reflect the fact that a proportion of these would occur in the counterfactual (in this case due to the fact that the regulations will be in force in the EU regardless of whether GB implements them or not, and the concerned markets are global ones). Therefore, 25% of the total costs and benefits to business and consumers would be realised for electronic displays.

35. Research currently suggests that 100% of electronic displays are imported into the UK (see Section **Error! Reference source not found.**). This means that the additionality for electronic displays can only be attributed to imported products and since we currently have not identified evidence to suggest that there is a targeted sole UK market for electronic displays, then it is likely that overseas manufacturers will choose to comply with the EU

ecodesign requirements, regardless of whether GB implements them or not. However, if GB did not implement the ecodesign requirements under Option 2, then there would be potential for overseas manufacturers to export electronic displays that do not meet the higher EU ecodesign requirements but meet the unchanged GB ecodesign requirements, which would have negative impacts on carbon and energy bill savings. Therefore, by preventing lower energy efficient electronic display products reaching the GB market, there will be positive effects on carbon and energy bill savings. Hence, we assume 25% additionality currently to account for the potential that overseas manufacturers may only export electronic displays to GB, and for the prevention of lower energy efficient products reaching the GB market.

36. We will assume this additionality estimate until further evidence is gathered at the consultation stage. An example of such evidence that would help to inform our current estimate would be further information around the current number of UK manufacturers of electronic displays. Information around the extent to which manufacturers export electronic displays would also be helpful to inform our current estimate. This estimate may then be revised based on feedback from UK stakeholders and any further evidence provided, including on the impact of the NI protocol, that is able to inform further analysis.

37. A change in additionality factor causes the Net Present Value (NPV) to either decrease or increase proportionally, but it cannot result in the NPV becoming negative. For example, 50% additionality would reduce the NPV by half, relative to the 100% additionality scenario. Or for example, 25% additionality would reduce the NPV by three quarters, relative to the 100% additionality scenario.

## 4.1 Summary of costs and benefits of Option 2

38. Table 1 outlines the key costs and benefits that have been identified as relevant. The final column indicates how these have been considered in this Impact Assessment.

39. The draft regulations will impose a real cost (see Table 2) on any UK manufacturers of electronic displays. For the purposes of this Impact Assessment, we assume that manufacturers operate in competitive markets

and increased costs are passed on to the end consumers. 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 is the case when undertaking our analysis. Ultimately this is an issue of where the costs are felt (consumers or firms), not whether they are incurred.

**Table 1: Summary costs and benefits of updating the ecodesign requirements for electronic displays (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 for electronic displays already exist. | Described Qualitatively (although assumed to be passed on to consumers[11] and therefore accounted for in the CBA). |
| | 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 CBA. |
| | **Benefits** | |
| | Product requirements creating a greater regulatory equivalence, facilitating trade. | Described Qualitatively. |
| | Possible increased innovation leading to longer lasting, more efficient products to compete in the global market. | Described Qualitatively. |
| | Environmental benefits of improved resource efficiency, for example, improved recyclability and repairability. | Described Qualitatively. |

[11] We assume that manufacturers would only have two choices – (1) absorb any additional costs and reduce profits or (2) pass the cost on to consumers. Since competitors will all be facing similar cost pressures given the regulations apply across the respective industry, it is reasonable to assume that manufacturers would not choose (1), as the most profitable scenario for the sector is for everyone to pass on the additional costs. Further, the costs of the concerned products are assumed to be moderate relative to the potential bill savings for consumers (see Table 2).

| Group | Type of cost / benefit | Included in CBA or 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 CBA. |
| | 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. |
| | **Benefits** | |
| | Lower energy bills over the lifetime of the product due to increased energy efficiency performance. | Included in CBA. |
| **Wider society** | **Costs** | |
| | Enforcement costs of imposing requirements. Costs are assumed to be negligible compared with the costs of products especially since efficiency requirements already exist for electronic display products. | Described Qualitatively. |
| | **Benefits** | |
| | Lower electricity system costs – due to a reduction in energy use of the products. | Included in CBA. |
| | Carbon savings/reduction in greenhouse gas emissions. | Included in CBA. |
| | Air quality improvements. | Included in CBA. |
| | Possible creation of new jobs driven by the need to innovate and improve. | Described Qualitatively. |

40. Table 2 provides the high-level cost and benefit estimates of Policy Option 2 according to the costs and benefits outlined above for electronic displays. Option 2 (costed against the Do Nothing option) shows a Net Present Value (NPV) of £4m with a benefit-cost ratio of around 1:1. Electrical energy savings are expected to be around 111 GWh over the appraisal period (2021/22-2030/31) amounting to 0.02 million tonnes of Carbon Dioxide equivalent ($CO_2e$). More detail is provided in the sections which follow.

**Table 2: Estimated Costs and Benefits of Policy Option 2, 2021/22 to 2030/31**

| Costs/benefits, £m | **Option 2** |
|---|---|
| Costs to manufacturers (assumed to be passed onto consumers) | 11 |
| Costs of increase in non-traded $CO_2e$ emissions (extra heating)[12] | 0 |
| **Total Costs (A)** | **11** |
| Value of energy savings (net) | 14 |
| Value of reduction in CO2e emissions | 2 |
| Net benefits of air quality improvements | 0 |
| **Total Benefits (B)** | **15** |
| Net Present Value (B–A) | 4 |
| Benefit Cost Ratio (B/A) | 1.3 |

Data in the main body of this Impact Assessment are presented in 2021 prices and present value (and, therefore differ from those on the front page which are 2016 prices and 2017 present values). Total figures may appear to not add up due to rounding.

41. All calculations were sourced from the BEIS Energy Using Products Policy (EUPP) Model which takes into consideration the costs and benefits associated with updating existing ecodesign requirements for each product separately.

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

- forecasted sales/stock figures;
- estimates for additional costs arising from producing products compliant with the draft regulations under Option 2 compared with Option 1;
- forecasted level of usage (in hours/year);

[12] 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 1 for more details.

- estimates for the energy usage (in kWh/year/unit), again for products compliant with the draft regulations under Option 2 compared with Option 1; and
- the expected lifespan of products (before a replacement is required).

43. High-level descriptions of the modelling approach are outlined in the following sections along with the outputs. More detailed descriptions are provided in Annex 1 to Annex 2, along with the key modelling assumptions.

## 4.2 Option 1: Do Nothing

44. The 'Do Nothing' option represents no regulatory change for electronic displays. The existing regulations would continue to apply to certain classes of electronic displays. This option would, therefore, have no direct impact on manufacturers although there would be an indirect impact from not having open and fair competition – potentially impacting on competitiveness and innovation. For those that sell solely in GB, the current regulations for electronic display products would continue to apply in GB in the same way as before EU exit. UK manufacturers that export their product to the EU, could face trade complications given that GB's requirements would be different from the EU's.

45. The main reason why this option has not been pursued further has been explained in Section 3.4. The market failures identified include technological progress, consumer purchasing habits, split incentives, and the products lack of resource efficiency.

46. Further, under the 'Do Nothing' option, the overall NPV would be lower. This is because there would not be as great a market drive to improve energy efficiency which would reduce benefits. This would also make costs higher and result in consumers having higher energy bills in the long term.

47. Additionally, another key reason is the assumed UK proportion of electronic displays that are imported. Currently, BEIS desk-based research has identified no UK manufacturers of electronic displays, suggesting that the UK imports 100% (see Section 5.2). For non-UK manufacturers who either choose not to plan or fail to plan and adjust to the new EU regulations, there may be an excess supply of products that do not comply with the new EU regulations. Thus, temporarily those products may reach the UK market and

have negative impacts on carbon and energy bill savings. However, we expect this to be minimal as it would be a short-term effect but will seek stakeholders' views on this as part of our consultation.

48. In a Do Nothing scenario, there may be scope to assume that any UK manufacturers of electronic displays who do not export, may be less motivated to innovate and produce products that comply with global requirements, as focus is likely to be shifted to price competition over increasing energy efficiency. For UK manufactures that do not export, there will be an opportunity to undercut higher priced, more efficient products with cheaper, less efficient products. This targets consumers who would rather pay less at the point of purchase compared to a more efficient product that will accumulate energy savings (hence bill savings) over its lifetime. Hence, the market and regulatory failures would persist, harmonised information on energy consumption would not be systematically generated and consumers would not be able to differentiate between high efficiency and low to average efficiency appliances. Therefore, the potential carbon emission and energy bill savings (shown in Table 2) would not be realised.

49. Under the Do Nothing option, there also may be scope for assuming that UK manufacturers would comply with the new EU requirements once they come into force. This could be due to economies of scale and the potential ease of meeting the requirements and/or because energy consumption is viewed as an important factor for such products. This would have the effect of GB having the same requirements as the EU without regulation. If this were to occur, broadly the same costs would still apply as under Option 2 (since enforcement and compliance costs are negligible compared with overall costs). However, there is a risk that businesses do not comply with EU requirements under the Do-Nothing Option, although we consider the likelihood of this to be low and will test during stakeholder consultation.

