| **Title: Banning the sale of high-caffeine energy drinks to children under the age of 16 years**<br>**IA No:**<br>**Lead department or agency:** Department of Health and Social Care<br><br>**Other departments or agencies:** | Impact Assessment (IA)<br>**Date:** 23 June 2025<br>**Stage:** Development/Options<br>**Source of intervention:** Domestic<br>**Type of measure:** Secondary legislation<br>**Contact for enquiries:** energydrinksconsultation@dhsc.gov.uk |
|---|---|

## Summary: Intervention and Options

| **Cost of Preferred (or more likely) Option** (Present value base year = 2027) | | |
|---|---|---|
| **Total Net Present Social Value** | **Business Net Present Value** | **Net cost to business per year** |
| 8,083.2m | -738.2m | 43.3m |

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

Evidence suggests consuming high-caffeine energy drinks is associated with a range of possible negative outcomes for children. This includes increased frequency of headaches, irritation, tiredness, reduced sleep duration and quality, and increased risk of emotional difficulties, such as stress. Parents, teachers, and public health professionals are concerned. There is already voluntary retail action aiming to limit the sale of these drinks to children under 16 years, but research shows some retailers continue to sell them to children. We believe government action is necessary as the current voluntary approach does not sufficiently protect children from the potential negative outcomes from consuming high-caffeine energy drinks.

**What are the policy objectives of the action or intervention and the intended effects?**

The main objective is to reduce the consumption of high-caffeine energy drinks by children under 16 years. This aim is to protect children from possible harms associated with the consumption these drinks. The secondary objective is to contribute to a reduction in children's sugar intake for those which stop consuming sugar sweetened versions of high-caffeine energy drinks. This will contribute towards reducing related outcomes including childhood obesity and dental decay related tooth extractions. The main indicators of success include a reduction in consumption of high-caffeine energy drinks by children under 16 years, and a reduction of sugar consumed from this source.

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

The main policy options considered are:

- Option 1: Doing nothing, and continuing with a voluntary, business-led approach
- Option 2: A ban on the sales of high-caffeine energy drinks to children under 16 years (the government's manifesto commitment)

We also considered alternative options to achieving the policy objectives, such as restricting advertising, minimum unit pricing, educating the public, introducing clearer caffeine content labelling requirements, restricting can/bottle size, or a combination of these. These were ruled out for various reasons described in the assessment. Subject to the outcomes of the consultation, we believe Option 2 is the best option to achieve the policy objectives. Option 1 is unlikely to lead to any further reduction in children's consumption of high-caffeine energy drinks.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** Month/Year

| | | | | |
|---|---|---|---|---|
| Is this measure likely to impact on international trade and investment? | | Yes | | |
| 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:** | **Non-traded:** | |

***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: Ashley Dalton Date: 23 June 2025

# Summary: Analysis & Evidence

Policy Option 2

**Description: Banning the sale of high-caffeine energy drinks to children under the age of 16 years**

**FULL ECONOMIC ASSESSMENT**

| **Price Base Year** 2024 | **PV Base Year** 2027 | **Time Period Years: 25 years** | **Net Benefit (Present Value (PV)) (£m)** | | |
|---|---|---|---|---|---|
| | | | **Low:** Optional | **High:** Optional | **Best Estimate: £8,392.2m** |

| **COSTS (£m)** | **Total Transition** (Constant Price) Years | **Average Annual** (excl. Transition) (Constant Price) | **Total Cost** (Present Value) |
|---|---|---|---|
| **Low** | Optional | Optional | **Optional** |
| **High** | Optional | Optional | **Optional** |
| **Best Estimate** | £122.4m | £41.2m | **£773.8m** |

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

Appraised over 25 years, the reduction in high-caffeine energy drink consumption is expected to reduce profits for retailers by £100.5m, and high-caffeine energy drink manufacturers by £658.9m. We expect there to be no net loss to the overall economy due to these losses being offset by gains to carbonated soft drink manufacturers and other sectors across the economy. Familiarisation costs are expected to incur for all sectors including retailers (£105.3m), out of home (£7.4m), and the vending sector (£9.6m). Ongoing costs for age verification of £636.3m to all sectors, and new staff training (£7.8m) are also expected to occur.

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

This regulation could lead to a loss in sales from customers over 16 years who are unable to provide ID, and may also lead to additional costs on customers to obtain ID to buy high-caffeine energy drinks. Some retailers may miscategorise soft drinks as high-caffeine energy drinks meaning sales of some soft drinks to children under 16 years are lost. The increase in age verification checks may lead to more violence and verbal abuse towards retail workers. For consumers, there may also be a loss in consumer surplus and lengthened queue times.

| **BENEFITS (£m)** | **Total Transition** (Constant Price) Years | **Average Annual** (excl. Transition) (Constant Price) | **Total Benefit** (Present Value) |
|---|---|---|---|
| **Low** | Optional | Optional | **Optional** |
| **High** | Optional | Optional | **Optional** |
| **Best Estimate** | - | - | **£9,166m** |

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

Appraised over 100 years, lower calorie consumption due to a reduction in the consumption of high-caffeine energy drinks by children over their lifetimes is expected to generate health benefits primarily due to fewer cases type 2 diabetes, coronary heart disease, stroke, colorectal cancer, breast cancer, liver disease, uterine cancer, upper gastrointestinal cancer, kidney cancer and osteoarthritis. The present value of these health benefits is estimated at £7,719m. In addition, it would provide NHS savings of £127m, social care savings of £84m, and reduced premature mortality is expected to deliver an additional £1,236m of economic output.

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

Children may experience additional health benefits associated with a reduction in caffeine consumption. There is a large body of consistent evidence that consuming high-caffeine energy drinks is associated with a range of possible negative outcomes on children's physical and mental health, sleep, education, and engagement with other harmful health behaviours. If the proposed legislation reduces consumption of these drinks by children under 16 years, then we expect this to contribute towards reducing these outcomes. However, it has not been possible to monetise these effects at this stage.

**Distributional impacts**

The proposed ban would deliver benefits for children under 16 years, and for both sexes, although it may be greater among boys as evidence indicates they consume more high-caffeine energy drinks. We are not aware of data that shows differences in high-caffeine energy drink consumption for groups with other protected characteristics. Research suggests that the consumption of high-caffeine energy drinks is higher among children from more deprived areas, so we expect a bigger positive impact for children from these areas.

| Key assumptions/sensitivities/risks | Discount | 3.5 / 1.5 |
|---|---|---|
| The benefits are appraised over a longer period than the costs (100 years compared to 25 years), to allow time for the health benefits to be realised as this is a policy targeted at children. This is consistent with other childhood obesity policy appraisals. Key assumptions affecting both the costs and benefits in the analysis include the rate of proxy purchasing that occurs and how current high-caffeine energy drinks are displaced. Key assumptions affecting the costs only include the number high-caffeine energy drinks bought per transaction, time taken for age verification and the time taken for vending machine clients to plan their replacement stock if a universal ban was introduced. A key assumption affecting our benefits only is that children maintain the same average calorie reduction for their entire adulthood. All these assumptions are tested in our sensitivity analysis to reflect the level of uncertainty. A discount rate of 1.5% is applied to health impacts and 3.5% to all other monetised impacts in line with HMT's The Green Book methodology. All costs and benefits are presented as 2027 present value in 2024 prices. | | |

**BUSINESS ASSESSMENT (Option 2)**

| Direct impact on business (Equivalent Annual) £m: 44.9m | | |
|---|---|---|
| **Costs: £44.9m** | **Benefits:** 0 | **Net: £44.9m** |

# Contents

# Evidence Base

## 1. Policy rationale

### 1.1. Policy context

1. In 2024, the Government set out its ambition to raise the healthiest generation of children ever, providing them with a better and more prosperous future. To achieve this bold ambition, the Department of Health and Social Care (DHSC) will be taking a range of actions, including steps to tackle obesity and promote healthier diets.

2. One of these important actions is to ban the sale of high-caffeine energy drinks to children under the age of 16 years (that is, children aged 15 years and under) in England. This was set out as a government commitment in its election Manifesto[1] and the King's Speech 2024.[2]

3. There is public support for the manifesto commitment. In recognition of the large body of consistent evidence of possible health harm, a range of academics, health organisations and public health leaders called on government to ban the sale of high-caffeine energy drinks to children in January 2024.[3] In polling commissioned by the Children's Food Campaign in April 2024, 80% of parents were in support of such a ban.[4] In addition, 72% of the public respondents to YouGov polling on the policies announced in the King's Speech agreed the ban is a good idea.[5]

4. This action would also deliver on a recommendation to Government from the House of Lords Select Committee on Food, Diet and Obesity. In their report *Recipe for health: a plan to fix our broken food system*, the committee recommended that the Government must 'legislate as soon as possible to implement its promised ban on the sale of high-caffeine energy drinks to children, ensuring the ban is comprehensive and providing adequate resources for it to be enforced'.[6]

5. The Department for Health and Social Care (DHSC) is consulting on its proposals for banning the sale of high-caffeine energy drinks to children under 16 years. This consultation stage impact assessment sets out our provisional assessment of the impact of the proposals on children, retailers, manufacturers of high-caffeine energy drinks, vending machine businesses, enforcement authorities and the health and care sector. It will be updated following consultation.

[1] Labour (2024) Build an NHS fit for the future.

[2] GOV.UK (2024) The King's Speech 2024.

[3] Food Active (2024). Renewed call on Government to restrict energy drinks sales to children, as evidence reveals wider risks.

[4] Sustain: Children's Food Campaign (2024). Parent Polling Report.

[5] YouGov (2024) What do Britons think of the policies in the 2024 King's Speech?

[6] House of Lords Food Diet and Obesity Committee (2024). Recipe for Health: a plan to fix our broken food system.

6. The proposed regulation affects England only, as policy on high-caffeine energy drinks is a devolved matter. Further information is set out in Section 3.4, Devolved policy.

## 1.2. Problem under consideration

### *Negative outcomes associated with children's consumption of high-caffeine energy drinks*

7. Growing evidence suggests that consuming high-caffeine energy drinks is associated with a range of possible negative outcomes on children's physical and mental health, as well as their education.

8. There have been several reviews on the safety of high-caffeine energy drinks. This includes the 2019 statement on energy drinks by the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment.[7] This is an independent scientific committee that provides advice to government departments and agencies. It noted that the consumption of high-caffeine energy drinks by children and adolescents is a complex social issue.

9. The latest and most comprehensive evidence comes from a systematic review of 57 studies, on over 1.2 million children and young people, from more than 21 countries.[8] It reported a large body of evidence that consistently suggests an association between consuming high-caffeine energy drinks and negative outcomes in children including:

   - increased frequency of headaches, irritation, tiredness and stomach aches
   - reduced sleep duration and quality
   - increased risk of emotional difficulties, such as stress, anxiety and depression
   - increased risk of suicide

10. Few studies in the systematic review found evidence of positive benefits of high-caffeine energy drinks, and authors commented as a whole these drinks lack any nutritional or functional value. Two studies found that for elite youth swimmers, high-caffeine energy drinks benefitted some aspects of their sport performance. But, given the focus on elite youth swimmers, this is not generalisable to children as a whole.

11. In addition to a range of negative health outcomes, the systematic review also suggested an association between high-caffeine energy drink consumption and reduced academic performance, and engagement with other harmful behaviours, such as smoking and vaping, alcohol use, binge drinking and other substance use.

[7] Committee on Toxicity (2019) Statement on the potential risks from "energy drinks" in the diet of children and adolescents.

[8] C Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281.

12. These findings are generally consistent with those from two reviews by the Evidence for Policy and Practice Centre, commissioned by the Department in 2018:

    a) secondary analysis of existing population level datasets of energy drink consumption by children in the UK,[9] and

    b) review of systematic reviews on the consumption of high-caffeine energy drinks by children.[10]

13. In addition to being high in caffeine, high-caffeine energy drinks can contain high levels of sugar, although reduced and sugar-free versions are available. The health impact of excess consumption of sugar sweetened drinks is well known. The Scientific Advisory Committee on Nutrition report on carbohydrates and health[11] found that high intakes of these drinks are associated with increased risk of obesity and related health conditions such as type 2 diabetes, in addition to poor oral health and decay-related tooth extractions in children. These are significant health issues impacting children and families, the NHS and society.

14. Research suggests that reduced and sugar-free versions of carbonated soft drinks still impact negatively on oral health, for example due to their acidity which contributes towards tooth enamel erosion.[12]

15. Parents and teachers are also concerned about children's consumption of high-caffeine energy drinks. Of parents surveyed in the Department for Education's Omnibus in December 2024,[13] 82% of parents reported feeling concerned about the potential negative effects of high-caffeine energy drink consumption on children, and of these 51% were very concerned. Areas of concern included the potential impact of these drinks on children's oral health, ability to sleep, behaviour, energy levels, concentration in school, and mood, anxiety or mental health. Parents were also concerned about children replacing meals with high-caffeine energy drinks, but to a lesser extent.

16. Of teachers surveyed, 61% agreed or strongly agreed that the consumption of high-caffeine energy drinks negatively impacts the health and wellbeing of pupils at their school. Almost 50% of teachers agreed or strongly agreed that the consumption of energy drinks negatively impacts pupil behaviour, and ability to learn.[14]

17. These findings are consistent with previous research. Of teachers and school leaders surveyed by the teachers' union NASUWT in 2017, 13% identified high-caffeine energy drinks as a main contributor to poor behaviour among children in school, and a barrier to

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[9] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[10] Brunton G, Khouja C, Raine G, Stansfield C, Kwan I, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drink use and effects in young people: A rapid overview of systematic reviews*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[11] Public Health England (2015) SACN Carbohydrates and Health Report.

[12] Inchingolo AM, Malcangi G, Ferrante L, Del Vecchio G, Viapiano F, Mancini A, Inchingolo F, Inchingolo AD, Di Venere D, Dipalma G, Patano A. Damage from Carbonated Soft Drinks on Enamel: A Systematic Review. Nutrients. 2023 Apr 6;15(7):1785.

[13] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 parent tables.