### 4.2.1 Option 2 (Preferred Option): Update Ecodesign Requirements for Electronic displays

50. The CBA was based on one model (see Annex 2 for a more detailed description) examining the impact of the regulatory changes on electronic displays.

51. The model is based on:

- 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).

52. The numbers below in **Error! Reference source not found.** Table 3 and Table 4**Error! Reference source not found.** show the effects of the proposed revision to the existing ecodesign requirements for electronic displays compared with Option 1 (Do Nothing). Low and high scenarios of ±10% have been presented as indicative variances from the central estimate due to unknown uncertainty. Based on more in-depth sensitivity analysis provided in Section 5 which considers the sensitivity of each variable used in the modelling, ±10% is the maximum expected range for which costs and benefits could vary. A more in-depth sensitivity analysis is, however, provided in Section 5.

53.

Table 3: Discounted costs summary for electronic displays (2021 prices)

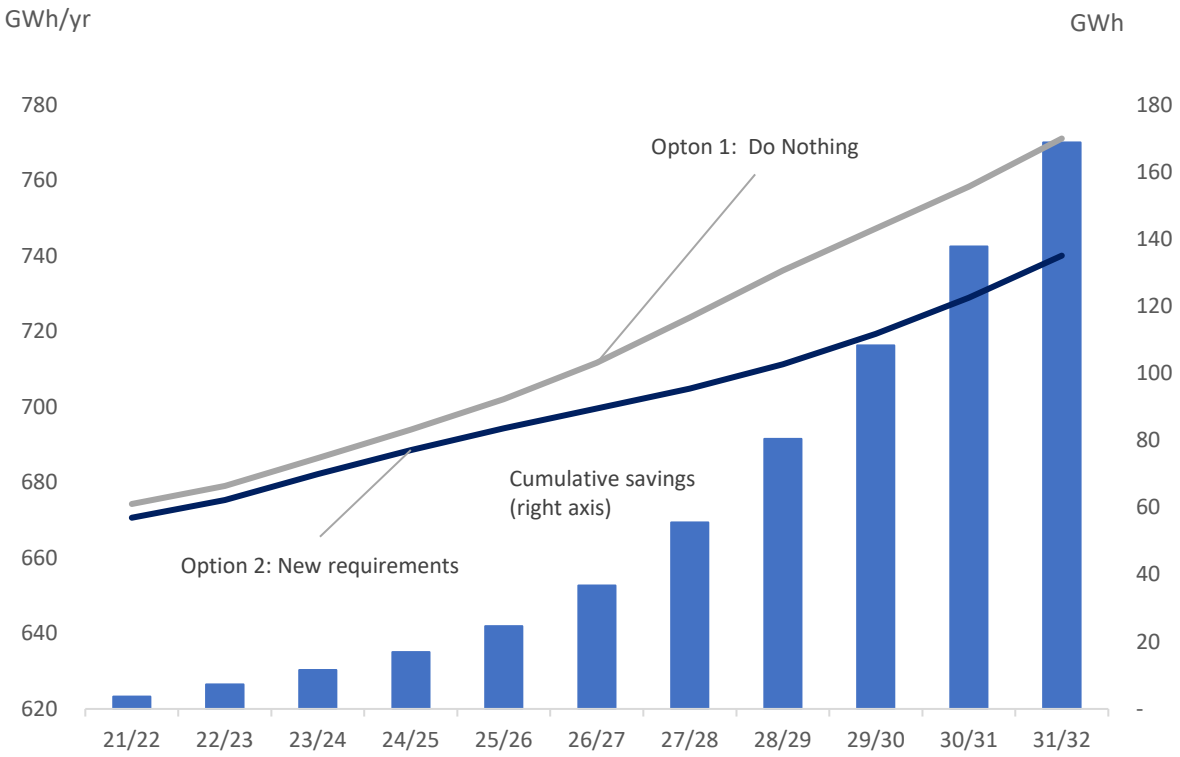
| £m | Low (-10%) | Central | High (+10%) |
|---|---|---|---|
| Costs to manufacturers (assumed to be passed onto consumers) | 10 | 11 | 12 |
| Total costs of increase in non-traded CO2e emissions (£m) | 0 | 0 | 0 |
| TOTAL | **10** | **11** | **12** |

**Table 4: Discounted benefits summary for electronic displays (2021 prices)**

| £m | Low (-10%) | Central | High (+10%) |
|---|---|---|---|
| Value of energy savings | 12 | 14 | 15 |
| Value of reduction in $CO_2e$ emissions | 1 | 2 | 2 |
| Net benefits of air quality improvements | 0 | 0 | 0 |
| TOTAL | 14 | **15** | 17 |

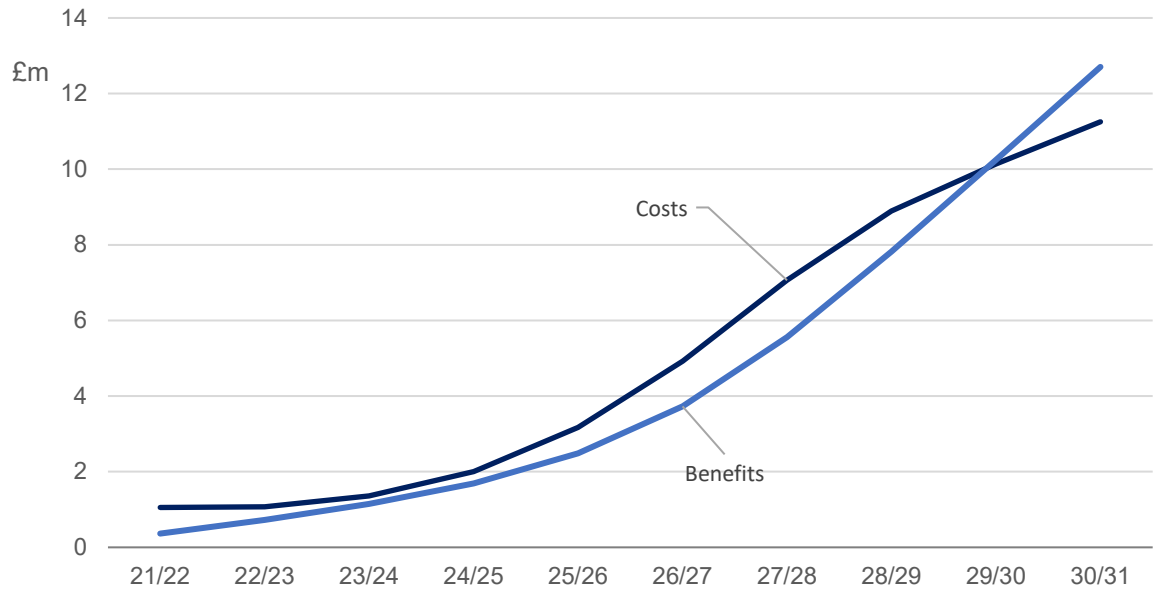
Figures have been rounded so may not appear to sum correctly.

**Figure 1: Estimated energy use under Options 1 (Do Nothing)[13] and 2 (updating ecodesign requirements) for electronic displays and the cumulative energy savings of implementing Option 2.**




[13] Note that for Option 1 (Do Nothing), energy savings (GWh) also occur as we assume that some consumers of electronic displays will take into account energy efficiency when purchasing, given that they will be utilised for long periods of a day. The savings, however, are less than the energy savings that we forecast to occur under the preferred option, Option 2.

**Figure 2: Cumulative costs and benefits of Option 2 for electronic displays (2021 prices)**




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.

54. 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 as the non-compliant stock gradually gets replaced by displays which meet the requirements under Option 2. Once the stock has largely been replaced by around 2027/28, annual energy savings remain broadly static but there are still savings. Additional costs are upfront under Option 2, occurring at the point of purchase only but the energy saving benefits accrue over the lifetime of the product. As a result, a positive NPV is achieved where benefits exceed costs from 2029 onwards (see Figure 2). Whilst the appraisal period for electronic displays is 10 years, outside of these benefits continue to increase whilst the cumulative cost stalls. The change in costs quickly falls to zero whilst benefits gradually increase. An estimate for NPV in 2050/51 is approximately £42m (see section 5.2)

### 4.2.2 Electronic Displays: Non-monetised costs and benefits

55. 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.

56. Further, compliance and distributional costs were considered negligible as outlined in Section 4.3. Similarly, additional benefits of innovation due to UK manufacturers being required to improve efficiency and maintaining consistency with respect to these particular products with non-UK manufacturers (particularly for ease of trade with the EU) were not considered.

## 4.3 Non monetised costs and benefits

57. 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).

58. For electronic displays there are likely to be costs for manufacturers associated with meeting the information requirements and new material efficiency requirements as set out in the draft regulations.