[14] Department for Education (2025) School and college voice: omnibus surveys for 2024 to 2025. School and college voice data tables: 2024 to 2025 academic year, December 2024 teacher tables.

engaging with learning.[15] Research published in 2023[16] reported similar findings, with some of the teachers interviewed expressing alarm at how consumption of these drinks is associated with effects on pupils' school attendance and ability to learn.

18. Further detail on the reported health and broader outcomes associated with children's consumption of high-caffeine energy drinks is set out in Section 10, Non-monetised benefits.

***What a high-caffeine energy drink is***

19. High-caffeine energy drinks are soft drinks that contain at least 150 milligrams of caffeine per litre of drink, which is higher than other soft drinks. Caffeine levels in high-caffeine energy drinks generally vary between 80 milligrams of caffeine per serving in 250ml products, and between 160 to 200 milligrams of caffeine per serving in 300ml to 500ml products.

20. The European Food Safety Authority caffeine topic page[17] suggests that some high-caffeine energy drinks can have up to double the amount of caffeine found in an average mug of coffee, and similar to the amount of caffeine in 5 cans of cola.

21. Research has found that these drinks have little to no nutritional benefit.[18] In addition to being high in caffeine, high-caffeine energy drinks can contain high levels of sugar, which is known to be linked with obesity and dental decay, although reduced and sugar-free versions are available.

22. They can also contain other ingredients which may have a stimulant effect, such as taurine, ginseng, and guarana.[19] Research notes that the effects of high-caffeine energy drinks have been attributed to caffeine, caffeine-like additives, or other ingredients like taurine that may interact with caffeine.[20]

23. Under Regulation (EU) No 1169/2011 on Food Information to Consumers,[21] which has been retained in UK law, manufacturers must label any drink, except for tea and coffee, that contains over 150 milligrams of caffeine per litre with the words '*High caffeine content. Not recommended for children or pregnant or breast-feeding women*'.

24. These criteria are used by relevant industry bodies in the UK to define high-caffeine energy drinks in their existing voluntary guidelines. As set out in Paragraph 43, these include

[15] NASUWT Big Question Survey 2017, 2017. Available: https://www.nasuwt.org.uk/article-listing/nasuwt-victory-on-energy-drinks-ban.html.

[16] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022; volume 26, issue 3, pages 575 to 585

[17] European Food Safety Authority (N.D.) Caffeine.

[18] C Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281.

[19] Zucconi S, Volpato C, Adinolfi F, Gandini E, Gentile E, Loi A, and Fioriti L. Gathering consumption data on specific consumer groups of energy drinks. Supporting Publications 2013; 10(3). doi:10.2903/sp.efsa.2013.

[20] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[21] Legislation.GOV.UK (2011) Regulation (EU) No 1169/2011 of the European Parliament and of the Council.

voluntary guidelines for retailers and manufacturers not to sell or directly market high-caffeine energy drinks to children under 16 years, respectively.

25. Under the criteria, the following are not considered high-caffeine energy drinks: tea, coffee, soft drinks with a maximum of 150 milligrams caffeine per litre such as cola, and non-caffeinated sport hydration drinks.

26. In the section on Reformulation on Page 54, we have considered the potential for manufacturers to reformulate their products, to reduce the caffeine to a maximum of 150 milligrams of caffeine per litre and therefore continue to sell these to children. However, at this stage we consider this unlikely.

***Children's consumption of high-caffeine energy drinks***

27. Data suggests that large numbers of UK children regularly consume high-caffeine energy drinks. There is research reporting that up to one third of UK children aged 13 to 16 years, and nearly a quarter of those aged 11 to 12 years, consumed one or more high-caffeine energy drinks each week, based on data collected in surveys at various time-points between 2013 and 2018.[22]

28. Of children aged 11 to 15 years surveyed in 2018 in England, 9% reported consuming high-caffeine energy drinks between 2 and 4 times a week.[23] Based on population estimates from the Office for National Statistics in 2018, this percentage translates to over 250,000 children.

29. More recent data from a 2022 survey of children reported that 4% of children aged 11 to 15 years in England consumed one or more high-caffeine energy drink each day.[24] Based on population estimates from the Office for National Statistics in 2018, this percentage is estimated to reflect over 100,000 children consuming these at least daily.

30. To inform our appraisal, we collected consumption data through the Department for Education's Omnibus Survey in December 2024.[25] An estimated 4% of pupils aged 11-16 years reported consuming high-caffeine energy drinks daily or most days, 11% consume them at least once a week, 13% consume them at least once a month and 18% consume them less often than once a month. These data include children aged 16 years, who are out of scope of the proposed ban, however, the results are generally consistent with the wider literature.

31. Through the Department for Education's Omnibus Survey we also collected data on the volume of high-caffeine energy drinks consumed. Of the pupils that reported consuming

[22] Khouja C, Kneale D, Brunton G, Raine G, Stansfield C, Sowden A, Sutcliffe K and Thomas J. Consumption and effects of caffeinated energy drinks in young people: an overview of systematic reviews and secondary analysis of UK data to inform policy. BMJ Open 2022: volume 12, issue 2, article number e047746

[23] Brooks F, Klemera E, Chester K, Magnusson J and Spencer N. Health behaviour in school-aged children (HBSC) national report: findings from the 2018 HBSC study for England. University of Hertfordshire 2020.

[24] Hulbert S, Eida T, Ferris E, Hrytsenko V and Kendall S. Health behaviour in school-aged children (HBSC) national report: findings from the 2001-2022 HBSC study for England. University of Kent 2023.

[25] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 pupil tables

high-caffeine energy drinks daily or most days, or at least once a week, most (63%) reported consuming between 1 to 3 drinks per week and 10% reported consuming between 4 to 7 drinks per week.[26]

32. Of particular concern, research consistently reports that children living in more deprived areas and from lower income households were more likely to consume high-caffeine energy drinks compared to those from more affluent areas and households.[27,28] This means the possible negative outcomes of high-caffeine energy drinks on children's health and education are likely to be felt unequally across society, disproportionately affecting those from more deprived communities.

33. Research has identified a range of reasons why children say they consume high-caffeine energy drinks,[29] such as:

- taste
- enhancing energy levels or performance
- social and peer influence
- the low cost
- ease of access
- marketing

***Safety of caffeine for children***

34. The Food Standards Agency safety advice on food additives[30] recommends that children should only consume caffeine in moderation and provides advice on caffeine consumption based on the European Food Safety Authority scientific assessment on the safety of caffeine.

35. The European Food Safety Authority has not set a safe caffeine intake level for children and adolescents, citing insufficient information available to derive this.[31] However, it indicates ‘no safety concern’ with children consuming up to 3 milligrams of caffeine per kilogram of body weight in either a single serving or over the course of a day. We do not expect further evidence on children to become available, due to ethical and feasibility issues that limit the ability to undertake causal research on this topic in children.

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[26] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 pupil tables

[27] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022; volume 26, issue 3, pages 575 to 585

[28] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[29] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[30] Food Standards Agency (2024) Food additives.

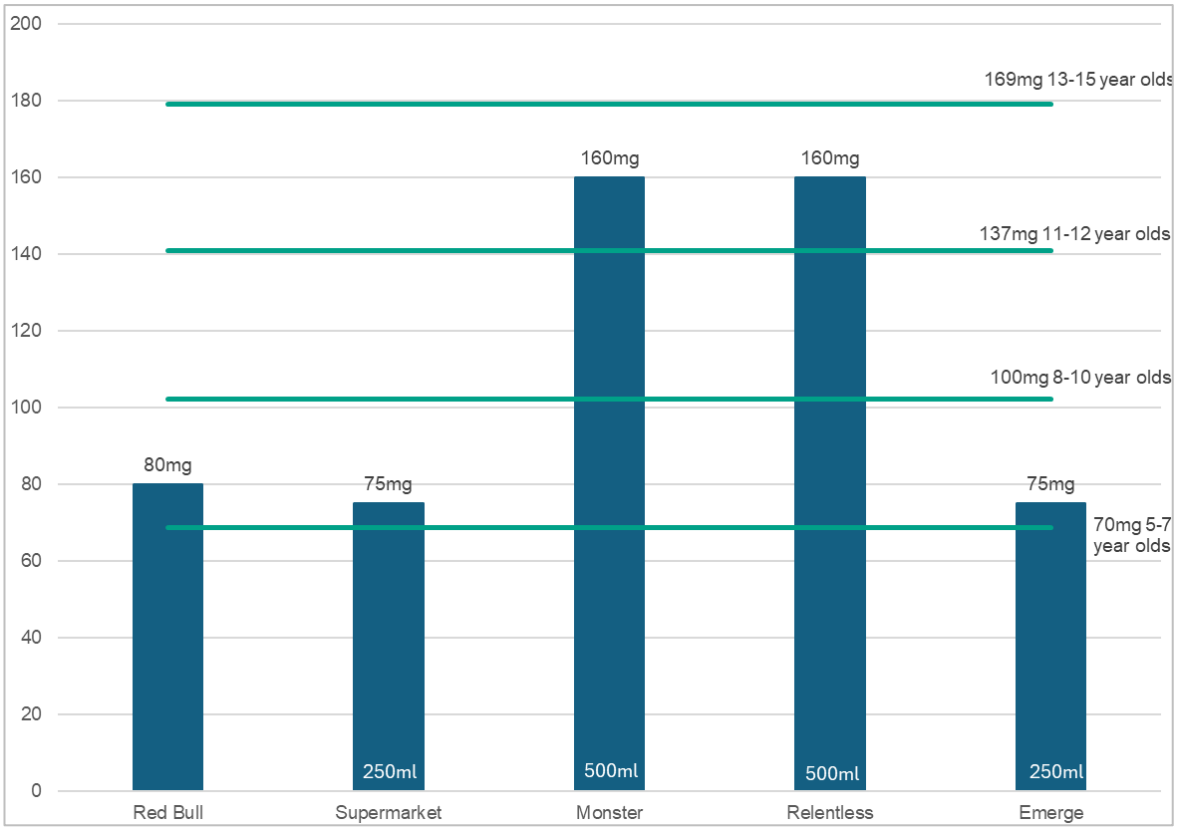
[31] European Food Safety Authority (EFSA) panel on dietetic products, nutrition and allergies. Scientific opinion on the safety of caffeine. EFSA Journal 2015: volume 13, issue 5, article number 4102

36. The threshold (3 milligrams of caffeine per kilogram of body weight per day) is the same as is used for the safety of single servings of caffeine in healthy adults.[32] However, the European Food Safety Authority indicates no safety concerns with adults consuming up to 400 milligrams of caffeine over the course of a day, which is almost 6 milligrams of caffeine per kilogram of body weight per day – double the level of 'no safety concern' for children.

37. Figure 1 sets out 5 popular brands of high-caffeine energy drink and compares their caffeine content against the level of 'no safety concern' threshold for children aged 5 to 7 years, 8 to 10 years, 11 to 12 years, and 13 to 15 years.

38. This shows that an average 500ml high-caffeine energy drink containing 160 milligrams of caffeine exceeds the level of 'no safety concern' for children aged 11 to 12 years and under, and for older children aged 13 to 15 years provides almost all the caffeine needed to reach this level. For these older children, the level of 'no safety concern' could be easily exceeded. For example, if they consume a high-caffeine energy drink alongside other caffeinated products such as tea, coffee, or chocolate, or if they consume repeated servings of high-caffeine energy drinks.

*Figure 1: Caffeine content in a serving of 5 popular brands of high-caffeine energy drinks and the European Food Safety Authority caffeine level of 'no safety concern' for children*




**Source**: DHSC Analysis of 2019 Health Survey for England (HSE) and high-caffeine energy drink market data. This graph shows the caffeine content of a single serving only. The HSE data collection on child weight was disrupted by COVID-19. Latest data were collected in 2019 and 2022; we have used HSE 2019, due to the larger sample for the age groups used.

[32] European Food Safety Authority (EFSA) panel on dietetic products, nutrition and allergies. Scientific opinion on the safety of caffeine. EFSA Journal 2015: volume 13, issue 5, article number 4102

39. While children also consume caffeine from other sources like chocolate, tea, coffee and colas, these generally contain less caffeine per serving than many high-caffeine energy drinks, meaning large or repeated servings may be needed to reach comparable caffeine levels.

40. NHS information on breastfeeding and diet[33] suggests the amounts of caffeine in different foods and drinks, which is:

    - an average serving (50g) of plain milk chocolate contains less than 10 milligrams of caffeine
    - a can of cola contains 40 milligrams of caffeine
    - a mug of tea contains around 75 milligrams of caffeine
    - coffee can contain 80 milligrams of caffeine in an espresso or 100 milligrams of caffeine in a mug of instant coffee

41. The proposed ban is informed by a large body of evidence which specifically suggests an association between high-caffeine energy drink consumption and a broad range of negative outcomes for children's physical and mental health, wellbeing, education and engagement with other harmful behaviours. We are not aware of similar evidence for, concerns about, or international policy action taken on, other caffeinated products. Through the consultation, we specifically invite information or evidence on this.

### *Existing action on high-caffeine energy drinks*

42. High-caffeine energy drinks are not currently an age restricted product. This is despite existing legislation which stipulates manufacturers must label any drink, except for tea and coffee, that contains over 150 milligrams of caffeine per litre with the words '*High caffeine content. Not recommended for children or pregnant or breast-feeding women*'.[34]

43. However, there has been a range of voluntary action across the retail sector to stop selling high-caffeine energy drinks to children under 16 years. Since 2018, we understand that most larger retailers and many convenience stores have voluntarily banned the sale of these drinks to children under 16 years. This action followed the #NotForChildren campaign[35] and significant media coverage. Before this, in 2017, the Vending and Automated Vending Association issued voluntary guidance to its members which recommends that high-caffeine energy drinks should not be sold in vending machines in public sites where children under 16 years have regular access.[36] In addition, the British Soft Drinks Association introduced a voluntary code of practice on high-caffeine energy

[33] NHS (2022) Breastfeeding and diet.

[34] Legislation.GOV.UK (2011) Regulation (EU) No 1169/2011 of the European Parliament and of the Council.

[35] Jamie Oliver (2018) Energy drinks are #NotForChildren.

[36] Automated Vending Association (2017) Healthier Vending Criteria for Better Choice & Healthy Choice Products. *Not publicly available*.

drinks in 2010 which commits its members to not directly market, or sample them with children under 16 years.[37]

44. Despite the broad voluntary action across the sector, research has found that voluntary bans in place have not prevented all children from being sold high-caffeine energy drinks, particularly in smaller convenience stores.[38] In addition to meaning that children can still purchase high-caffeine energy drinks, the fact that voluntary action has not been consistently adopted means there is not a level playing field for business, and some retailers may miss out on sales through trying to protect children's health.

45. This is consistent with findings from the Department for Education's Omnibus survey in December 2024,[39] where 70% of children aged 11 to 16 reported it is easy or very easy for people of their age to buy high-caffeine energy drinks. Of children aged 11 to 16 years who consume high-caffeine energy drinks, 47% reported that they buy them directly. These data include children aged 16 years, who are out of scope of the proposed ban, so may be an overestimate for children under 16 years, but are supported by the wider literature.

46. In recognition of the large body of consistent evidence of an association with possible health harm, in January 2024 a range of academics, health organisations and public health leaders called on government to ban the sale of high-caffeine energy drinks to children.[40]

### 1.3. Rationale for intervention

47. We consider a statutory ban on the sale of high-caffeine energy drinks to children under 16 years is needed to protect the public health of our children and reduce inequalities in health.

48. This action recognises the large and increasing body of evidence which consistently reports an association between consuming high-caffeine energy drinks and a range of possible negative outcomes for children's physical and mental health, in addition to their education.[41] We are particularly concerned these outcomes may be felt unequally across society,[42] disproportionately affecting the health and life prospects of children from more deprived households and communities.

49. Despite welcome voluntary action across the retail and manufacturing sector, research has shown this has not been enough to stop sales of high-caffeine energy drinks to children.[43] This may particularly apply to smaller retailers. Setting the minimum age of sale in

[37] British Soft Drinks Association. (2010) Code of practice on high caffeine soft drinks.

[38] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022; volume 26, issue 3, pages 575 to 585

[39] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 pupil tables.

[40] Food Active (2024). Renewed call on Government to restrict energy drinks sales to children, as evidence reveals wider risks.

[41] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[42] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[43] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022; volume 26, issue 3, pages 575 to 585

legislation is fairer for industry, as the same rules apply to all businesses and no retailer is disadvantaged by protecting the health of our children. Our engagement with the retail sector so far indicates that legislating the minimum age of sale would be welcomed.

50. We recognise that it is not possible to say from the type of evidence available that high-caffeine energy drink consumption directly causes the outcomes described. However, researchers have noted ethical and feasibility issues that limit the ability to undertake causal research on this topic in children.[44] The House of Commons Science and Technology Committee recognised these limits of the scientific evidence in its inquiry on high-caffeine energy drinks in 2018, although concluded that a ban might be legitimate on the basis of societal concerns and qualitative evidence.[45]

51. In Section 3, Policy options considered, we consider alternative options to government regulation. In this impact assessment, we also consider the sectors, markets and stakeholders that will be affected.

## 2. Proportionality assessment of the analysis used

52. The evidence and data used in this impact assessment sets out the currently available information we are aware of. As a consultation stage impact assessment, we consider this appropriate. We will continue to refine and further test the evidence used for the final stage impact assessment. Stakeholders can provide evidence and information through the consultation.

53. A significant amount of the data and evidence used has been collated from official statistics and other publicly available sources. For instance, we use the Office for National Statistics Nomis data to inform the number of businesses impacted by this legislation and we use the Annual Survey of Hours and Earnings to inform the familiarisation costs for businesses impacted by this legislation.

54. However, it has not been possible to source all our required data inputs and modelling assumptions using publicly available data and evidence. To try and fill these gaps we have engaged with relevant stakeholders and trade organisations to develop and test a set of inputs and assumptions used in our modelling. We will continue to engage relevant stakeholders throughout the consultation to refine these further.

55. We worked with the Department for Education to collect data on children's consumption of high-caffeine energy drinks in their Omnibus Surveys to pupils, teachers and parents. This provided us with data on the volume of high-caffeine energy drinks consumed by children. These data are essential for our costs and benefits modelling, and to our knowledge were not available in any other recent published data.

[44] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[45] Science and Technology Committee (House of Commons) (2018) Energy Drinks Inquiry.

56. In some instances, we have used a wide range of approaches to refine certain assumptions. For example, we consider the rate of proxy purchasing in our costs and benefits methodology but there is no direct data or evidence that exists to inform this assumption. We firstly considered data available for other age restricted products. Cigarettes were illegal for purchase by people under 18 years, but legal for proxy purchasing between 2008 and 2014. The Smoking, Drinking and Drug Use among Young People Survey provides data on the rate of proxy purchasing which we used to develop an assumption for our modelling and tested this with relevant stakeholders. We also included questions in the Department for Education Omnibus Survey to understand in more detail how children under 16 years obtain high-caffeine energy drinks. Both sources have been used to inform a sensible range for our assumptions on proxy purchasing. This remains an uncertain input used in our modelling, and as a result we have conducted sensitivity analysis on this. We will continue to engage with relevant stakeholders and welcome more views through the consultation to improve upon this.

57. We will continue to explore ways to improve our evidence base ahead of our final stage impact assessment, and as we develop the evaluation we will consider where data can be collected to improve the evidence base in this area. Any data and evidence that can be gathered in the consultation will be used to inform the final stage impact assessment.

58. Further detail about our inputs and assumptions can be found in Section 11, Risks and assumptions. The key areas of uncertainty are then reflected in more detail in Section 12, Sensitivity Analysis.

## 3. Policy options considered

59. The impact assessment sets out modelling on two main options:

- Option 1: Do nothing
- Option 2: Ban sales of high-caffeine energy drinks to children under 16 years

60. Subject to consultation, Option 2 is the preferred option for meeting the policy objectives (set out in Section 4, Policy objective). As described in Section 1, Policy rationale, the Government's Manifesto and King's Speech commitment to ban the sale of high-caffeine energy drinks to children under 16 years is a significant factor in the rationale for the policy. We have compared this to Option 1, which is the do-nothing approach.

61. We have not included an option to set the minimum age of sale at 18 years at this stage. However, we recognise that the age of 18 is the minimum age for buying many other age-restricted products. In addition, we are aware of research that, between 2008 and 2016, 16- to 18-year-olds in England were the highest consumers of high-caffeine energy drinks among all children and adolescent age groups.[46] However, children in this age group have

[46] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022; volume 26, issue 3, pages 575 to 585

a higher average body weight than children aged under 16 years,[47] and so older children are likely to have a higher caffeine level of 'no safety concern'.[48] Through the consultation we invite views on whether the proposed age limit is appropriate.

62. If needed, we will reconsider the options after considering evidence from the consultation and quantify additional options in the final impact assessment.

### 3.1. Option 1: Do nothing

63. Under Option 1, we would continue the business-as-usual approach. High-caffeine energy drinks are not currently an age restricted product, although there has been broad voluntary action not to sell these drinks to children under 16 years across the retail sector since around 2018. This followed the #NotForChildren campaign[49] and significant media coverage. From our engagement with retailers, we assume that the majority already have voluntary bans on the sale of high-caffeine energy drinks to children under 16 years. Therefore, we consider that voluntary action has progressed as far as it is feasible to expect.

64. However, not all retailers have implemented a voluntary ban and, in those that have, compliance is not enforced. Research highlights that some retailers continue to sell high-caffeine energy drinks to children, which may particularly apply to smaller retailers.[50] In addition to meaning that children can still purchase high-caffeine energy drinks, the fact that voluntary action has not been consistently adopted means there is not a level playing field for business, and some retailers may miss out on sales through trying to protect children's health.

65. Option 1 would create no additional impact for businesses, manufacturers, and enforcement authorities, but our engagement with the retail sector so far indicates that legislating the minimum age of sale would be welcomed, so that the same rules apply to all businesses. We consider that continuing with the current voluntary approach under Option 1 would not protect children from the potential negative outcomes from high-caffeine energy drinks, as some retailers will continue to sell these drinks to children.

66. Therefore, we consider that Option 1 will not achieve the policy objectives. It would also not fulfil the Government's commitment in the Manifesto and King's Speech.

[47] NHS England (2020) Health Survey for England 2019 [NS].

[48] European Food Safety Authority (EFSA) panel on dietetic products, nutrition and allergies. Scientific opinion on the safety of caffeine. EFSA Journal 2015: volume 13, issue 5, article number 4102

[49] Jamie Oliver (2018) Energy drinks are #NotForChildren.

[50] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022; volume 26, issue 3, pages 575 to 585

### 3.2. Option 2: Ban sales of high-caffeine energy drinks to children under 16 years

67. Under Option 2, the sale of high-caffeine energy drinks to children under 16 years would be banned in England. We consider that this option would fulfil the policy objectives (set out in Section 4, Policy objective).

68. The intention is to formalise and strengthen existing voluntary action taken across large parts of the retail sector. Regulation would introduce a universal approach and ensure the same rules applied to all businesses, meaning no business is disadvantaged by protecting the health of our children. In addition, local enforcement authorities would ensure that retailers comply with the ban and take proportionate action when they do not.

69. Where possible, our proposals are consistent with voluntary action already taken (see Paragraph 43), to reduce burden for retailers and enable them to continue to use existing processes to implement the ban.

70. Option 2 would impact on retailers and manufacturers of high-caffeine energy drinks, the vending and out of home sector, and enforcement authorities. The estimated impacts are summarised in Section 6, Summary of monetised and non-monetised costs and benefits. We will continue to refine these for the final impact assessment.

71. We have identified two sub-options to achieve implementation of the ban in vending machines. These are described in Section 5, Summary of preferred option.

### 3.3. Alternative options considered

72. We considered other regulatory and non-regulatory options to achieve the policy objectives. These consider the reasons why children say they consume high-caffeine energy drinks, such as taste, enhancing energy levels or performance, social and peer influence, the low cost, ease of access and marketing.[51]

73. The alternative options considered are set out in Table 1, in addition to the reasons they have not been taken forward or quantified at the consultation stage.

[51] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

*Table 1: Alternative options considered to achieve the policy objective*

| Option | Consideration |
|---|---|
| **Introduce a school-based ban** on high-caffeine energy drinks | • There is already action on high-caffeine energy drinks in schools. Under the Department for Education's School Food Standards, which are mandatory for all maintained schools, free schools and academies in England, high-caffeine energy drinks cannot be provided in schools.[52] There is currently no scheme to monitor compliance to the Standards.<br>• In the Department for Education Omnibus Survey, the majority of secondary school leaders (74%) said their school had a policy, and in almost all cases (88%) the policy was that pupils are banned from consuming these drinks both on the school premises or during the school day.[53]<br>• However, a school-based ban would only impact on consumption on the school premises and during school time, and therefore we consider it is likely to have a limited effect on consumption overall. |
| **Educate the public** through a public health campaign on responsible consumption of high-caffeine energy drinks | • This option relies on individuals to change their behaviour and so may have limited effect, [54] particularly if used in isolation.<br>• We believe that it is likely there are already high levels of public awareness around the suitability of these drinks for children. High-caffeine energy drinks are already labelled as 'not recommended for children'[55] and many retailers have voluntarily banned sales to children under 16 years.<br>• In addition, in the Department for Education Omnibus Survey,[56] 82% of parents reported feeling concerned or very concerned about the potential negative effects of high-caffeine energy drink consumption on children. |
| **Introduce clearer caffeine content labelling requirements or health warnings** on high-caffeine energy drinks | • Manufacturers already must comply with the caffeine labelling requirements set out by Regulation (EU) No 1169/2011 on Food Information to Consumers,[57] which state that high-caffeine energy drinks must be labelled as not recommended for children or pregnant women.<br>• Changes to labelling may introduce a Technical Barrier to Trade, which we want to avoid if possible. |

[52] Department for Education (2025) School food standards practical guide.

[53] Department for Education (2025) School and college voice: September 2024.

[54] Theis DRZ, White M. Is Obesity Policy in England Fit for Purpose? Analysis of Government Strategies and Policies, 1992-2020. Milbank Q. 2021 Mar;99(1):126-170. doi: 10.1111/1468-0009.12498. Epub 2021 Jan 19.

[55] Legislation.GOV.UK (2011) Regulation (EU) No 1169/2011 of the European Parliament and of the Council.

[56] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 parent tables.

[57] Legislation.GOV.UK (2011) Regulation (EU) No 1169/2011 of the European Parliament and of the Council.

| Option | Consideration |
|---|---|
| | • This option relies on individuals to change their behaviour and so may have limited effect, [58] particularly if used in isolation. In addition, there is also some international evidence that such labelling on high-caffeine products could increase their appeal to some adolescents and young people.[59-60] |
| **Restricting advertising/marketing** of high-caffeine energy drinks to children in broadcast and non-broadcast media | • The British Soft Drinks Association already has a voluntary code of practice which commits its members to not directly market or sample high-caffeine energy drinks with children.[61]<br>• In addition, the Committee of Advertising Practice's guidance on media placement restrictions states that media placement restrictions prohibit age-restricted marking communications from appearing in media for children or young people, and where children and young people make up a significant proportion of the audience.[62] We expect this to apply to high-caffeine energy drinks when the ban comes into force. |
| **Restrict high-caffeine energy drink companies** from endorsing sporting events | • This may impact on adult consumption of high-caffeine energy drinks, which is not the policy aim and not considered proportionate action. |
| **Introduce a minimum unit price** on high-caffeine energy drinks | • This may impact on adult consumption of high-caffeine energy drinks, which is not the policy aim and not considered proportionate action. |
| **Restrict can/bottle size** e.g. 250ml | • High-caffeine energy drinks are already sold in 250ml servings, in addition to larger sizes (300ml or around 500ml).<br>• This option relies on individuals to change their behaviour and so may have limited effect,[63] particularly if used in isolation. Children could continue to consume high amounts of high-caffeine energy drinks if they purchase multiple servings, or a multi-pack.<br>• In addition, restricting the product size would introduce a Technical Barrier to Trade, which we want to avoid if possible. It may also affect adult consumption of high-caffeine energy drinks, which is not the policy aim and not considered proportionate action. |

[58] Theis DRZ, White M. Is Obesity Policy in England Fit for Purpose? Analysis of Government Strategies and Policies, 1992-2020. Milbank Q. 2021 Mar;99(1):126-170. doi: 10.1111/1468-0009.12498. Epub 2021 Jan 19.