59. Manufacturers are already required to provide the technical details and the information required in the draft regulations; therefore, this information would be readily available to them.

60. The overall savings of resource efficiency measures are considered modest in comparison to the energy savings. Moreover, it was not possible to quantify all resource efficiency measures.

61. Although the draft regulations would be a revision of existing regulation, transitional costs are not expected to be minimal despite the general processes being already established.

62. However, 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 (SAMBA) in Section 6.2.

### 4.3.1 Transitional Impacts

63. 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 IT.

64. We expect that a rise in transition costs would be offset by increases in product prices, and these are implicitly included within these increases in prices.

65. Given that the draft regulation would be a revision of existing regulation, transitional costs are expected to be minimal as the general processes are already established. Manufacturers are already required to provide technical details so the information required would be readily available to them. The EU's additional assessment of their review study into regulations for electronic displays[14] concluded that additional costs such as approbation, changes in packaging, marking etc would be negligible.

66. The EU expects transitional costs to be moderate, particularly for small and micro sized businesses (SMBs), given the increasing difficulty that manufacturers face in accessing new technologies and efficient components in the highly competitive market, for which prices are increasing. Based on this, we assume that UK SMBs are involved in the same market, so we expect their transition costs to be moderate too.

### 4.3.2 Resource Efficiency

67. Resource efficiency covers requirements such as those to ensure that electronic displays are designed in such a way as to facilitate reuse, repair, and recycling of the product. Resource efficiency also includes information requirements where specific information is required in instruction manuals and on free-to-access websites. This includes information about the manufacturer, product type, and parameters related to energy efficiency. Resource

[14] COMMISSION REGULATION (EU) - laying down ecodesign requirements for electronic displays pursuant to Directive 2009/125/EC of the European Parliament and of the Council, amending Commission Regulation (EC) No 1275/2008, and repealing Commission Regulation (EC) No 642/2009 Available at: https://ec.europa.eu/info/law/better-regulation/initiative/1949/publication/5780188/attachment/090166e5c7e2f2d6_en

efficiency is an important aspect as these measures can increase the lifespan of the product and reduce a product's end of life environmental impact.

68. Introducing circular economy principles to a product's supply chain ultimately means to close the loop between the production and the end-of-life disposal. It intends to increase material resource efficiency by minimising raw material extraction and optimising recycling and reuse. From a supply chain point of view the circular economy has implications over the design, production, operation and maintenance, and end-of-life disposal of products.

69. The overall savings of resource efficiency requirements have not been quantified. Electronic displays are already in the scope of Waste Electronic and Electrical Equipment Regulations 2013 (WEEE), in which these savings were assessed qualitatively and predicted to be modest in comparison to the energy savings.

70. The removability of main components is key to recyclability and is addressed for electronic displays in WEEE Regulation 28 which will continue to apply at the end of the transition period.

71. Resource efficiency requirements require electronic displays to be designed in such a way that spare parts can be accessed and removed with commonly available tools. From August 2018, the recovery rate for these products must be 85% with at least 80% recycled. Electronic displays use materials that require specific attention at the end of life and displays make up 75% of the weight of electric and electronic waste in the category of consumer electronics[15].

72. Presence of flame retardants (particularly halogenated) in plastics is a significant obstacle in the recycling of electronic displays. The proposed ecodesign requirements go some way to increasing the quantity of plastics that can be recycled rather than incinerated; the European Commission estimates that in the EU an additional 76 kt/year would be recycled, whilst also preventing 20 kt/year of halogenated flame retardants on the market.

[15] Impact Assessment accompanying the document COMMISSION REGULATION (EU) – laying down ecodesign requirements for electronic displays pursuant to Directive 2009/125/EC of the European Parliament and of the Council, amending Commission Regulation (EC) No 1275/2008, and repealing Commission Regulation (EC) 642/2009. Available at: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52019SC0354

There is no extra administrative burden for industry and distributors and a limited burden on surveillance authorities in the form of laboratory spot-checks, hence costs are not monetised. Recyclers and NGOs requested a ban of flame retardants, specifically halogenated ones. In the updated ecodesign regulations the use of halogenated flame retardants is banned in the enclosure and stand of electronic displays.[16] However there may be further scope for addressing this issue further in future ecodesign requirements.

73. For the reasons discussed above, the costs associated with resource efficiency are expected to 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 (SAMBA).

### 4.3.3 Enforcement and Compliance Costs

74. Enforcement and compliance costs are not easily quantified. Enforcement action would be undertaken where the market surveillance authority (MSA) believed there was sufficient risk-based justification to do so, in line with their enforcement policy[17] (see Section 8.2 for further detail). Additional costs are, however, considered minimal given that requirements already exist for both products and would continue to apply under the Do Nothing Option.

75. Testing costs may increase under Option 2 but any potential extra cost is expected to be absorbed by the respective industry. However, regardless of the proposed measures, manufacturers will be obliged to test products under the Do Nothing Option or under Option 2 because products are required to be tested under the existing regulations. Further, we will be seeking to clarify whether testing costs have been adequately considered during consultation.

[16] Ecodesign Regulation (EU) 2019/2021 on electronic displays. Available at: https://eur-lex.europa.eu/eli/reg/2019/2021/oj

[17] 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.

76. Moreover, because UK imports of electronic displays are expected to be nearly 100%, the overall testing costs that would fall on to the UK businesses would be minimal.

77. On the other hand, the expected increase in frequency of testing or increase in the cost of testing, is expected to positively benefit UK SMBs involved in these sectors, who would have the opportunity to profit from the increased demand.

78. Finally, at present, BEIS desk-based research indicates that there are few, if any, UK manufacturers of electronic displays, so an increase in testing costs would not have a large-scale effect. However, in any case, any such costs may fall disproportionately on to smaller businesses and are therefore considered in the Small and Micro Business Assessment (SaMBA) (see Section 6.2).

79. As suggested in HM Government's OIOO (One-In, One-Out) Methodology[18], 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 (see Section 5).

### 4.3.4 Distributional Impacts

80. In setting ecodesign requirements, the European Commission took distributional impacts into account. A key constraint in setting requirements is that those 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, businesses and consumers will see savings from their energy bills.

### 4.3.5 Trade Impacts

81. In terms of impact on UK trade with the EU, the proposed Ecodesign requirements are expected facilitate UK-EU trade of electronic display

[18] HM Government's OIOU (One-In, One-Out) Methodology, July 2011. Available at: https://www.regulation.org.uk/library/2011_oioo_methodology.pdf

products[19]. In terms of estimated total import and export quantity (tons), the UK imports 1% of electronic displays from the EU and exports 1% of electronic displays to the EU. But in terms of estimated monetary value (£), 44% of the UK's total imports of electronic display are imported from the EU, and 31% of the UK's total exports of electronic displays are exported to the EU[19]. The remaining majority of UK imports and exports of electronic displays (for both quantity and value) are largely comprised of UK-US and UK-Asia trade.

82. Therefore, although the UK does not import or export large quantities of electronic displays to the EU, the value of trade with the EU is reasonably high, given just under half of UK imports and nearly one third of UK exports are attributed to trade with the EU. Since the EU will be committing to the proposed Ecodesign requirements, UK imports of electronic displays in terms of both quantity and value, will likely remain significantly unchanged, given that prices are not expected to rise significantly[15]. For similar reasons, UK exports too are likely to remain significantly unchanged, as it would most likely not be in UK businesses' best interest to forego nearly a third of the sector's export value, unless there was certainty that this value of trade could be achieved elsewhere.

83. However, it is not possible to ascertain who exactly imports and exports electronic displays, so the individual impacts on trade, e.g. for manufacturers, cannot be commented on at this stage. We will seek to understand these impacts however, through consultation with stakeholders.

### 4.3.6 Further Impacts

84. We have not attempted to monetise the direct costs, under Option 2, of the potential effect that the updated UK requirements for electronic displays could have on innovation. Requiring UK manufacturers to improve efficiency would create considerable opportunities to innovate, which has possible benefits such as improved consumer choice, investment in industry, and

[19] All trade data was sourced from the International Trade Centre (ITC) Trade Map using the following 6-digit level HS codes: 852842; 852849; 852852; 852859. For both quantity and value, a 2017-2019 average total was taken. ITC Trade Map available at: https://www.trademap.org/

knowledge spill-over. However, it was considered disproportionate to quantify this given the complexity and the uncertainty in the level of innovation that might be achieved.

85. For the same reasons, it was considered disproportionate to attempt to quantify the additional benefit of Option 2 in ensuring open and fair competition with EU manufacturers (in particular for ease of trade with the EU) or, similarly, the costs of Option 1 in manufacturers having different requirements to comply with.

# 5 Sensitivity analysis

86. Annex 1 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. The model also accounts for optimism bias explicitly using prudent inputs. These are explained in Table 14.

87.

| 88. ar ia bl e | Risk rating | Impact on Costs | Impact on benefits | Comment |
|---|---|---|---|---|
| Cost (£) | High | The cost value could change by up to ±15%, resulting in a ±15% change to overall costs. | None. | The model assumes Costs and Stock/Sales figures are independent, therefore a change in the cost of products has no impact on the volume of products sold/in stock. Benefits remain unaffected. |
| Sales/Stock | Medium | The sales/stock value could change by up to ±10%, resulting in a ±10% change to overall costs. | The sales/stock value could change by up to ±10%, resulting in a ±10% change to overall benefits. | Overall costs and benefits are directly proportional to the size of the Sales/Stock. |
| Use (hours/year) | Medium | None. | The use value could change by up to ±10%, resulting in a ±10% change to overall benefits. | The number of hours in a year per product is used and 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) | Medium | None. | The energy use value could change by up to ±10%, resulting in a ±10% change to 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 | Medium | 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). |
| Additionality | High | Directly related. | Directly related. | A change in the additionality assumption has a proportional effect on the costs and benefits, and therefore NPV. We consider it possible that additionality of each product could vary by +/-25%. |

89. Table 5 below indicates the relative sensitivity of a variable and how this affects the overall costs/benefits. A variable with a 'high' risk rating has 1.5 times the percentage uncertainty of a 'medium' risk rating variable, and a 'low' risk rating variable has half of the uncertainty of a medium risk variable. Variables used in the modelling are proportional to the NPV, therefore those with a higher risk rating are more sensitive to variations in modelling.

90. From

| 91. ar ia bl e | Risk rating | Impact on Costs | Impact on benefits | Comment |
|---|---|---|---|---|
| Cost (£) | High | The cost value could change by up to ±15%, resulting in a ±15% change to overall costs. | None. | The model assumes Costs and Stock/Sales figures are independent, therefore a change in the cost of products has no impact on the volume of products sold/in stock. Benefits remain unaffected. |
| Sales/Stock | Medium | The sales/stock value could change by up to ±10%, resulting in a ±10% change to overall costs. | The sales/stock value could change by up to ±10%, resulting in a ±10% change to overall benefits. | Overall costs and benefits are directly proportional to the size of the Sales/Stock. |
| Use (hours/year) | Medium | None. | The use value could change by up to ±10%, resulting in a ±10% change to overall benefits. | The number of hours in a year per product is used and 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) | Medium | None. | The energy use value could change by up to ±10%, resulting in a ±10% change to 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 | Medium | 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). |
| Additionality | High | Directly related. | Directly related. | A change in the additionality assumption has a proportional effect on the costs and benefits, and therefore NPV. We consider it possible that additionality of each product could vary by +/-25%. |

92. Table 5, Cost and Energy Use are the variables which are likely to have the biggest impact on NPV and could change by ±15%. In isolation, either one would change the NPV by the same percentage. The other variables are less likely to change so would therefore affect the NPV less.

| Variable | Risk rating | Impact on Costs | Impact on benefits | Comment |
|---|---|---|---|---|
| Cost (£) | High | The cost value could change by up to ±15%, resulting in a ±15% change to overall costs. | None. | The model assumes Costs and Stock/Sales figures are independent, therefore a change in the cost of products has no impact on the volume of products sold/in stock. Benefits remain unaffected. |
| Sales/Stock | Medium | The sales/stock value could change by up to ±10%, resulting in a ±10% change to overall costs. | The sales/stock value could change by up to ±10%, resulting in a ±10% change to overall benefits. | Overall costs and benefits are directly proportional to the size of the Sales/Stock. |
| Use (hours/year) | Medium | None. | The use value could change by up to ±10%, resulting in a ±10% change to overall benefits. | The number of hours in a year per product is used and 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) | Medium | None. | The energy use value could change by up to ±10%, resulting in a ±10% change to 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 | Medium | 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). |

| | | | | |
|---|---|---|---|---|
| Additionality | High | Directly related. | Directly related. | A change in the additionality assumption has a proportional effect on the costs and benefits, and therefore NPV. We consider it possible that additionality of each product could vary by +/-25%[20]. |

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

A change of ±10% in the variables is used as the base uncertainty which is then multiplied by the risk factor (1.5 for high; 1 for medium; 0.5 for low risk) to obtain the percentage impact change.

93. 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.

## 5.1 Risks

94. In the following section, we consider the specific risks associated with the model. In general, however:

- Figures assume all costs will be incurred by UK consumers. 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 1, 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

[20] The variation in our additionality estimate will primarily depend on the extent to which the ecodesign requirements under Option 2, and the effect of the NI protocol, prevent less energy efficient products reaching the UK.

products which do not meet the requirements, they are likely to do so at a lower cost.

- The costs included in Table 1 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 CBA.
- 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.
- Resource efficiency is only considered qualitatively, as the environmental benefits are disproportionate compared to energy savings, and there was difficulty in quantifying all resource efficiency measures.

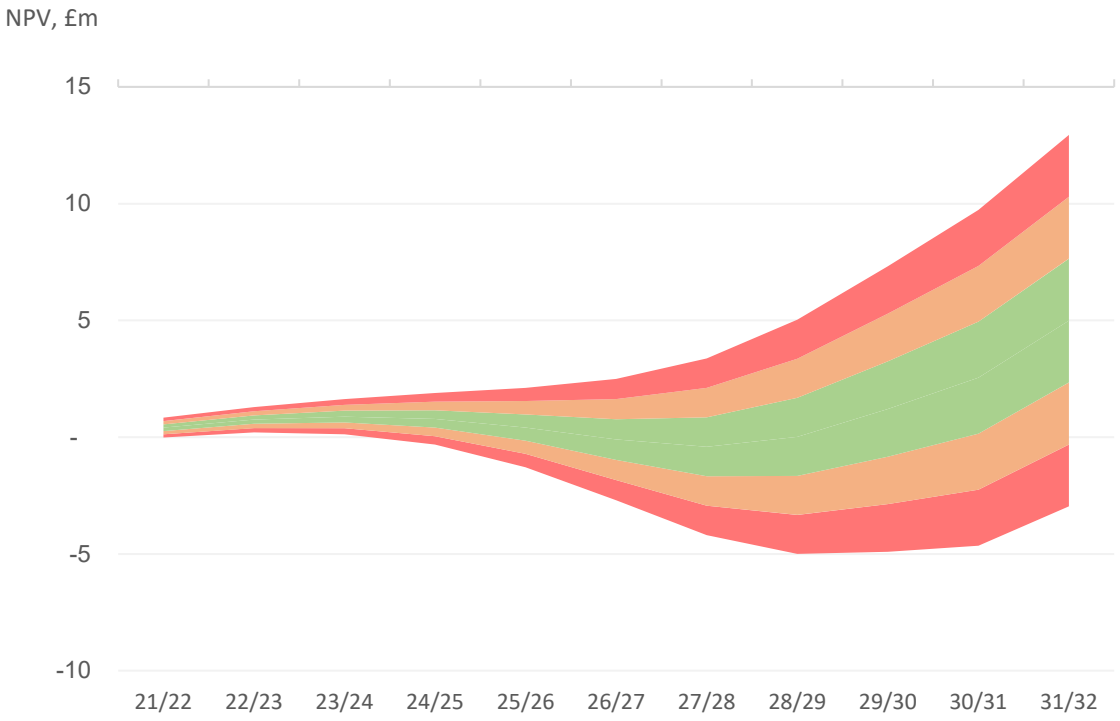
95. For those reasons, we consider a reduction in the NPV for either product unlikely.

96. **Error! Reference source not found.**Figure 3 below indicates the impact on the NPV 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.

97. The 20% scenario is the highest expected variation in the costs and benefits, and therefore NPV.

98. Higher variation than this is considered unrealistic based on the assumptions used in modelling but is represented by the 30% increase/decrease scenario. See Section 5 for further detail.

**Figure 3: Chart showing the range of the NPV over the appraisal period with up to 30% adjustments from the central cost and benefit estimates (2021 prices).**




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%.

99. Table 6**Error! Reference source not found.** below provides more detailed costs for the +/- 20% scenario (the orange areas in Figure 8) compared with the central estimates.

**Table 6: Costs, benefits and NPV for electronic displays under high (+20%) and low (-20%) scenarios over the entire appraisal period (2021/22 to 2030/31).**

| All values are in 2021 prices, £m | Electronic Displays |
|---|---|
| Low (-20%) costs | 9 |
| Central Costs | **11** |
| High (+20%) costs | 14 |
| Low (-20%) benefits | 12 |
| Central Benefits | **15** |

| | |
|---|---|
| High (+20%) benefits | 18 |
| Low NPV (high costs, low benefits) | -1 |
| Central NPV | **4** |
| High NPV (low costs, high benefits) | 9 |

100. Under the high costs (+20%) and low benefits (-20%) scenario (Low NPV), there would be an estimated NPV of -£1m over the appraisal period (2021/22 to 2030/31) compared with £4m 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 an NPV of around £9M.