[59] Goldman J, Zhu M, Pham TB, Milanaik R. Age restriction warning label efficacy and high school student consumption of highly-caffeinated products. Prev Med Rep. 2018 May 30;11:262-266. doi: 10.1016/j.pmedr.2018.05.018.

[60] Ares G, Torres M, Machin L, and Antunez L. Caffeine warning labels may increase young adults' intention to purchase energy drinks. Food Quality and Preference. 2023. doi: 10.1016/j.foodqual.2023.105003

[61] British Soft Drinks Association. (2010) Code of practice on high caffeine soft drinks.

[62] Committee of Advertising Practice (2017) Media placement restrictions: protecting children and young people.

[63] Theis DRZ, White M. Is Obesity Policy in England Fit for Purpose? Analysis of Government Strategies and Policies, 1992-2020. Milbank Q. 2021 Mar;99(1):126-170. doi: 10.1111/1468-0009.12498. Epub 2021 Jan 19.

74. We do not, at this stage, consider that a combination of these alternative options would achieve the policy objectives and deliver on the Government commitments We have ruled the options out for different reasons, and consider these reasons also apply to a combination of more than one of the options. For example, some are considered likely to have limited effect, such as those which rely on individuals to change their behaviour, rather than shaping external influences.[64] High-caffeine energy drinks are already labelled as not recommended for children, and so we consider that stronger action is needed. Some of the options are considered restrictive such as those which introduce Technical Barriers to Trade, which we want to avoid if possible. Others affect adult consumption of high-caffeine energy drinks, which is not the policy aim and, in this instance, not considered proportionate action.

75. We will review evidence from the consultation and, if necessary, consider if any alternative options need quantifying in the final impact assessment.

### 3.4. Devolved policy

76. Policy on high-caffeine energy drinks is a devolved matter. No devolved government in the UK currently has mandatory measures on the sale of high-caffeine energy drinks to children.

77. Both Welsh[65] and Scottish Governments[66] have previously consulted on such a ban and each published their response in 2023. Scottish Government decided not to pursue mandatory measures at the time, after careful consideration of the evidence base.[67] Welsh Government published a call for evidence on the issue and the summary of responses in 2024,[68] and is considering next steps. In the Welsh Government call for evidence summary, the most frequently cited new academic evidence was the large systematic review by Ajibo and others published in early 2024.[69] The findings of this review are set out in Section 1.2, Problem under consideration and Section 10, Non-monetised benefits.

### 3.5. International policy

78. Several countries have taken regulatory action to reduce the potential harms of high-caffeine energy drinks by banning their sale to children. These include Lithuania, Latvia, Turkiye, the Russian Federation, Romania, Poland, and most recently Kazakhstan. We understand other countries are considering introducing a ban, such as Norway, the Czech Republic, Hungary, and Ukraine.

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[64] Theis DRZ, White M. Is Obesity Policy in England Fit for Purpose? Analysis of Government Strategies and Policies, 1992-2020. Milbank Q. 2021 Mar;99(1):126-170. doi: 10.1111/1468-0009.12498. Epub 2021 Jan 19.

[65] Welsh Government (2023). Consultation outcome: Proposal to end the sale of energy drinks to children under 16.

[66] Scottish Government (2023). Ending the sale of energy drinks to children and young people: consultation analysis.

[67] Scottish Government (2023) Ending the sale of energy drinks to children and young people: consultation

[68] Welsh Government (2024). Part 2: Call for evidence in relation to the consumption of energy drinks by children.

[69] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

79. A scoping review published in 2024 sets out alternative action taken by other countries.[70] Action taken includes school-based bans on high-caffeine energy drinks, labelling that high-caffeine energy drinks are not recommended for children, restrictions to marketing high-caffeine energy drinks to children, and setting a maximum caffeine level per serving or per 100ml. Many countries were recorded as having taxation policies on high-caffeine energy drinks, but these generally seemed to be taxes on sugar sweetened beverages, of which sugar sweetened high-caffeine energy drinks are in scope. The authors noted a lack of research on the effectiveness of these policies. We are not aware of evidence that compares the effectiveness of these policies in reducing children's consumption of high-caffeine energy drinks.

80. We are engaging with officials in relevant international governments to inform our policy development. We will continue to refine our options taking into account this engagement, engagement with other stakeholders and responses to the consultation.

## 4. Policy objective

81. It is the Government's ambition to raise the healthiest generation of children ever. The proposed ban on the sale of high-caffeine energy drinks to children under 16 years aims to contribute to that.

82. The main objective is to reduce the consumption of high-caffeine energy drinks to children under 16 years. The aim is to protect children from possible harms associated with the consumption these drinks, including negative outcomes to their physical and mental health, as well as their education.

83. The secondary objective is to contribute to a reduction in children's sugar intake for those which stop consuming sugar sweetened versions of high-caffeine energy drinks. The aim is to contribute towards reducing related outcomes including childhood obesity and dental decay related tooth extractions.

84. The ban aims to benefit all children aged under 16 years who consume high-caffeine energy drinks. Based on the available consumption data, we expect the greatest benefit may be for those aged 11 to 16 years. In addition, we expect it may particularly benefit children living in the most deprived households and areas, who are generally most likely to consume high-caffeine energy drinks.

85. The main and secondary policy objectives will be evaluated though a post-implementation review within 5 years of implementing the ban. Further details of our plans for monitoring and evaluation are set out in Section 17, Monitoring and Evaluation.

86. The main indicators of success will include:

[70] Rostami M, Babashahi M, Ramezani S, and Dastgerdizad H. A scoping review of policies related to reducing energy drink consumption in children. BMC Public Health. 2024 Aug 26;24(1):2308. doi: 10.1186/s12889-024-19724-y.

a) a reduction in the consumption of high-caffeine energy drinks by children under 16 years

b) a reduction in the consumption of sugar from high-caffeine energy drinks by children under 16 years

87. For the policy to be successful, it is essential that retailers comply with the ban and that it is enforced by local enforcement authorities. These outcomes may not be directly measurable. We intend to monitor them using indirect evidence, for example the proportion of children who report buying high-caffeine energy drinks may indicate retailer compliance.

## 5. Summary of preferred option

88. The preferred option at consultation stage is Option 2. This would ban the sale of high-caffeine energy drinks to children under 16 years in England. As set out in Section 1, Policy rationale this was a specific commitment in the Government's Manifesto and King's Speech.

89. We assess that the alternatives to regulation, including the do-nothing option of continuing with the existing voluntary approach, will not be effective in achieving the policy objective. We consider that some of the alternative options may have a limited effect, introduce barriers to trade, or have unintended consequences such as increasing the appeal of caffeinated products to young people or affecting adult consumption. We will continue to refine our considerations for the final stage impact assessment.

90. The proposed regulation affects England only, as policy on high-caffeine energy drinks is a devolved matter.

91. Subject to consultation, Option 2 proposes:

a) a ban on the sale of high-caffeine energy drinks in England to children under 16 years (that is, children aged 15 years and under)

b) the products in scope include any drink, other than tea or coffee, that contains over 150 milligrams of caffeine per litre (these criteria are currently used by relevant industry bodies to define high-caffeine energy drinks in existing voluntary guidelines, and under Regulation (EU) No 1169/2011 on Food Information to Consumers[71] products meeting these criteria need to be labelled as not recommended for children or pregnant women)

c) all retail settings are in scope, both in store and online, including retailers that primarily sell food and drink (such as supermarkets and convenience stores), the eating out of home sector (such as restaurants and cafes), and retailers which do not primarily sell food and drink (such as clothes retailers and newsagents)

[71] Legislation.GOV.UK (2011) Regulation (EU) No 1169/2011 of the European Parliament and of the Council.

d) a ban on vending machine sales of high-caffeine energy drinks to children under 16 years. We have set out modelling for two options to achieve this:

    i. a complete ban on the sale of high-caffeine energy drinks in vending machines, regardless of the age of the person buying them. This is our preferred option, taking into account learning from the ban on the sale of tobacco products to children from automated machines which found that it was not effective for the retailer to ensure that no one under the age of 18 years used the machine and as a result, the sale of tobacco in automated machines was banned altogether.[72] Whilst we recognise this will affect adult's ability to buy high-caffeine energy drinks, given the developments with tobacco products, we think this is appropriate to take this approach to protect the public health of children.

    ii. the business or organisation where the vending machine is located to take appropriate action to ban the sale of high-caffeine energy drinks in vending machines to children under the age of 16 years

e) enforcement by local authorities (most likely trading standards officers) as a criminal offence, with an alternative option to issue fixed monetary penalties (a fine) as a civil sanction

92. As the proposed definition for products in scope of the ban is consistent with existing voluntary guidelines and Regulation (EU) No 1169/2011 on Food Information to Consumers,[73] we consider that the proposed ban will not introduce any new labelling requirements for high-caffeine energy drinks.

93. We expect the proposed ban to increase the number of businesses which stop selling high-caffeine energy drinks to children under 16 years. In turn, we expect this will reduce sales of these drinks to children under 16 years, reducing their consumption of them, and the associated negative outcomes relating to their caffeine and sugar content.

94. We intend for the ban to be secondary legislation under the Food Safety Act 1990 to protect, and reduce inequalities in, children's health. The date for the arrangements to come into effect is to be agreed but, as set out in the consultation, we propose providing businesses and enforcement authorities six months following the commencement of the legislation to prepare to implement the ban.

95. We intend that local enforcement teams in food authorities will ensure businesses comply with the legislation. Generally, local trading standards officers are responsible for enforcing such regulations, but enforcement policy will depend on local arrangements.

[72] Department of Health (2012) The Prohibition on the Sale of Tobacco from Vending Machines: Impact Assessment.

[73] Legislation.GOV.UK (2011) Regulation (EU) No 1169/2011 of the European Parliament and of the Council.

## 6. Summary of monetised and non-monetised costs and benefits

96. This section summarises the monetised and non-monetised costs and benefits for Option 2: ban the sale of high-caffeine energy drinks to children under 16 years through statutory regulation. Full detail is set out in Section 7, Monetised costs and Section 8, Non-monetised costs and unintended consequences.

97. If the policy is successful, the main benefits are expected to accrue through:

    a) a reduction in the negative health outcomes associated with the consumption of high-caffeine energy drinks

    b) obesity benefits from the policy through a reduction in calories consumed (through a reduction in sugar intake).

98. We expect the policy to incur some costs to both businesses and the Government.

99. The expected costs to businesses in the retail and the out of home sector include:

- costs for staff to familiarise themselves with the policy and adapt to the new regulation. This may include creating or updating guidance for implementing the ban in store or for online sales, installing new shelf labels or signage to communicate the ban to customers, training staff, and updating IT and Electronic Point of Sale systems
- costs of carrying out additional age verification checks for those who fail ‘Challenge 25’ in retailers without an existing voluntary ban
- ongoing costs, such as the cost of age verification checks for high-caffeine energy drink transactions
- the cost of reduced sales of high-caffeine energy drinks for retailers without an existing voluntary ban.

100. The expected costs to manufacturers include:

- the loss of sales to high-caffeine energy drink manufacturers, which occurs because reduced consumer demand among children under 16 years leads retailers to order fewer products from the manufacturer.
- the gain in sales for carbonated soft drink manufacturers due to the displacement of most high-caffeine energy drink sales by soft drinks of equal value.

101. The expected costs to the vending machine sector include:

- costs for the vending machine sector to familiarise themselves with the policy. This includes initial staff awareness and distribution of knowledge across the sector, and stock planning.

- the loss of sales to vending machine businesses

102. The expected costs to Government relate to funding local authority enforcement of the policy. This includes the cost of trading standard officers familiarising themselves with the policy and their enforcement activity including providing advice, undertaking test purchases, and issuing penalties for non-compliance. There are also potential costs for courts.

103. A summary of the costs and benefits are set out in Table 2.

*Table 2: Summary of costs and benefits by stakeholder group (2024 prices, 2027 present value)*

| Stakeholder | Impact | Cost/benefit | Quantified | Estimate |
|---|---|---|---|---|
| Retailers (including online) | Familiarisation* | Cost | Yes | £105.3 m |
| | Ongoing costs – training new delivery drivers | Cost | Yes | £0.8m |
| | Ongoing costs - Age verification | Cost | Yes | £636.3m |
| Out of home sector | Familiarisation** | Cost | Yes | £7.4 m |
| | Ongoing-costs – training new staff*** | Cost | Yes | £7.0 m |
| | Ongoing costs - Age verification | Cost | No | N/A |
| Vending machine sector | Familiarisation**** | Cost | Yes | £9.6 m |
| All Sectors | Retailers lost markup from fall in high-caffeine energy drink sales | Transfer cost | Yes | £1,004.8 m |
| | Retailers gained markup from increase in non-energy drink sales | Transfer cost | Yes | £904.3 m |
| | High-caffeine energy drink manufacturers lost markup from ban | Transfer cost | Yes | £658.9 m |
| | Carbonated soft drink manufacturers gained markup from ban | Transfer cost | Yes | £593.0 m |
| | Retailers and manufacturers in the wider economy gained markup | Transfer cost | Yes | £166.4 m |
| Local authorities | Enforcement costs (including costs for the courts) | Cost | Yes | £7.4 m |
| Wider society | Health benefits due to a reduction in obesity through reduction in sugar consumption | Benefit | Yes | £9,166 m |
| | Health benefits through reduction caffeine consumption | Benefit | No | N/A |
| | | | **Total monetised costs** | **£773.8 m** |
| | | | **Total monetised benefits** | **£9,166 m** |

*Notes:*

** Familiarisation for retailers includes creating guidance, creating, producing and distributing shelf labels, staff training and awareness, and updating IT systems including Electronic Point of Sale systems.*
*** Familiarisation for out of home businesses includes creating guidance, new signage, staff training and awareness, and updating IT systems including Electronic Point of Sale systems.*
****Only businesses that do not currently sell age restricted products will incur ongoing training costs.*
*****Familiarisation for vending businesses includes staff awareness. knowledge sharing and stock planning.*

# 7. Monetised costs

## 7.1 Costs to business

### 7.1.1 Retail sector (including online)

104. This section aims to summarise the main costs that we expect the retail sector to incur. The main categories of costs have been established through considering similar regulations in retail settings, and through engagement with industry stakeholders. These include familiarisation costs, such as creating guidance, creating, producing and installing shelf labels or signage, staff training, and updating Electronic Point of Sale and IT systems, and ongoing costs, including new staff training and age verification.

105. Table 3 summarises the familiarisation, ongoing, and total costs for the retail sector explored within this section. The estimated total costs for the retail sector including online retail are £742.4 million over a 25-year appraisal period (which is consistent with the appraisal period used for other obesity related impact assessment). This is largely driven by the costs of ongoing age verification checks which we do estimate is an overestimation.

*Table 3: Summary of costs to the retail sector over a 25-year appraisal period (2024 prices, 2027 present value)*

| Type of cost | Impact | Total cost |
|---|---|---|
| **Familiarisation costs** | Creating guidance and disseminating information | £1.2 m |
| | Creating, producing and installing shelf labels or signage | £1.7 m |
| | Staff training and awareness | £14.0 m |
| | Updating Electronic Point of Sale systems | £0.08 m |
| | Updating IT systems | £88.2 m |
| | Total Familiarisation | **£105.3 m** |
| **Ongoing costs** | New delivery driver staff training | £0.8 m |
| | Age verification | £636.3 m |
| | Total Ongoing | **£637.1 m** |
| **Total cost to retailers (including online)** | | **£742.4 m** |

106. The remainder of this section will cover:

- a summary and methodology of calculating the familiarisation costs incurred by retailers in scope of the ban
- a summary and methodology of ongoing costs incurred by retailers in scope of the ban

**Differentiation in cost assumptions for stores and businesses**

107. In our appraisal of the retail sector, we differentiate costs incurred by ‘stores’ and by ‘businesses’. We define stores as individual retail sites, and businesses as the overarching enterprises that operate one or more of the individual retail sites (stores).

108. For example, when calculating the cost of updating Electronic Point of Sale systems, we expect this to be done once per ‘business’. On the other hand, when information is being disseminated to employees this will be done in every ‘store’.

109. Due to the variations in the data available to us, different methodologies are required to estimate the number of retailers in England’s food retail market.

***Familiarisation costs for retailers in scope of the ban***

110. Businesses and individuals in the retail sector would need to become familiar with the policy and adapt to the new legislation. This would incur a cost to retailers.

111. We consider that familiarisation costs for retailers would fall under these main categories:

- time spent creating guidance (whole retail sector)
- creating, producing and installing shelf labels or signage to communicate the new age of sale restriction to customers (businesses operating physical stores only)
- staff training and awareness (whole retail sector)
- updating Electronic Point of Sale systems (businesses operating physical stores only)
- updating IT systems (businesses operating physical stores also with an online offering and online only retailers).

112. Based on stakeholder engagement with the Association of Convenience Stores, for all retailer familiarisation costs, we assume that businesses and stores with an existing voluntary ban will incur only 50% of the costs compared to those who do not. This is because they are likely to have existing processes and materials in place. Due to the uncertainty in this reduction we have tested it within the sensitivity analysis (see Section 12, Sensitivity Analysis).

*Summary of familiarisation costs*

113. Table 4 summarises the familiarisation costs for the retail sector explored within this section. The total familiarisation costs for the retail sector including online retail are £105.3 million incurred within the first year of the policy.

*Table 4: Summary of familiarisation costs incurred by retailers in scope of the ban (2024 prices, 2027 present value)*

| **Type of cost** | **Total cost** |
|---|---|
| Creating guidance | £1.2 m |
| Creating, producing and installing shelf labels or signage | £1.7 m |
| Staff training and awareness | £14.0 m |
| Updating Electronic Point of Sale systems | £0.08 m |
| Updating IT systems | £87.4 m |
| Total Familiarisation | **£105.3 m** |

*Creating guidance*

114. In Annex A: Retail sector methodology, we calculate that there are 38,950 retail businesses which operate physical stores in England. We assume that all of them would need to create guidance about the new legislation for their stores, to support staff to understand and comply with the measure. As set out in Annex A: Retail sector methodology (see Table 78), these 38,950 retail businesses we estimate that 30,776 (79%) businesses do have an existing ban, meaning 8,174 businesses do not.

115. The Association of Convenience Stores provided an average hourly wage rate of retail staff at group level (e.g. staff working in a central team who are responsible for administrative activities) of £22.00. Adjusting this hourly wage by 19% to account for non-wage labour costs,[74] such as national insurance and pensions, the estimated business level hourly wage for staff at group level is £26.13.

116. We assume that businesses will spend 2 hours creating the guidance. By multiplying this time by the business level hourly wage for staff at group level, we estimate the cost of creating new guidance to be £52.25 per business. As we assume a 50% reduction in costs for business with an existing voluntary ban, this cost is reduced to £26.13 for those businesses. These figures represent average costs per business, and actual costs may vary depending on the size of the business.

117. By multiplying the average costs per business by the number of businesses in each group (those with or without an existing ban), we estimate the total cost of creating guidance for all retail businesses operating physical stores as £1.2 million.

118. We also considered the costs of creating guidance for online only retail businesses. We assume that online only retailers would need to create guidance about the new legislation to support relevant teams to understand and comply with the measure. In an online retail setting, guidance may support IT professionals responsible for updating webpages to communicate the legislation, or teams which co-ordinate the packaging and delivery of age restricted goods. As described in Annex A: Retail sector methodology, we estimate that 2 online only retail businesses would be in scope of this ban, and of these 2 online only businesses we estimate that 1 of these businesses does not have an existing ban.

[74] Based on the non-wage percentage of labour costs from Office for National Statistics (2020) Index of Labour Costs per Hour, UK, July to September 2020.

119. Despite the potentially different content, we assume that online only retailers would spend the same amount of time as businesses that operate physical stores to create guidance on the ban, therefore we assume the same costs per business of £52.25 for retailers without a voluntary ban, and £26.13 for businesses with an existing voluntary ban (see Paragraph 116). These figures represent average costs per business, and actual costs may vary.

120. By multiplying the average costs per business by the number of online only businesses in each group (those with or without an existing ban), we estimate the total cost of creating guidance for online only businesses as £78.

121. By adding the total cost of creating guidance for businesses who operate physical stores (£1.2 million) to the total cost for online only businesses to create the guidance (£78), we estimate a total cost of £1.2 million to retailers for creating guidance.

*Creating, producing and installing shelf labels or signage*

122. In Annex A: Retail sector methodology, we calculate that there are 38,950 retail businesses which operate physical stores in England. We assume that all retail businesses which operate physical stores may decide to create and produce shelf labels or signage for their respective stores to install. Shelf labels or signage may be used at the sales fixture or tills to communicate the minimum age of sale of high-caffeine energy drinks to customers, and that they may be asked for identification if they look under the age of 25 years. As set out in in Annex A: Retail sector methodology (see Table 78), of these 38,950 retail businesses we estimate that 30,776 (79%) businesses do have an existing ban, meaning 8,174 businesses do not.

123. The Association for Convenience Stores provided us with an average hourly wage rate of retail staff at group level (e.g. staff working in a central team who are responsible for administrative activities) of £22.00. Adjusting this hourly wage by 19%[75] to account for non-wage labour costs, such as national insurance and pensions, the estimated business level hourly wage for staff at group level is £26.13.

124. We assume that businesses will spend 2 hours creating and producing new shelf labels or signage. By multiplying this time by the business level hourly wage for staff at group level, we estimate the cost of creating and producing new shelf labels to be £52.25 per business. As we assume a 50% reduction in costs for business with an existing voluntary ban, this cost is reduced to £26.13 for those businesses. These figures represent average costs per business, and actual costs may vary depending on the size of the business.

125. By multiplying the average costs per business by the number of businesses in each group (those with or without an existing ban), we estimate the total cost of £1.2 million to retailers for creating and producing shelf labels or signage.

[75] Based on the non-wage percentage of labour costs from Office for National Statistics (2020) Index of Labour Costs per Hour, UK, July to September 2020.

126. All 62,216 stores would then need to install the new shelf labels or signage. As set out in Annex A: Retail sector methodology (see Table 78), of the 62,216 stores we estimate that 52,246 stores do have an existing ban, meaning 9,970 stores do not have an existing ban.

127. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for retail cashiers and check-out operators is £13.72.

128. We assume that it would take each store 1 hour to install the new shelf labels or signage. By multiplying this time by the store level hourly wage, we estimate the cost of installation to be £13.72 per store. As we assume a 50% reduction in costs for stores with an existing voluntary ban, this cost is reduced to £6.86. These figures represent average costs per store, and actual costs may vary depending on the size of the store.

129. By multiplying the average costs per store by the number of stores in each group (those with or without an existing ban), we estimate the total cost of £0.5 million to retailers for installing shelf labels or signage.

130. By adding the total cost of businesses creating and producing shelf labels or signage (£1.2 million to the total cost for stores to install them (£0.5 million), we estimate a total cost of £1.7 million for creating, producing and installing shelf labels or signage.

*Staff training and awareness*

131. In Annex A: Retail sector methodology, we calculate that there are 2.8 million staff members across the retail sector in England. We assume that all these staff members would need training to ensure awareness of the new regulations.

132. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for retail cashiers and check-out operators is £13.72.

133. We assume that the training time would be 1 hour for retail staff working in stores without an Electronic Point of Sale system, and 30 mins for those working in stores with an Electronic Point of Sale system. This assumption considers that staff in stores without an Electronic Point of Sale system need a more comprehensive understanding of the legislation as they must identify a high-caffeine energy drink themselves and be aware of the minimum age of sale, whilst staff in stores with an Electronic Point of Sale system will be prompted by the system on the necessary action, so they do not need to understand the legislation in as much detail, reducing the training needed.

134. By multiplying these times by the store level hourly wage, we estimate the cost of training for staff members working without an Electronic Point of Sale system to be £13.72 per employee, and for those who work with an Electronic Point of Sale system to be £6.86. As we assume a 50% reduction in costs for stores with an existing voluntary ban, these costs are reduced to £6.86 for employees working without an Electronic Point of Sale system, and £3.43 for those working with an Electronic Point of Sale system where applicable. These figures represent average costs per employee, and actual costs may vary.

135. To calculate the number of staff members that are working with or without an Electronic Point of Sale system, we assume that 77% of employees use an Electronic Point of Sale system, based on the Association of Convenience Stores local shop report.[76] We then separate these employees into those working in stores with and without a voluntary ban, using the assumption that 84% of stores have an existing voluntary ban. This results in the employee numbers set out in Table 5.

*Table 5: Estimated number of employees working in retail stores, by whether the store has an existing voluntary ban and Electronic Point of Sale (EPOS) system*

| | **Number of employees** |
|---|---|
| Employees working in a store with no voluntary ban but with an EPOS system | 0.3 million |
| Employees working in a store with no voluntary ban and with no EPOS system | 0.1 million |
| Employees working in a store with an existing voluntary ban and with an EPOS system | 1.8 million |
| Employees working in a store with an existing voluntary ban but with no EPOS system | 0.5 million |

136. By multiplying the average costs per employee by the number of employees in each group (those with or without an existing ban and with or without an Electronic Point of Sale system), we estimate the total cost of training staff members across the retail sector of £13.8 million.

137. We also considered the cost of training for grocery retail delivery drivers. We currently assume that, for high-caffeine energy drinks bought online, age verification will take place at the time of delivery. Therefore, delivery drivers will need to be familiar with the legislation and the processes for verifying age for these products. We assume that age restricted goods will be retained by the delivery driver if age cannot be verified, and they will not be left in a safe place. In the consultation, we ask how the ban may work for online sales and whether identification should be checked at the point of sale or point of delivery. We will refine our assumption after the consultation if necessary.

138. To calculate the number of grocery retail delivery drivers in England we use 2024 Annual Survey of Hours and Earnings data[77] which states that there are 132,000 delivery drivers and couriers in the UK.

139. Since the energy drinks ban is set to be implemented only in England, an adjustment is made to scale UK-level data down to estimate English-level data. We applied a weighting of 84.5%, which represents the proportion of the population from the UK that live in England. This has been calculated using ONS Population Estimates (Mid-2023)[78] and reflects the entire population, not just children under 16 years.

[76] Association of Convenience Stores (2024) Local Shop Report 2024.

[77] Office for National Statistics (2024) Earnings and hours worked, occupation by four-digit SOC: ASHE Table 14.

[78] Office for National Statistics (2023) Population estimates for England and Wales Mid 2023.

140. We applied the England weighting (see Paragraph 139) to the UK estimate of delivery drivers, to estimate that there are a total of 111,552 delivery drivers and couriers in England.

141. Based on a primary research report from December 2022,[79] 32% of the delivery drivers surveyed were employed as retailer delivery drivers. In the absence of more specific data, we use this figure as the best available estimate for the proportion of delivery drivers and couriers in England that work in grocery retail. Applying this percentage, we estimate that 35,697 delivery drivers are employed in the grocery retail sector in England.

142. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for delivery drivers and couriers is £14.56.

143. We assume that the training time for each delivery driver would be 30 minutes, in line with the training time for staff working with an Electronic Point of Sale system. By multiplying this time by the hourly wage of a delivery driver and courier, we estimate the cost of training to be £7.28 per employee. These figures represent average costs per employee, and actual costs may vary.

144. By multiplying the average costs per employee by the number of delivery drivers and couriers in the grocery retail sector in England, we estimate the total cost of staff training as £0.3 million.