101. An increase in costs of around 134%, with no change in benefits, represents the NPV tipping point between a positive and negative value. A 26% decrease in the benefits, with no change in costs, has the same effect. The next section examines the likelihood of such a divergence.

## 5.2 Appraisal period

102. As discussed previously, a 10-year appraisal period was chosen as it is a reasonable timeframe in which we can expect that most displays in the UK meet the ecodesign requirements set out in Option 2.

103. However, costs and benefits will continue to accrue after this period. Table 7 and Table 8 compare the costs, benefits, and savings of Option 2 for two different appraisal periods; 10 and 30 years.

104. As we would expect, the NPV for a 30-year appraisal period is much greater than for the 10-year scenario (ten times as much). The Benefit Cost Ratio also increases by more than 50% when the appraisal period is extended. Additionally, total energy savings are much higher for the greater appraisal period (again, more than ten times as much), although carbon savings are comparatively much closer in both scenarios (around four times greater with a longer appraisal period).

105. Costs increase in the 30-year scenario as displays products are purchased on average every 4-6 years per household. This means that the costs plateau between 2031 and 2051 but do not start to reduce (assuming replacement cost remains constant).

106. The increase in Carbon Savings is less significant as UK energy generation is predicted to become 'cleaner' over time, e.g. Generating one GWh in 2030 produces fewer $MtCO_2e$ than in 2050.

**Table 7: Estimated Costs and Benefits of Policy Option 2, 2021/22 to 2031/32 and 2021/22 to 2051/52**

| *prices (£m), present value year* | **Option 2 (£m)** | |
|---|---|---|
| | **2031 (10 year appraisal period)** | **2051 (30 year appraisal period)** |
| Costs to Manufacturers (passed on to consumers) | 11 | 41 |
| Costs of increase in non-traded $CO_2e$ emissions (extra heating) | 0 | 1 |
| **Total Costs (A)** | **11** | **42** |
| Value energy savings (net) | 14 | 77 |
| Value of reduction in $CO_2e$ emissions | 2 | 6 |
| Net benefits of air quality improvements | 0 | 1 |
| **Total Benefits (B)** | **15** | **83** |
| **Net Present Value (B–A)** | **4** | **42** |
| **Benefit Cost Ratio (B/A)** | **1.3** | **2.0** |

**Table 8: Estimated energy and carbon savings of Policy Option 2, 2021/22 to 2031/32 and 2021/22 to 2051/52.**

| Savings, from 2021 | to 2031 (10 year appraisal period) | to 2051 (30 year appraisal period) |
|---|---|---|
| Total gross energy savings (GWh) | 169 | 1398 |
| Total net energy savings (GWh) | 119 | 1010 |
| Total traded ($MtCO_2e$) | 0.03 | 0.08 |
| Total non-traded ($MtCO_2e$) | -0.01 | -0.02 |
| Net carbon savings ($MtCO_2e$) | 0.02 | 0.07 |

# 6 Impact on UK businesses

### 6.1.1 Direct Costs and Benefits to UK Businesses

107. This section considers the costs and benefits of the proposal to UK businesses. It is restricted to UK-based manufacturers and UK business purchases of electronic displays. The proposed requirements have no impact on products manufactured in, and then exported from the UK, since manufacturers are only obliged to meet the requirements of the country they are exporting to.

108. As per the guidance from BEIS[21], we consider only the *direct* costs to businesses here. These include manufacturing costs which, elsewhere, are assumed to be passed onto consumers.

109. During the consultation process, we will seek views on the proportion of each respective product that are imported into the UK.

110. We are currently unable to identify information that confirms the presence of UK electronic display manufacturers, with the current evidence indicating that most displays are manufactured in Asian countries and then imported into the UK. Therefore, we expect that any UK business activity involving electronic displays will be logistical or concerned with the assembling of electronic displays. Hence for electronic displays, we currently assume a 100% import scenario, subject to any evidence/information gathered post-consultation.

111. In Table 9 we present the direct costs of electronic displays, which shows a positive Business NPV. Analysis suggests that the crossover to a negative NPV for electronic displays occurs when the percentage of imports is around 50%. Given that the 100% import scenario is currently considered conservative estimates though, we are confident that the true proportion is not lower than 50%. The impact on UK businesses is, therefore, positive overall.

112. For UK-based manufacturers selling within the UK, the direct costs determined to be in scope are the:

[21] 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

- **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 draft 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 draft regulations, including testing equipment and new IT/software purchases. As per Section 4.3, these costs are not monetised here as they are considered negligible in this case.

113. Given some electronic displays are non-domestic products[22], we consider the associated purchase costs to be direct business costs since the requirements will increase the cost of their purchases. However, business consumers that are the end-users of these products 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.

114. 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.

### 6.1.2 Other costs and benefits to business

115. Other benefits of Option 2 to manufacturers include maintaining consistency with respect to these particular products with manufacturers outside of the UK and a likely increase in innovation, raising competitiveness. Since these are indirect costs, they have not been considered here.

[22] Commercial monitors are considered non-domestic electronic displays (see Annex 2 for further detail).

### 6.1.3 Total costs and benefits to business

116. Table 9 below shows the overall direct costs and benefits to UK businesses[23]. A 100% import scenario has been assumed in the modelling. Two other import scenarios have been shown as a comparison

**Table 9: Summary of costs and benefits directly impacting UK businesses for likely import scenarios – electronic displays (2021 prices).**

| Costs/benefits | Total (£m) | Of which direct business costs (£m) if… | | |
|---|---|---|---|---|
| | | 90% imported | 95% imported | 100% imported |
| Costs to manufacturers/business purchasers | 11 | 3 | 3 | 2 |
| Costs of increase in non-traded $CO_2e$ emissions (extra heating)[24] | 0 | 0 | 0 | 0 |
| **Total Costs (A)** | **11** | **3** | **3** | **2** |
| Value energy savings (net) | 14 | 5 | 6 | 6 |
| Value of reduction in $CO_2e$ emissions | 2 | 0 | 0 | 0 |
| Net benefits of air quality improvements | 0 | 0 | 0 | 0 |
| **Total Benefits (B)** | **15** | **5** | **6** | **6** |
| **Net Present Value (B–A)** | **4** | **2** | **3** | **4** |

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

117. Table 10 below shows the related Business Net Present Value and Business Impact Target Score.

[23] It was not possible to accurately quantify the sole benefits to manufacturers of owning the more energy efficient domestic appliances under Option 2.

[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.

**Table 10 EANDCB and Business Net Present Value for Option 2 (under the 100% import scenario**

| | 2021 Prices, 2021 present value (£m) |
|---|---|
| Business Net Present Value | 4 |
| EANDCB[25] | -0.47 |
| Score for BIT | -2.34 |

118. 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 assessment

119. Across all sectors, the UK market is dominated by SMBs (defined as having up to 49 Full Time Equivalent (FTE) and 10 FTE employees respectively[26]), making up 99% of businesses at the start of 2019[27].

120. Such businesses are likely to be disproportionately affected by the transitional costs associated with Option 2, particularly 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 if a product fell outside of the acceptable efficiency range. Similarly, 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.

121. The market for electronic displays is dominated by large Asian companies. For display panels, the main component of TVs and monitors relevant for energy efficiency, all manufacturing takes place in Asia. Any UK

[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 (31).

[26] BEIS Better Regulation Framework Manual, February 2018. Available at: https://www.gov.uk/government/publications/better-regulation-framework.

[27] Business Population Estimates for the UK and the Regions 2019. Available at: https://www.gov.uk/government/statistics/business-population-estimates-2019

business activity in this sector is therefore likely to be in logistics or assembly. The European Commission's Impact Assessment was unable to identify any independent SMBs working in the production chain of electronic displays[2]. The new regulations proposed in Option 2 are unlikely to have a significant impact on SMB retailers, and SMB repair shops and recyclers are likely to benefit from better repair information and easier disassembly.

122. BEIS research indicates there are no UK SMB manufacturers of electronic displays therefore direct business costs and benefits are assumed to be zero. Most, if not all, SMBs in the electronic displays sector are active in importing, reselling, installing, and/or servicing. Some may experience an increase in testing and production costs, however most of the burden of these costs falls onto manufacturers so is therefore not counted. SMB end-users of electronic displays will benefit from reduced costs over the lifetime of the equipment.

123. While the exact number of such businesses affected by the draft regulations is uncertain, Table 11 below shows the breakdown for manufacturing of "other electrical equipment" and manufacturing of "computers and peripheral equipment" (equivalent data was not specifically available for electronic displays).