145. By adding the total cost of staff training for staff members across the retail sector (£13.8 million) to the total cost for training delivery drivers (£0.3 million), we estimate a total cost of £14.0 million[80] to retailers for staff training and awareness.

*Updating Electronic Point of Sale systems*

146. We assume that all businesses with an Electronic Point of Sale system will need to update their systems based on the new legislation.

147. We assume that 77% of businesses use an Electronic Point of Sale system, based on the Association of Convenience Stores local shop report,[81] resulting in an estimate of 29,992 retailers using an Electronic Point of Sale system. Based on the assumption that 79% of retailers have an existing voluntary ban, of these 23,697 do have an existing ban and 6,294 do not.

148. The Association of Convenience Stores provided an average hourly wage rate of staff at group level (e.g. staff working in a central team who are responsible for administrative activities) of £22.00. Adjusting this hourly wage by 19%[82] to account for non-wage labour

[79] Scandit (2022) Driver Views from the Last Mile: Primary Research Report.

[80] These figures do not total due to rounding.

[81] Association of Convenience Stores (2024) Local Shop Report 2024.

[82] Based on the non-wage percentage of labour costs from Office for National Statistics (2020) Index of Labour Costs per Hour, UK, July to September 2020

costs, such as national insurance and pensions, the estimated business level hourly wage for staff at group level is £26.13.

149. Based on stakeholder engagement with Association of Convenience Stores, we assume it will take businesses 0.17 hours (10 minutes) to update the Electronic Point of Sale system. By multiplying this time by the business level hourly wage for staff at group level, we estimate the cost of updating the Electronic Point of Sale system to be £4.36 per business. As we assume a 50% reduction in costs to business with an existing voluntary ban, this cost is reduced to £2.18 where applicable. These figures represent average costs per business, and actual costs may vary depending on the size of the business.

150. By multiplying the average costs per business by the number of businesses in each group (those with or without an existing ban), we estimate the total cost of updating the Electronic Point of Sale systems to be £0.08 million.

*Updating IT systems*

151. We assume that all businesses with an online offering, including online only retailers, will need to update their IT systems based on the new legislation. As previously calculated in Annex A: Retail sector methodology, we estimate that 1,351 businesses operating physical stores also have an online offering, and there are 2 online only businesses.

152. We assume a head office manager of each business will provide an IT professional with the knowledge of the new regulations, so they understand what changes need to be made to IT systems. We estimate that this would take 1 hour for knowledge sharing at a cost of each professional's hourly wage.

153. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for managers, directors and senior officials is £30.45 and for information technology professionals is £32.78.

154. By multiplying the time spent on knowledge sharing by each professional's hourly wage, we estimate the cost of knowledge sharing to be £64.22 per business. These figures represent average costs per business, and actual costs may vary depending on the size of the business.

155. By multiplying the average cost per business by the number of businesses with an online offering, including online only retailers, we estimate the total cost of knowledge sharing to be £0.9 million.

156. After the knowledge is shared, an IT professional will need to physically update the IT systems. In the absence of specific data, we adopt the same assumption used in the impact assessment on restricting volume promotions for high fat, sugar, and salt products,[83] that it would take an IT professional 200 hours (25 days; based on 8 hour working days) to complete the updates which was based on stakeholder feedback. This is likely an

[83] Department of Health and Social Care (2020) Impact Assessment: Restricting volume promotions for high fat, sugar, and salt (HFSS) products.

overestimate as we expect that the level of updates required will be less extensive than those in the mirrored impact assessment, but it is our best estimate at this stage. Due to the uncertainty, we have included this within our sensitivity analysis (see Section 12, Sensitivity Analysis).

157. Using the IT professional wage (see Paragraph 153) multiplied by the time taken to update the systems we estimate that these updates would cost £6,555 per business. These figures represent average costs per business, and actual costs may vary depending on the size of the business.

158. By multiplying the average cost per business by the number of businesses with an online offering, including online only retailers, we estimate the total cost of physically updating IT systems to be £87.4 million.

159. By adding the total cost of knowledge sharing (£0.9 million) to the total cost for physically updating the IT systems (£87.4 million), we estimate a total cost of £88.2 million to retailers for updating IT systems.

***On-going costs for retailers in scope of the ban***

160. We assume that businesses in the retail sector are subject to the following ongoing costs:

- training new staff (online delivery drivers only)
- age verification (whole retail sector)

161. These costs would occur throughout the 25-year appraisal period.

162. Retailers in scope of the ban are also expected to experience lost sales throughout the appraisal period which are calculated for all sectors in Section 7.1.3, Lost sales.

163. Table 6 summarises the ongoing costs for the retail sector explored within this section. The total ongoing costs for the retail sector including online retail is £637.1 million.

*Table 6: Summary of ongoing costs incurred by retailers in scope of the ban (2024 prices, 2027 present value)*

| **Type of cost** | **Total cost** |
|---|---:|
| New staff training | £0.8 m |
| Age verification | £636.3 m |
| Total ongoing costs | £637.1 m |

164. The remainder of this section will provide a summary and methodology of the ongoing costs incurred by retailers in scope of the ban

*Training new staff*

165. We assume that the retail sector will already have processes in place on a yearly basis to train their staff on the sale of age restricted products. Therefore, we assume there is no

additional ongoing costs to the retail sector as a result of the age restriction placed on high-caffeine energy drinks.

166. However, we do not know if deliver drivers or couriers will currently have training on age restricted products in place. Therefore, we assume that new delivery drivers would need to be trained on an ongoing basis to ensure that they are aware of the regulations.

167. In the absence of specific data, we assume the same annual turnover rate as retail industry employees of 18%. We use this to estimate the number of new staff by applying it to the total number of delivery drivers in grocery retail. Based on the assumption that each employee who leaves is replaced, we estimate that 6,425 new staff members will require training each year.

168. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for delivery drivers and couriers is £14.56.

169. We assume that the training time for each delivery driver is 30 minutes, in line with the training time for staff working with an Electronic Point of Sale system. By multiplying this time by the hourly wage of a delivery driver and courier, we estimate the cost of training to be £7.28 per employee. These figures represent average costs per employee, and actual costs may vary.

170. By multiplying the number of new delivery drivers by the average cost of training per employee, we estimate the annual cost of £46,773.

171. We assume that this cost reoccurs annually following implementation. Over the 25-year appraisal period, future years costs are discounted at a rate of 3.5% in line with HMT's The Green Book, resulting in a total discounted cost of £0.8 million to retailers for the training of new delivery drivers.

*Age verification*

172. We estimate the total ongoing costs for additional age verification checks due to the ban. We assume that retail businesses with an existing voluntary ban already check identification for high-caffeine energy drink sales, so we do not include costs for those stores. Instead, we calculate the additional checks needed only for stores without an existing voluntary ban.

173. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for retail cashiers and check-out operators is £13.72.

174. We assume that it would take 0.017 hours (1 minute) to check identification. This is informed by stakeholder engagement, though we recognise it is higher than the assumptions used in other impact assessments. We welcome evidence on this assumption through consultation, and test this further in Section 12, Sensitivity Analysis. By multiplying this time by the store level hourly wage, we estimate the cost of age verification to be £0.34

per transaction. These figures represent average costs per transaction, and actual costs may vary.

175. Annex F: High-caffeine energy drink transactions methodology explains how we calculate the number of transactions expected over the 25-year appraisal period in stores without a voluntary ban. Our calculations use the assumption that 1 high-caffeine energy drink is bought per transaction that was informed by stakeholder engagement with the Association for Convenience Stores. However, which we recognise is likely to be an overestimate as consumers may purchase multiple high-caffeine energy drinks in a single transaction as they can be bought as multipacks, particularly in grocery retail stores. However, in the absence of data on purchase volumes, this assumption provides a conservative upper-bound estimate of the potential cost impact. We have explored the impact of the assumption within the sensitivity analysis.

176. In addition, we recognise that the estimated number of transactions is informed by consumption of high-caffeine energy drinks by children under 16 years. Following the implementation of the ban we would expect the consumption of children under 16 years to fall to zero. However, we assume some children under 16 years would still attempt to purchase a high-caffeine energy drink and therefore the age verification cost is still incurred. The main age verification costs will be incurred by those purchasing high-caffeine energy drinks aged 16 to 25 years. We do not have data to inform either of these arguments, therefore we use the consumption of under 16 years as a proxy for this.

177. We multiplied the number of transactions each year by the average cost per transaction to estimate the yearly cost. Over the 25-year appraisal period, future costs are discounted at a rate of 3.5% in line with HMT's The Green Book, resulting in a total discounted cost of £636.3 million to retailers for age verification.

### 7.1.2. Out of home sector

178. This section aims to summarise the main costs that we expect the out of home sector to incur. The main categories of costs have been established through considering similar regulations that have previously been implemented that impact the out of home sector, and through engagement with industry stakeholders. These costs include familiarisation costs, such as creating guidance, staff training and awareness, updating Electronic Point of Sale systems, and installing new signage, and ongoing costs, including new staff training.

179. Table 7 summarises the familiarisation, ongoing and total costs for the out of home sector explored within this section. The total costs for the out of home sector are £14.4 million incurred over a 25-year appraisal period.

*Table 7: Summary of costs to the out of home sector over a 25-year appraisal period (2024 prices, 2027 present value)*

| Type of cost | Impact | Total cost |
|---|---|---|
| Familiarisation costs | Creating guidance | £2.1 m |
| | Staff training and awareness | £5.0 m |
| | Updating Electronic Point of Sale systems | £0.1 m |
| | Installing new signage | £0.2 m |
| | **Total familiarisation** | **£7.4 m** |
| Ongoing costs | New staff training | £7.0 m |
| | **Total ongoing** | **£7.0 m** |
| **Total cost to out of home sector** | | **£14.4 million** |

180. The remainder of this section will cover:

- A summary and methodology of calculating the familiarisation costs incurred by the out of home sector in scope of the ban
- A summary and methodology of ongoing costs incurred by the out of home sector in scope of the ban

***Familiarisation costs to the out of home sector***

181. We assume that businesses and employees in the out of home sector need to become familiar with the policy and adapt to the new legislation. This would incur a cost to out of home businesses.

182. We consider that familiarisation costs would fall under these main categories:

- time spent creating guidance
- staff training and awareness
- updating Electronic Point of Sale systems
- installing new signage to communicate the ban to customers

183. Table 8 summarises the familiarisation costs for the out of home sector explored within this section. The total familiarisation costs for the out of home sector is £7.4 million incurred in the first year of implementation.

*Table 8: Summary of familiarisation costs to the out of home sector over a 25-year appraisal period (2024 prices, 2027 present value)*

| | **Total cost** |
|---|---|
| Creating guidance | £2.1 m |
| Staff training and awareness | £5.0 m |
| Updating Electronic Point of Sale systems | £0.1 m |
| New signage | £0.2 m |
| Total familiarisation costs | £7.4 m |

184. The remainder of this section details the methodology used to calculate each familiarisation cost.

*Creating guidance*

185. We assume that all out of home sector businesses selling high-caffeine energy drinks would need to create guidance about the new regulations. As calculated in Annex B: Out of home sector methodology, we estimate that 60,577 businesses in England sell high-caffeine energy drinks and are in scope of the ban.

186. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for restaurant and catering establishment managers and proprietors is £17.18. This wage is used to inform the estimated wage for employees that may be responsible for creating guidance in licensed restaurants, unlicensed restaurants and cafes, take away food shops and mobile food stands, sports facilities, and museums, cinemas, amusement parks, botanical gardens and nature reserves. Additionally, the estimated hourly wage for publicans and managers of licensed premises is £18.81, which is used to inform estimated wage for employees that may be responsible for creating guidance in public houses and bars.

187. We assume that businesses will spend 2 hours creating the guidance, in line with the assumptions for the retail sector. By multiplying this time by the hourly wages for each profession per sector we estimate the costs of creating guidance per business. These figures represent average costs per business, and actual costs may vary depending on the size of the business.

188. By multiplying the average costs per business by the number of businesses in each out of home sector, we estimate the total cost of £2.1 million to out of home businesses for creating guidance as set out in Table 9.

*Table 9: Estimated total cost for creating new guidance for the out of home sector, by business type*

| Out of home sector | Total cost for creating new guidance |
|---|---|
| Licensed restaurants | £0.6 m |
| Unlicensed restaurants and cafes | £0.1 m |
| Take away food shops and mobile food stands | £1.3 m |
| Public houses and bars | £0.06 m |
| Sports facilities | £0.05 m |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | £0.001 m |
| **Total** | £2.1 m |

*Staff training and awareness*

189. We assume that all staff members with customer facing roles across the out of home sector would need training to ensure awareness of the new regulations. We assume that 50% of employees from large and medium businesses have customer facing roles, while all employees in small and micro businesses are assumed to be customer facing.

190. Annex B: Out of home sector methodology outlines the method for estimating the number of employees from out of home businesses in scope of the ban. We applied a 50% reduction to the total number of employees in large and medium businesses in the out of home sector, to estimate the number of employees with customer facing roles. We estimate that a total of 606,526 employees in the out of home sector work in customer facing roles, and so require training on the ban (see Table 10).

191. We applied different assumptions depending on whether employees work in a business using an Electronic Point of Sale system or not. We assume that all of employees from small, medium and large businesses use an Electronic Point of Sale system, and 30% of micro businesses use an Electronic Point of Sale system. This results in us estimating that the majority of out of home employees use an Electronic Point of Sale system (481,722), in comparison to those that do not (124,806).