**Table 11: Number and proportion of manufacturing businesses (local units, VAT traders and/or PAYE employers) in the UK that are small and micro-sized, 2019[28]**

| | Micro (<10 employees) | Small (10-49 employees) | All businesses |
|---|---|---|---|
| All manufacturing | 62,235 (76%) | 15,105 (18%) | 86,110 |
| Of which … Manufacture of other electrical equipment | 505 (73%) | 150 (22%) | 695 |
| Of which… Manufacture of computers and peripheral equipment | 705 (88%) | 70 (9%) | 805 |

[28] ONS: UK business: activity, size and location 2018 (see Table 4). Available at: https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation Considered UK Local Units in VAT and/or PAYE based Enterprises. All manufacturing includes SIC codes 10-32. Manufacture of other electrical equipment includes SIC code 2790.

124. 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.

125. To mitigate the impact on small and micro businesses, possible options could be considered including:

- phasing the transition period; or
- providing an exemption.

126. However, existing regulation relates to products and not manufacturers. An exemption, or a phasing of the regulation, would mean that products would have a 2-tier structure: those manufactured by medium and large manufacturers (250+ employees), and those by smaller businesses. Such an approach would make enforcement activities harder as businesses, as well as products, would have to be investigated. Further, if smaller businesses were exempt, such an approach could have the perverse incentive of stifling growth.

127. The EU's proposed legislation applies regardless of the manufacturer's size and that will continue to be the case in the EU under their regulations. If an exemption or phase-in period were in place for UK-manufacturers, they would be unable to export their products to the EU market, affecting their competitiveness.

128. While we cannot completely rule-out small or micro UK businesses being affected, for the reasons outlined above, we have decided not to mitigate.

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

130. Wider impacts

131. Table 12 below summarises the wider social and environmental costs and benefits, some of which have, while others have not, been considered in this assessment.

**Table 12: 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 3 |
| 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 4 |
| Social impacts | | |
| Health and Well-being Impact Test guidance | Yes | Section 9 |
| 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 | - |

132. Of the above assessments, only four have been identified as worth exploring further:

- Competition Assessment Impact Test guidance;
- Small and Micro Business Assessment (SAMBA);
- Wider Environmental Issues Impact Test guidance; and
- Health and Well-being Impact Test guidance.

133. Of the remaining six 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 resource efficiency, and warrants more in-depth consideration.

- Regulating ERPs has no direct or indirect effect on statutory equality duties.

# 7 Summary and Implementation Plan

## 7.1 Summary

134. In a Do Nothing scenario, electronic displays would have outdated ecodesign requirements. Without updating the requirements, businesses will not be incentivised to produce more energy and resource efficient products and consumers will not be effectively persuaded to purchase the most efficient products on the market.

135. Policy Option 2 addresses these market failures by revising ecodesign requirements for electronic displays to reflect those agreed by the UK as a Member State at EU level in December 2018. Option 2 also introduces resource efficiency requirements for electronic displays that make them more re-useable, repairable and recyclable.

136. The main analysis used is taken from the EUPP model (see **Error! Reference source not found.** Annex 2)

137. The benefits identified are:

- reduced energy costs[29] due to improved energy efficiency;
- consistency between GB and EU requirements and global standards;
- likely increase in innovation due to manufacturers having to produce more efficient products;
- carbon savings / reduction in greenhouse gas emissions[29];
- improved air quality[29]; and
- increased repairability and recyclability.

138. The costs identified are:

- increased manufacturing costs[29] to produce more efficient products are expected. This is inclusive of transitional costs and assumed to

[29] This cost/benefit was quantified.

be passed onto consumers through the supply chain resulting in increased prices[29];

- 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; and
- enforcement costs of imposing requirements are also considered but have a net zero cost.

139. Quantified costs and benefits give an NPV of £4M over the appraisal period (2021/22 to 2030/31).

## 7.2 Implementation and Delivery Plan for Option 2

140. The Office for Product Safety and Standards (OPSS) within BEIS is the appointed UK Market Surveillance Authority responsible for the enforcement of ecodesign requirements for suppliers and so would be responsible for ensuring manufacturers, authorised representatives, or importers comply with the updated ecodesign requirements for electronic displays. They will do so through applying their enforcement policy[17], the aim of which is to undertake risk-based enforcement activities including supporting stakeholders through the provision of advice and guidance as well as employing proportionate sanctions. This regime will ensure the estimated energy bill and carbon emissions savings are realised.

141. This activity forms part of business as usual activity for the OPSS, and while it is expected there will be minimal opportunity cost as staff familiarise themselves with the new guidance, it is not anticipated there will be further additional costs associated with enforcement of these regulations.

142. The revised ecodesign requirements for electronic displays are proposed to apply from March 2021, the same time as the EU's implementation dates. 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.

143. Once the draft regulations are made, OPSS will issue a notice informing manufacturers and importers of the new regulations. As the proposed ecodesign requirements reflect what the UK, as a Member State, agreed at EU level in December 2018 following extensive consultation we anticipate a good level of awareness among manufacturers.

144. Considering technological progress for electronic displays, the Government will review draft regulations no later than 3 years from the application dates. This is to allow sufficient time for all provisions to be implemented and to understand market penetration.

145. 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) (EU Exit) Regulations 2019, the proposed requirements will be brought forward using secondary legislation.

## 7.3 Post Implementation Review

146. We consider a proportionate Post Implementation Review (PIR), conducted no later than set out in the draft regulations review dates, suitable in this instance. It would be based on a qualitative assessment of the impacts of the draft regulations. As net energy savings are relatively low in the context of the UK's total energy use, we predict that measuring direct energy savings from improved ecodesign requirements for electronic displays would be difficult in the context of the UK energy market.

147. The PIR should aim to assess if the regulation has effectively achieved its objectives of phasing out lower energy efficiency electronic displays and improving the resource efficiency, using this to inform future policy development. We anticipate that the PIR will be based on market observations – breaches, for example – and consultation with industry. We expect the review will focus on whether the regulations have resulted in only electronic displays that comply with the requirements being placed on the market, rather than attempting to quantify the energy savings of their use. In addition, we expect the review to consider whether, as a result of technological advances, further savings could be made by raising the minimum energy efficiency requirements. To achieve this, data on the

contemporary stock of electronic displays would need to be collected, making sure that the information includes energy efficiency of the products.

148. Further, an assessment on the development of global regulatory standards, particularly in the USA and EU, may help to inform GB policy and whether GB legislation requires updating, for example by increasing the stringency of the requirements, broadening the scope of the requirements or introducing circular economy principles. This will help to establish if the objectives of the regulation remain appropriate and are still required.

# Annex 1 General modelling approach and key assumptions

149. This annex sets out the modelling approach used in this Impact Assessment, the detail of the costs and benefits analysed in the CBA as well as the key assumptions made.

## A1.1 The model

150. 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 lighting and household 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 EUPP.

151. In 2012, the model was extensively peer-reviewed 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.

152. The main purpose of the model is to assess the impact of policies around EUPs. 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).

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

154. 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. 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, it is considered to be cancelled out by reduced cooling costs in the warmer months.

## A1.2 Input variables

### Stocks and/or sales

155. 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.

156. 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 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.

157. 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.

158. 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.

### A1.3 Lifespan (years)

159. The lifespan of a 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).

### A1.4 Costs (£)

160. 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;
- the **value of improved air quality** from the energy savings; and
- 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].

### Level of usage (hours/year)

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

### Energy consumption (kW)

162. 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

[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.

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].

### A1.5 Modelling assumptions

163. 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).

164. 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.

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

### A1.6 Modelling example

166. This section includes an example of how the model calculates the costs and benefits. 2023 has been used as the example year. (All figures have been rounded.)

#### Costs

167. As an example, let us assume that 20 million products were purchased in 2023. Due to the regulatory changes, the additional costs of buying a product (over those under Option 1 where there are no regulatory changes) are estimated, on average, to be £0.25 (2017 prices). This gives,

Total cost (2017 prices) = 20.0m units * £0.25 = £5.0m.

168. Converting to 2021 prices, however, gives,

Total cost (2021 prices) = £5.0m * 1.07[32] = £5.3m.

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[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.

32 Table 19 (2021 price scaling factor, compared with 2017), Green book supplementary guidance, 2018.

169. Since, in the main body of this assessment, costs have been provided with a present value year of 2021, these prices must be discounted at an annual rate of 3.5%[33] giving

Discounted cost = £5.3m * $(1/1.035)^2$ = £5.0m

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

**Benefits:**

171. Average annual energy consumption is estimated to be, on average, 1.50 kWh/yr less under the draft regulations. Therefore,

**Energy savings (in 2023 for those products purchased in 2023)**
**= 1.50 kWh/yr * 20.0m units = 30m kWh/yr**

172. Using the Green Book supplementary guidance:

**Value of energy savings (discounted) =**
**30m kWh * 1.08 £/kWh[34] * 1.03[35] * (1/1.035)^2 = £3.2**

**Value of reduction in CO2e emissions (discounted) =**
**30m kWh * 0.255/1000 tCO2e/kWh[36] * 34.0 £/tCO2[37] * 1.03[35] * (1/1.035)^2 = £0.3m**

**Net benefits of air quality improvements (discounted) =**
**30m kWh * 0.0052[38] £/kWh * 1.03[35] * (1/1.035)^2 = £0.2m**

**Total benefits (of 2023 cohort in 2023, discounted) =**
**£3.2m + £0.3m + £0.2m = £3.7**

173. Energy savings for this cohort (products purchased in 2023) are then applied in subsequent years reduced by the number of products which were estimated to have reached the end of their lifetime. This is calculated using a

[33] 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.

[34] Table 9 (Long-run variable cost, Central Estimate, Domestic, 2023), Green book supplementary guidance[32].

[35] Prices in the Green book are expressed in 2018 prices which then have to be converted to 2021 prices using Table 19 (2021 price scaling factor, compared with 2018), Green book supplementary guidance, 2018[32].

[36] Table 1 (Long-run marginal, Domestic, 2023), Green book supplementary guidance, 2018[32].

[37] Table 3 (Traded, Central estimate, 2023), Green book supplementary guidance, 2018[32].

[38] Table 15 (electricity, National average. 2023), Green book supplementary guidance, 2018[32].

normal distribution with an associated mean and standard deviation. After the mean number of years, it is assumed that the annual energy savings will apply to only half of the 20.0M units and, after the mean added to two standard deviations, only 2%.

174. 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 2 Specific Modelling for Electronic Displays

175. In this section, specific details are provided for the modelling of electronic displays.

176. An Electronic Display is the name given to display screen or associated electronics that, as its primary function, displays visual information from wired or wireless sources.

177. The proposed updated requirements as set out in Option 2 would require manufacturers to:

- ensure that the minimum power source efficiency of electronic displays should not be lower than the values set out in the draft UK regulations.
- Ensure that the maximum idle state power consumption of electronic displays should not exceed the values set out in the draft UK regulations.

178. The product scope for the Ecodesign regulation represents an expansion from the previous regulation (EC Nº 642/2009). Not all the new Ecodesign requirements apply to each type of display included in the scope of the regulation.

179. The scope of the regulation covers:

- Televisions
- Monitors
- Computer Monitors
- Computer Displays

180. Table 13 presents which requirements apply to the respective display type.

**Table 13: Ecodesign Scope for Electronic Displays**

| **On-mode and functional requirements do not apply to the following displays** (i.e. material efficiency, off/standby and information requirements apply) | **On-mode, functional and off/standby requirements do not apply to the following displays** (i.e. material efficiency and information requirements apply) |
|---|---|
| Broadcast Displays | Status Displays |
| Professional Displays | Control Panels |
| Security Displays | |
| Digital Interactive Whiteboards | |
| Digital Photo Frames | |
| Digital Signage Displays | |

181. The proposed displays regulation will introduce MEPS requirements for four different modes: on, standby, off, and network-standby (including automatic power-down). Furthermore, the regulation sets two display functional requirements covering peak luminance ratio and a forced menu and set up requirements on initial activation.

182. The proposed MEPS will be introduced in two separate tiers (2021, 2023) for on-mode consumption, with the remaining modes being subject to MEPS in the first tier.

183. The regulation includes resource and material efficiency requirements and requirements regarding information provided by manufacturers, their authorised representatives, and importers. This information is intended for use by professional buyers and repairers.

184. Furthermore, whilst digital signage displays are in scope of the regulation, those which meet any of the following characteristics are out of scope:

- Designed and constructed as a display module to be integrated as a partial image area of a larger display screen area and not intended for use as a standalone display device;
- Distributed self-contained in an enclosure for permanent outdoor use;
- Distributed self-contained in an enclosure with a screen area less than 30 dm2 or greater than 130 dm2;
- The display has a pixel density less than 230 pixels/cm2 or more than 3 025 pixels/cm2;

- A peak white luminance in standard dynamic range (SDR) operating mode of greater than or equal to 1 000 cd/m2;
- No video signal input interface and display drive allowing the correct display of a standardised dynamic video test sequence for power measurement purposes.

185. The reference scenario of the models includes the impact of the televisions regulation (on televisions only) and the network standby Ecodesign regulation[39] as both televisions and displays are subject to its standby, off-mode and network standby consumption limits

186. The MEPS are separated into three categories; displays with resolution up to HD; displays with resolution 'greater than' HD and up to UHD/4K; and those with resolution greater than UHD/4K. Therefore, the models have been structured to account for the different requirements by separating televisions into these sub-technologies. However, most monitors are not UHD/4K, and the market for ultra-high-resolution monitors is small and not expected to grow significantly so these models only look at HD displays.

187. On mode consumption in the modelling is limited to the energy required to power the screen itself and energy consumption related to audio functionality. External power supplies are excluded from the modelling.

188. The models are separated into four sub-models split into domestic and non-domestic sectors. They are segmented again according to technology (HD/UHD) and by screen size, as the MEPS distinguish between these characteristics.

189. Because the modelling focuses on the biggest display markets which have the greatest savings potential, smaller display markets such as the display signage market have been excluded from the modelling.

190. The models are stock-based and were derived using a variety of sources which are outlined in Table 14.

[39] Ecodesign Regulation (EU) No 801/2013

**Table 14: Overview of the key inputs into the CBA for electronic displays**

| Variable | Source(s) | Values/Assumptions |
|---|---|---|
| **Stocks/sales (Same under both options)** | Employment by occupation ONS data | Assumed the number of commercial displays from employment numbers in desk-based versus field-based work. Each desk-based position has a display associated to it. The uptake of dual monitors in offices has been included by assuming that employees in the financial and tech industries have used two monitors since 2012.<br><br>**Risk:** Low. Employment data is sturdy and shows progression of screen use. Stock of screen will affect the entire model. |
| | BCC Economic Forecast June 18, 2018 | Future stock numbers are estimated from the British chamber of commerce estimates for the service sector growth rate.<br><br>**Risk:** Low. BCC growth rate is strong until 2020. Future years are simple projections to 2050. Growth rate will affect final stock numbers, but any change is expected to be no more than a few percent. It also affects all technologies (compliant or not) equally. |
| | ICF assumption | It is estimated that all the screens in the commercial monitors category are LCD displays and at HD resolution.<br><br>**Risk:** Low. Assumption means there are no UHD in this market. The presence of UHDs would change the effect of regulation on the market, however, user experience of the market suggests that the assumption is strong. |
| | TechTalk, 2010 to 2017 | Screen sizes for monitors 2010 to 2017 are from TechTalk. |

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| | | For 2017 onward, it is assumed that the market size of the lower sizes " <=15" " and " 16" - 17" " continue to decrease in market share at the average rate between 2014 and 2017.<br><br>**Risk**: Low. Available data up to 2017 is complete although data source is not easily traceable. Screen sizes affect the energy consumption, but as the analysis depends on screen size, the overall effect is low. Additionally, the range of monitor sizes is small. |
| | Ebuyer | The range of monitors sold on Ebuyer is collected and classified to screen size. The same is done for the top 100 sales of monitors for Amazon. The two values (collected March 2020) are averaged and used to represent the sales percentages of 2021 (allowing 1 year for the online trends to be representative on the larger market). A linear extrapolation is assumed between 2017 and 2021.<br><br>For 18" - 19" sales are assumed to continue shrinking after 2021 at the same rate as the average from 2014 to 2017.<br><br>For 20" to 23" screen size, the ratio of sales is assumed to stay constant after 2021.<br><br>For 24" to 29" and 30"+, the sales are expected to increase as a transfer of the loss of sales from the other sizes in the years after 2021.<br><br>**Risk:** Medium. Online source is used to estimate the market share of current monitor sizes. The assumption is supported by anecdotal evidence. Screen sizes affects the energy consumption of the screen. This assumption significantly increases the energy savings contribution of screens larger than 30" in the policy scenario. |
| | Mintel UK Desktop Computer Report, 2017 | Stock of domestic screen monitors is estimated from the Mintel 2017 report, indicating that 48% of homes have a computer, 82% of which have a desktop |

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| | | computer. It is assumed each desktop computer is used with a display monitor, therefore Trend for sales of domestic computer displays is expected to be the same the trend shown by Mintel for desktop computers.<br><br>**Risk:** Medium. Data is extracted from the Mintel report which is a reliable source. Assumption determines the total stock of domestic displays. |
| | MHCLG live tables on household projections (updated 2016) | UK household data provided by government reports. Assumed rate of increase is constant from 2035-2036 carried forward to 2050.<br><br>**Risk:** Low. Reference data on household stock is of very good quality and widely accepted as the reference provided by government. The estimation to extend until the end of 2050 is appropriate. Affects the stock numbers and hence the absolute numbers but reference and policy scenario equally. |
| | Broadcasters' Audience Research Board (BARB) establishment survey | Total stock for Primary televisions is provided by BARB for 2010 to 2017. the "primary television" is defined as the set in the "main living room".<br><br>**Risk:** Medium. Data from BARB is well accepted and reliable. This data gives total stock numbers to the primary TVs model. All the calculations are based on this input so variation can potentially have a large impact on analysis. |
| | BARB establishment survey | Stock of televisions after 2018 is estimated by keeping the proportion of televisions per household from 2017 until 2050.<br><br>Size of televisions is extracted from the BARB establishment survey. From 2018 onwards the ratio of sizes is assumed to be constant.<br><br>**Risk:** Low. Data quality is very good and the assumption to extend current trend forward is reasonable. |
| | Natural Resources Defense Council | The screen technologies for televisions are split by HD and UHD. The NRDC source shows the sales % for different sizes of UHD screens in 2013, 2014 and 2015. As the BARB data does not distinguish between screen types, this |