*Table 10: Estimated number of employees in the out of home sector with customer facing roles, by business type*

| Out of home sector | Total number of employees in the out of home sector with customer facing roles | | |
|---|---|---|---|
| | All employees | Employees using an EPOS system | Employees not using an EPOS system |
| Licensed restaurants | 285,920 | 250,729 | 35,191 |
| Unlicensed restaurants and cafes | 33,836 | 26,141 | 7,695 |
| Take away food shops and mobile food stands | 210,422 | 133,944 | 76,479 |
| Public houses and bars | 49,369 | 47,032 | 2,337 |
| Sports facilities | 24,525 | 21,422 | 3,104 |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | 2,454 | 2,454 | 0 |
| **Total** | 606,526 | 481,722 | 124,806 |

192. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for bar staff is £13.66. This wage is used to inform the estimated wage for employees requiring training in licensed restaurants and public houses and bars. Additionally, the estimated hourly wage for waiters and waitresses is £13.59, which is used to inform estimated wages for employees requiring training in unlicensed restaurants and cafes and take away food shops and mobile food stands. The estimated hourly wage for retail cashiers and check-out operators is £13.72, which is used to inform estimated wages for employees requiring training in sports facilities, museums, cinemas, amusement parks, botanical gardens, and nature reserves. These figures represent average wage estimates, and actual wages may vary depending on the size of the establishment.

193. We assume that the training time would be 1 hour for out of home staff working in establishments without an Electronic Point of Sale system, and 30 minutes for those working in establishments with an Electronic Point of Sale system.

194. By multiplying these times by the average hourly wages for each out of home sector profession, we estimate the cost of training for staff members working with and without an Electronic Point of Sale system. We estimate the total cost of training staff members across the out of home sector of £5.0 million as set out in Table 11.

*Table 11: Estimated total cost for staff training in the out of home sector (2024 prices, 2027 present value)*

| Out of home sector | Total cost for staff training |
|---|---|
| Licensed restaurants | £2.2 m |
| Unlicensed restaurants and cafes | £0.3 m |
| Take away food shops and mobile food stands | £1.9 m |
| Public houses and bars | £0.4 m |
| Sports facilities | £0.2 m |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | £0.02 m |
| **Total** | £5.0 m |

*Updating Electronic Point of Sale systems*

195. We assume that all out of home businesses with an Electronic Point of Sale system will need to update their systems based on the new legislation.

196. As explained in Paragraph 191, we assume that all small, medium, and large out of home businesses use an Electronic Point of Sale system, and 30% of micro businesses use an Electronic Point of Sale system. We applied these proportions to out of home businesses by size, resulting in an estimate of 26,205 out of home businesses using an Electronic Point of Sale system (see Table 12).

*Table 12: Estimated number of businesses in the out of home sector that use an Electronic Point of Sale (EPOS) system*

| Out of home sector | Businesses using an EPOS system |
|---|---|
| Licensed restaurants | 10,047 |
| Unlicensed restaurants and cafes | 1,310 |
| Take away food shops and mobile food stands | 13,108 |
| Public houses and bars | 981 |
| Sports facilities | 736 |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | 23 |
| **Total** | 26,205 |

197. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for bar staff is £13.66. This wage is used to inform the estimated wage for employees requiring training in licensed restaurants and public houses and bars. Additionally, the estimated hourly wage for waiters and waitresses is £13.59, which is used to inform estimated wages for employees requiring training in unlicensed restaurants and cafes and take away food shops and mobile food stands. The estimated hourly wage for retail cashiers and check-out operators is £13.72, which is used to inform estimated wages for employees requiring training in sports facilities, museums, cinemas, amusement parks, botanical gardens, and nature reserves. These figures represent average wage estimates, and actual wages may vary depending on the size of the establishment.

198. Based on stakeholder engagement with the Association of Convenience Stores, we assume it will take businesses 0.17 hours (10 minutes) to update the Electronic Point of Sale system. By multiplying this time by the average hourly wages for each out of home sector profession, we estimate the cost of updating the Electronic Point of Sale system per out of home business. Then by multiplying the costs per business by the corresponding number of businesses in each out of home sector, we estimate the total cost of updating the Electronic Point of Sale systems to be £0.1 million as set out in Table 13.

*Table 13: Estimated total cost for updating Electronic Point of Sale (EPOS) systems in the out of home sector (2024 prices, 2027 present value)*

| **Out of home sector** | **Total cost for updating EPOS systems** |
|---|---:|
| Licensed restaurants | £0.03 m |
| Unlicensed restaurants and cafes | £0.004 m |
| Take away food shops and mobile food stands | £0.04 m |
| Public houses and bars | £0.003 m |
| Sports facilities | £0.002 m |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | £0.0001 m |
| **Total** | £0.1 m |

*New Signage*

199. We assume that each business will need to pay for any new signage to communicate the age of sale restrictions to their customers.

200. We estimate the cost of installing new signage by multiplying our estimate of the number of out of home businesses in scope (see Annex B: Out of home sector methodology), by the typical cost of a new sign (£4.00).[84] We estimate this to cost in total £0.2 million. Table 14 shows the estimated cost to each out of home sector.

*Table 14: Estimated total cost of producing new signage in the out of home sector (2024 prices, 2027 present value)*

| **Out of home sector** | **Total cost of new signage** |
|---|---:|
| Licensed restaurants | £0.1 m |
| Unlicensed restaurants and cafes | £0.01 m |
| Take away food shops and mobile food stands | £0.1 m |
| Public houses and bars | £0.01 m |
| Sports facilities | £0.01 m |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | £0.0001 m |
| **Total** | £0.2 million |

[84] Price as of 28 April 2025 in Age Check Certification Scheme (2025). Energy Drinks Poster.

### *On-going costs to the out of home sector*

201. For businesses in the out of home sector, the only ongoing cost considered in this section is the training of new staff. These costs would occur throughout the 25-year appraisal period.

202. While these businesses would also incur costs related to age verification, these costs are accounted for within the retail sector calculations (see costs in Section 7.1.1, Age verification). In addition, out of home businesses are also expected to experience lost sales throughout the appraisal period which are calculated for all sectors in Section 7.1.3, Lost sales.

203. Ongoing training costs are only considered for out of home businesses not already licensed to sell age-restricted products prior to implementation of the ban. This assumption is based on stakeholder engagement, which indicated that licensed businesses would add high-caffeine energy drinks to existing training for age-restricted products at minimal additional cost and the training would have been provided regardless of the implementation of this policy. Therefore, we only calculate ongoing costs for the following out of home sectors:

- Unlicensed restaurants and cafes
- Take away food shops and mobile food stands
- Sports facilities
- Museums, cinemas, amusement parks, botanical gardens and nature reserves

204. Table 15 summarises the ongoing costs for the out of home sector explored within this section. The total ongoing costs is £7.0 million.

*Table 15 Summary of ongoing costs incurred by out of home businesses in scope of the ban (2024 prices, 2027 present value)*

| **Type of cost** | **Total cost** |
|---|---:|
| New staff training | £7.0m |
| Total ongoing costs | £7.0m |

*Training new staff*

205. Any new staff joining out of home businesses in relevant sectors (see Paragraph 203) would need additional training to ensure they are aware of the regulations.

206. Through stakeholder engagement with the Association of Convenience Stores we were provided an estimate of the annual staff turnover rate in the retail industry as 18%. This was based on the last five years data from the Association of Convenience Stores colleague survey. In absence of more specific data for the out of home sector this assumption has been applied for out of home employees as well.

207. We use this to estimate the number of new out of home staff by applying it to the total number of out of home employees per sector. Based on the assumption that each

employee who leaves is replaced, we estimate that 48,823 new staff members will require training each year. We assume that 33,113 new staff members would work at out of home establishments with an Electronic Point of Sale system, and 15,710 without (see Table 16).

*Table 16: Estimated number of new employees in the out of home sector that will require training each year, by business type*

| OOH Sector | Number of new employees requiring training |
|---|---|
| **Unlicensed restaurants and cafes** | **6,090** |
| with an EPOS system | 4,705 |
| without an EPOS system | 1,385 |
| **Take away food shops and mobile food stands** | **37,876** |
| with an EPOS system | 24,110 |
| without an EPOS system | 13,766 |
| **Sports facilities** | **4,415** |
| with an EPOS system | 3,856 |
| without an EPOS system | 559 |
| **Museums, cinemas, amusement parks, botanical gardens and nature reserves** | **442** |
| with an EPOS system | 442 |
| without an EPOS system | 0 |
| **Total** | **48,823** |
| with an EPOS system | 33,113 |
| without an EPOS system | 15,710 |

208. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for waiters and waitresses is £13.59. This wage is used to inform the estimated wage for employees of unlicensed restaurants and cafes and take away food shops and mobile food stands. Additionally, the estimated hourly wage for retail cashiers and check-out operators is £13.72, which is used to inform estimated wage for employees of sports facilities, museums, cinemas, amusement parks, botanical gardens and nature reserves. These figures represent average wage estimates, and actual wages may vary depending on the size of the establishment.

209. We assume that the training time for new staff members would be 30 minutes for staff working with an Electronic Point of Sale system, and 1 hour for those working without, in line with our assumptions for familiarisation costs.

210. By multiplying these times by the relevant average hourly wage, we estimate the cost of training for new staff members per employee for each out of home sector. Then by multiplying the number of new staff members by the cost of training per employee, we estimate the annual cost across all out of home sectors of £0.4 million.

211. We assume that this cost reoccurs annually following implementation. Over the 25-year appraisal period, future years costs are discounted at a rate of 3.5% in line with HMT's The Green Book, resulting in a total discounted cost of £7.0 million to the out of home sector for the training of new staff across the 25-year appraisal period.

### 7.1.3. Lost sales

212. A ban on the sale of high-caffeine energy drinks to children under 16 years would lead to a reduction in sales of these drinks for retailers without an existing voluntary ban. As a result, affected retailers and manufacturers of high-caffeine energy drinks would experience a reduction in profits from sales of these drinks. However, our calculations within this section take into account that some adults might buy these drinks for children (see the section on Proxy purchasing on Page 50), and that the money usually spent on high-caffeine energy drinks could be spent on other products instead (see the section on Sales displacement on Page 51).

213. The reduction in sales of high-caffeine energy drinks applies to the retail sector, such as physical stores and online sales, as well as the out of home sector, and vending machine sales. We do not have evidence to determine where high-caffeine energy drinks are specifically purchased, so the lost sales are assumed to occur across all sectors considered in this impact assessment.

214. Table 17 summarises the estimated lost sales due a ban on the sale of high-caffeine energy drinks to children under 16 years over a 25-year appraisal period.

215. At the economy level, we assume that sales of high-caffeine energy drinks are displaced by purchases of carbonated soft drinks or other goods of equal value, either within the retail sector or elsewhere in the economy. This results in no net loss to the overall economy. However, the redistribution of spending leads to uneven impacts across sectors, with retailers and high-caffeine energy drink manufacturers experiencing a reduction in sales.

*Table 17: Summary of lost sales for all affected sectors over a 25-year appraisal period (2024 prices, 2027 present value)*

| **Lost sales cost** | **Total cost** |
|---|---:|
| Lost sales to retailers (including physical stores, online, out of home sector and vending machine sales) | -£100.5 m |
| Lost sales to high-caffeine energy drink manufacturers | -£658.9 m |
| Gain in sales for carbonated soft drink manufacturers | +£593.0 m |
| Total benefit to wider economy | +£166.4 m |
| Total lost sales | £0 |

216. This section sets out our estimates for the annual market value of high-caffeine energy drinks consumed by children under 16 years and the methodology for how we assume the market will be impacted by the ban.

217. The remainder of the section sets out our methodology and estimates for:

- the lost sales to retailers
- the lost sales to high-caffeine energy drink manufacturers
- the gain in sales to carbonated soft drink manufacturers
- the total benefit to the wider economy
- total lost sales

218. In this analysis, we consider high-caffeine energy drink manufacturers and carbonated soft drink manufacturers as two separate sectors. However, it is important to note that in the real world, some manufacturers may produce both types of products. This means that while the ban may reduce profits from high-caffeine energy drinks, these same businesses could potentially benefit from increased sales of other soft drinks, partially offsetting the overall impact.

*Estimating the annual market value of high-caffeine energy drinks consumed by children under 16 years*

219. To calculate lost sales, we estimated the market value of high-caffeine energy drinks consumed by children under 16 years.

220. Annex E: High-caffeine energy drink consumption methodology explains how we estimated the number of litres of high-caffeine energy drinks consumed by children under 16 years in the UK over the 25-year appraisal period, including adjustments for market growth.

221. Through a manual web scraping of the My Supermarket Compare database,[85] we estimated that the average retail price per litre of a high-caffeine energy drink is £2.94.

222. We estimated the annual market value of high-caffeine energy drinks consumed by children under 16 years in the UK by multiplying the estimated number of litres consumed per year in the UK by the average retail price per litre.

223. We applied a weighting for England (see Paragraph 139) to estimate the proportion of these sales attributable to England. We also applied the assumption that the annual market value would grow annually by 4.51%, based on historical trends (see Paragraph 684). Table 18 shows the estimated annual undiscounted market value of high-caffeine energy drinks consumed by children under 16 years in England across the 25-year appraisal period.

[85] Manual web scraping conducted on 24 October 2024 using My Supermarket Compare.

*Table 18: Estimated annual market value for high-caffeine energy drinks consumed by children under 16 years in England (2024 prices, undiscounted)*

| Year | Annual market value (£m) |
|---|---|
| Year 0 | £174.9 |
| Year 1 | £182.7 |
| Year 2 | £191.0 |
| Year 3 | £199.6 |
| Year 4 | £208.6 |
| Year 5 | £218.0 |
| Year 6 | £227.8 |
| Year 7 | £238.1 |
| Year 8 | £248.8 |
| Year 9 | £260.0 |
| Year 10 | £271.8 |
| Year 11 | £284.0 |
| Year 12 | £296.8 |
| Year 13 | £310.2 |
| Year 14 | £324.2 |
| Year 15 | £338.8 |
| Year 16 | £354.1 |
| Year 17 | £370.0 |
| Year 18 | £386.7 |
| Year 19 | £404.2 |
| Year 20 | £422.4 |
| Year 21 | £441.4 |
| Year 22 | £461.3 |
| Year 23 | £482.1 |
| Year 24 | £503.9 |

*Estimating how we expect the market to be impacted by the ban*

224. Using the estimated annual market value of high-caffeine energy drinks consumed by children under 16 years, we make a set of assumptions to estimate how we expect the market to be impacted by the ban.