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| | (NRDC), The Big Picture report, 2015 | estimate shows the split between UHD and HD in the absolute BARB stock base. No UHD screens smaller 30 inches exist in the energy star database, therefore the technology is assumed not to exist at these lower sizes.<br><br>**Risk:** Low. The quality of the data is detailed and easily traceable. The source is reliable. The impact is low as the ratio of UHD technologies is very small. |
| | Global Market Insights, UHD/4K Panel Market Size, 2016 | The forecast shows an 8% growth per year of the UHD market until 2024. Beyond 2024 to 2050, an accelerated growth of 30% is assumed (conservative compared to the uptake of HD technology). These are sales numbers and the proportion of UHD in the stock values is estimated as the average of the previous 4 years of sales.<br><br>**Risk:** Medium. Growth until 2024 estimate is from a good source, however the estimate of the 30% takeover after 2024 is an estimate heavily reliant on the assumption that a similar technology phase out occurs. The impact is higher as this defines the speed of the UHD technologies being the majority screen, and hence with higher consumption. |
| | BARB establishment survey | Total stock for Primary televisions is provided by BARB for 2010 to 2017. the "secondary television" is defined as the set in the "other room".<br><br>**Risk:** Medium. Data from BARB is well accepted and reliable. This data provides total stock numbers to the secondary TVs model. All the calculations are based on this input |
| **Lifespan in years** | EU preparatory study Lot 6 [1]<br><br>Household Electricity Survey, 2013 [2] | The lifespan of commercial displays is estimated from [1] and is kept constant from 2010 to 2050. It is estimated to be linked to consumer behaviour rather than technology limitations.<br><br>[2] details how many households purchase a television each year. The assumption is made that the lifespan of the televisions is the inverse of the annual replacement value. This lifespan is assumed to be constant over time. |

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| | | **Risk:** Low. Data is from peer reviewed and reputable sources. The assumption is reasonable as lifespan is dependent on behaviour. As the lifespan is shorter than the technical potential life, it is important to keep track of this value as it affects how fast a new technology enters the market. |
| **Cost of product (Different under each option)** | ResearchGate, Efficiency improvement opportunities for personal computer monitors: Implications for market transformation programs, 2013 | The cost to savings ratio of the reflective polarizer technology is carried over to apply on screens as a measure of how to bring existing screens to the correct energy performance metric.<br><br>The cost of the technology is scaled down through the years in a logarithmic fashion under the assumption that the market development of the technology makes it cheaper.<br><br>**Risk:** High. The source itself is of good quality, however, it is possible these technology benefits have already been used. Although parallels can be made, it is uncertain that the financial benefits would still apply. This affects the costing of the entire model. |
| **Level of usage in hours/years (Same under both options)** | EU Lot 26 Prep, 2011 [1] | Usage patterns of monitors are calculated from [1]. 2010 and 2020 usage values are shown in the study which are linked via a linear trend. The usage trends before 2010 and after 2020 are kept at the respective 2010 and 2020 values.<br><br>**Risk:** Low. Data provided is from well-reviewed Prep study. This is a reputable source. The only foreseen change in usage is the standby and off shift which is accounted for in the source. |
| | BARB establishment survey | Viewing data of televisions is provided by the BARB establishment survey data on a yearly basis from 2010 to 2017. The data details the viewing hours for primary and secondary televisions. The usage beyond 2017 is estimated from an average usage of 2015, 2016 and 2017.<br><br>Televisions not in viewing mode are estimated to be in standby. |

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| | | **Risk:** Low. The data provided by BARB is detailed and reliable. Usage patterns will affect the energy consumption. Consumption value in standby is very low, hence a small variation in the number of televisions on standby has an even lower effect on the energy consumption. |
| **Energy consumption in kWh/year (Different under each option)** | Energy Star Database (updated 2020) [1] | Used to track the consumption of different screens on the market.<br><br>**Risk:** High. The data source is reliant on the energy star program being comprehensive. Most displays should be represented in the database, but not necessarily all. The dataset influences all the consumption and savings the model calculates. |
| | | The monitors consumption values per size from 2018 were estimated from an average of the monitors sold from 2014 to 2018. This considers the lifespan of the asset. The consumption values for the reference scenario are then kept static from 2018 onwards.<br><br>**Risk:** Medium. The assumption is good for 2018 but it could be reasoned that the consumption would not stay constant after 2018. This is therefore a conservative assumption to allow better comparison of the reference and policy scenario. |
| | | If the average consumption of a product met the ecodesign requirements it was kept in the analysis. If not, the products were removed from the set. The remaining values were averaged to give the consumption values post policy implementation. Post-policy implementation consumption values were kept static.<br><br>**Risk:** High. This assumption does not account for new screens being developed and placed onto the market which may have a change in consumption without regulatory intervention. This assumption therefore affects the total benefits unlocked by the regulation. |
| | | In both the policy and reference scenario, it is assumed that the standby values for televisions have reached peak performance and remain constant after 2018. 2018 standby values are calculated from [1]. The past standby values are calculated as a linear relationship from the 2004 value in the standby prep study. |

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| | | **Risk:** Low. The consumption value of the standby mode can affect the final energy consumption outcome and is a factor in the regulation. However, this effect is expected to be negligible as the screens already meet the regulation on standby and the standby consumption is very small. |
| | | UHD television screen consumption values are calculated from [1] for the 2018 value. The consumption values for 2015, 2016 and 2017 are scaled by the same factor as the HD range.<br><br>**Risk:** Low. The impact is low as these consumption values are for before the regulation is due to come into effect. |
| | EU Lot 26 Prep, 2011 | For monitors, the results of the prep study for network standby provides the average levels of standby and sleep consumption in 2010. This measure is for 22" monitors which are the median monitor screens which approximated for all screen sizes in 2010. A linear progression is used to bring the 2010 values to the 2018 values. The consumption of the standby and off modes is assumed to have reached their lowest level in 2018. The value is static until 2050.<br><br>**Risk:** Low. The source is the prep study which is a reputable source and the assumption is deemed highly reasonable. |
| | TopTen report, European TV Market 2007 – 2013, 2014 | TopTen data is used for consumption value of television screens from 2010 to 2014. A linear trend is used to calculate the consumption values from 2014 to 2018 for each size.<br><br>**Risk:** Low. With reliable consumption values for 2010 to 2013 and 2018, using a linear progression is an adequate assumption to calculate the intermediate years. This method only determines the consumption values for 4 years. These are before the scope of the regulation, and hence have a low impact on the model. |

# Annex 3 Competition Assessment

191. 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.

192. 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 4 Wider Environmental Impacts Assessment

193. 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?

194. The policy in question has direct benefits accruing from environmental savings. Relevant impacts have been explicitly included in the CBA. 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 5 Definitions

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| Computer Display | electronic display intended for one person for close viewing such as in a desk-based environment. |
| Computer Monitor | an electronic display intended for one person for close viewing such as in a desk-based environment. |
| Electronic Display | display screen and associated electronics that, as its primary function, displays visual information from wired or wireless sources. |
| Monitor | an electronic display intended for one person for close viewing such as in a desk-based environment. |
| Television | an electronic display designed primarily for the display and reception of audio-visual signals and which consists of an electronic display and one or more tuners/receivers. |

# Annex 6 Glossary of Terms

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| BEIS | Department for Business, Energy and Industrial Strategy |
| BIT | Business Impact Score |
| CBA | Cost-Benefit Analysis |
| EANDCB | Equivalent Annual Net Direct Cost to Business |

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| ERP | Energy-Related Products |
| EU | European Union |
| EUP(P) | Energy Using Products (Programme/Policy) |
| FTE | Full Time Equivalent |
| IA | Impact Assessment |
| MSA | Market Surveillance Authority |
| NPV | Net Present Value |
| MEPS | Minimum Energy Performance Standards |
| MTP | Market Transformation Programme |
| OIOO | One-In, One-Out |
| OPSS | Office for Product Safety and Standards |
| PIR | Post Implementation Review |
| SMB | Small and Micro Sized Businesses |
| WTO | World Trade Organisation |
| USA | United States of America |