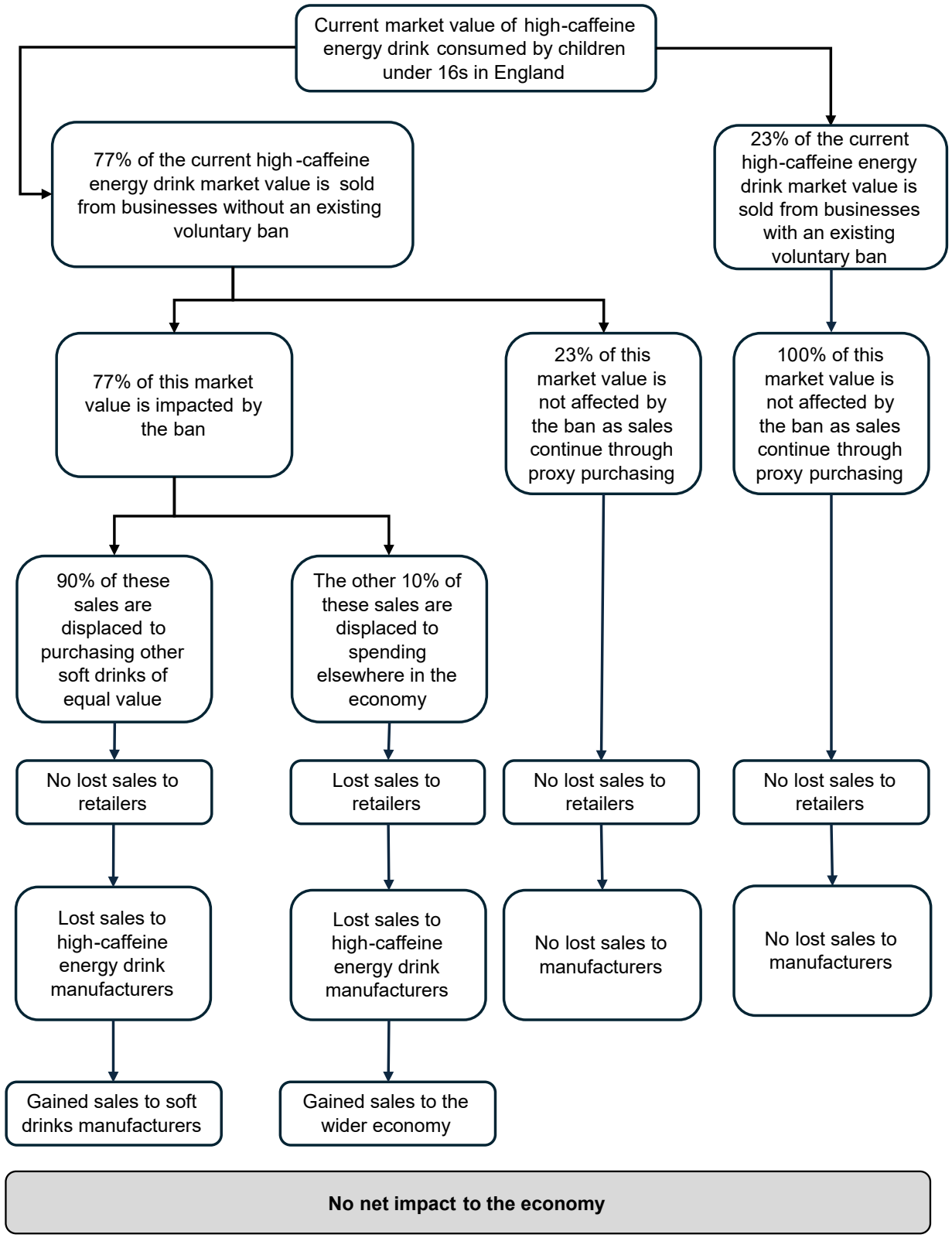
225. Key assumptions include:

- after the introduction of the ban, 23% of children's consumption of high-caffeine energy drinks continues to occur due to proxy purchasing (see the section on Proxy purchasing on Page 50).

- the remaining 77% of children's consumption of high-caffeine energy drinks is blocked by the ban. We assume that 90% of these children switch their consumption to regular carbonated soft drinks of equal value, and the remaining 10% switch their consumption to elsewhere in the UK economy (see the section on Sales displacement on Page 51).

226. Figure 2 summarises the methodology for how reducing high-caffeine energy drink consumption among children under 16 years may result in a loss of sales across different sectors of the UK economy.

*Figure 2: The methodology used to estimate the loss of sales from banning the sale of high-caffeine energy drinks for children under 16 years.*



*Proxy purchasing*

227. Proxy purchasing refers to the purchase of an age restricted product, by someone over the minimum age of sale, for someone who is under the minimum age of sale.

228. We are not aware of any robust data on the rates of proxy purchasing of high-caffeine energy drinks. However, we recognise that proxy purchasing may occur after the introduction of a ban, and this may impact its effect towards achieving the policy objective.

229. In the absence of robust data, we have attempted to estimate the likely rate of proxy purchasing for high-caffeine energy drinks after the introduction of the ban using data from the Smoking, Drinking and Drug Use among Young People Survey and commissioning data in the December 2024 Department for Education Omnibus Survey.

230. The Smoking, Drinking and Drug Use among Young People Survey[86] collects data on the proportion of pupils who asked someone else to buy them a cigarette in the last year, and the proportion of those that were successful. We have used this to estimate the proxy purchasing rate for cigarettes (see Table 19). As we do not intend to make proxy purchasing of high-caffeine energy drinks illegal under the proposed ban, we have considered the proxy purchasing rates for the period 2010 to 2014 when this was legal for cigarettes. We have rounded up the most recent data point to estimate a lower bound for our proxy purchasing estimates at 10%.

*Table 19: Estimated proxy purchasing rates for cigarettes between 2010 to 2021*

| | **2010** | **2012** | **2014** | 2016 | 2018 | 2021 |
|---|---|---|---|---|---|---|
| Proportion of all pupils who asked someone else to buy them cigarettes in the last year. | **10%** | **8%** | **6%** | 6% | 5% | 3% |
| Proportion of pupils who asked someone else to buy them cigarettes in the last year and were successful. | **90%** | **88%** | **91%** | 85% | 88% | 93% |
| Estimated proportion of all pupils who successfully got someone else to buy cigarettes for them. | **9.00%** | **7.04%** | **5.46%** | 5.10% | 4.40% | 2.79% |

Notes: Proxy purchasing legal until 2014.

231. To supplement this, we collected data through the Department for Education Omnibus Survey in December 2024 to improve our understanding of the rate of proxy purchasing for high-caffeine energy drinks. When pupils were asked how they usually obtain their high-

[86] Table 2.11 and Table 2.14 in NHS England (2022) Smoking, Drinking and Drug Use among Young People in England, 2021: Data tables.

caffeine energy drinks, 36% of pupils responded that they get them from home or are given them by friends or relatives.[87] When parents were asked how their child who consumes high-caffeine energy drinks usually obtains these drinks, 36% of parents responded that they get them from home and a further 7% responded that they are given them by friends.[88] From these data we infer that the proxy purchasing rate for high-caffeine energy drinks is higher than for cigarettes when proxy purchasing for cigarettes was legal.

232. As set out in Table 19, the proxy purchasing rate of cigarettes reduced after 2014 when this became illegal. High-caffeine energy drinks are not currently an age restricted product, although many retailers have introduced voluntary bans on their sale to children. We would expect the current proxy purchasing rate of high-caffeine energy drinks to reduce after legislating to ban their sale to children under 16 years.

233. To inform our central analysis we take a mid-point of the two estimates to assume the proxy purchasing rate for high-caffeine energy drinks is 23%. We recognise this is an uncertain assumption and therefore we conduct sensitivity analysis using the lower bound of 10% and upper bound of 36%. This is detailed in Section 12, Sensitivity Analysis.

234. However, we consider this assumption as reasonable, because 80% of parents polled supported the proposal to ban the sale of high-caffeine energy drinks to children under 16 years.[89] Therefore, it could be inferred that 20% of parents do not support the ban and therefore may continue to provide their children with high-caffeine energy drinks.

*Sales displacement*

235. We assume that if children under 16 years are no longer able to purchase high-caffeine energy drinks, most children will displace their spending to purchase something else at the same retailer of equal value. Specifically, we assume that for 90% of children under 16 years, sales are displaced to the purchase of other carbonated soft drinks and the remaining 10% is spent elsewhere in the UK economy.

236. We do not have any robust evidence to inform how children may behave in response to the proposed ban of high-caffeine energy drinks. Therefore, we have tried to combine available evidence with behavioural science theory, but many of these assumptions remain unevidenced. We have tested these assumptions with stakeholders, but welcome further evidence through consultation to improve on these for the final stage impact assessment.

237. If adolescents were no longer able to purchase high-caffeine energy drinks, displacement of their behaviour is likely, particularly among those characterised by high sensation-seeking or reward-dependent traits.[90] These individuals are more responsive to stimulation and reward, and when access to a familiar source (such as high-caffeine energy drinks) is

[87] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 pupil tables

[88] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 parent tables.

[89] Sustain: Children's Food Campaign (2024). Parent Polling Report.

[90] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

restricted, they may seek alternative means to satisfy similar psychological needs. This aligns with the 'gateway effect' in adolescent health behaviour, whereby the use of one substance or product increases the likelihood of engagement with others.[91] Frequent high-caffeine energy drink consumers are already more likely to demonstrate risky behaviours, poor dietary patterns (including high consumption of sugar-sweetened beverages and high fat, salt and sugar foods), and use of multiple substances, including alcohol and tobacco. In this context, the removal of high-caffeine energy drinks from the market for children under 16 years could displace consumption towards other products with high-sugar or energy providing effects that meet similar needs.[92]

238. We assume 90% of children under 16 years will change to consuming carbonated soft drinks of equal value. Research has identified a range of reasons why children say they consume high-caffeine energy drinks, such as taste, enhancing energy levels or performance, social and peer influence, the low cost, ease of access and marketing.[93] Of these reasons, children and adolescents have been found to consistently report taste as the primary reason for buying and consuming high-caffeine energy drinks, followed by energy-seeking.[94] We therefore assume carbonated soft drinks will offer the closest substitution for the taste of high-caffeine energy drinks through the same modality (i.e., a drink).

239. Evidence also suggests that children are likely to develop habits relating to the purchase and consumption of carbonated soft drinks more broadly, such as obtaining the drink at a similar time and location in each instance. This is due to a combination of social influences, targeted marketing, and behavioural patterns. We expect it is unlikely that children will immediately change their habit, and instead are more likely to change the drink they buy.

240. We assume that children under 16 years will change their consumption to a drink of the same value as we assume they do not have significant amounts of disposable income and several studies have cited the cost of a high-caffeine energy drink as important in their choice to consume these drinks. In a mixed methods study published in 2022, an adolescent reported that they can buy unbranded high-caffeine energy drinks for 30p.[95] In another small qualitative study, the low cost of some high-caffeine energy drinks was a key factor in 10- to 14-year-olds purchasing decisions. This reported that these drinks were available on promotion for as low as four 250ml cans for £1, often cheaper than other carbonated beverages.[96]

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[91] Cadoni C, and Peana AT. Energy drinks at adolescence: Awareness or unawareness? Frontiers in Behavioral Neuroscience. 2023. doi.org/10.3389/fnbeh.2023.1080963

[92] Marinoni M, Parpinel M, Gasparini A. *et al.* Risky behaviors, substance use, and other lifestyle correlates of energy drink consumption in children and adolescents: a systematic review. *Eur J Pediatr* **181**, 1307–1319 (2022). https://doi.org/10.1007/s00431-021-04322-6

[93] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[94] Visram S, Cheetham M, Riby DM, Crossley S, and Lake AA. Consumption of energy drinks by children and young people: a rapid review examining evidence of physical effects and consumer attitudes. BMJ Open 2016;6:e010380. doi:10.1136/bmjopen-2015- 010380

[95] Vogel C, Shaw S, Strömmer S, et al. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition. 2023;26(3):575-585. doi:10.1017/S1368980022002592

[96] Visram S, Crossley SJ, Cheetham M, and Lake A. Children and young people's perceptions of energy drinks: A qualitative study. PloS one, 2017, 12(11).

241. We assume the remaining 10% of children under 16 years will switch their consumption to elsewhere in the UK economy.

242. We have also considered and discounted the following alternative displacement scenarios. We will consider additional scenarios if relevant information is raised during the consultation.

- Due to the stimulant nature of high-caffeine energy drinks there is a potential scenario where children under 16 years change their consumption to tea or coffee (hot or cold) as caffeine-containing alternative beverages. This can be assumed because 32% of children and adolescents reported 'energy-seeking' to be their primary motivation for consuming high-caffeine energy drinks.[97] However, there are several reasons why we think this is unlikely. Tea and coffee, particularly canned coffee and out-of-home tea and coffee purchases (e.g., at coffee houses), is generally more expensive than high-caffeine energy drinks, of which the unbranded versions can cost as little as 30p.[98] Many tea and coffee drinks are generally served hot, therefore are not a clear alternative for a cold, carbonated drink. In addition, tea and coffee may not be sold in all locations where children under 16 years currently buy high-caffeine energy drinks.

- Research suggests that advertising and brand loyalty has a significant influence on children's consumption of high-caffeine energy drinks. Children are particularly susceptible to peer influences when making purchases, so if their older peers continue to purchase high-caffeine energy drinks children may attempt to continue to consume drinks from the same or similar brands.[99] This evidence might suggest that children under 16 years change to lower caffeine version of the same brand, where these products are available. It is reasonable to assume this may occur, but we lack relevant evidence to incorporate this into our analysis at this stage.

- It is also possible that children may change to confectionary products, given the ease of access to these products in retailer settings which sell high-caffeine energy drinks. There are no restrictions on children's ability to buy confectionery products and, depending on the product selected, they can be reasonably affordable. However, we think this is unlikely to occur as a direct result of the proposed ban, as confectionary products do not have a similar taste to high-caffeine energy drinks which is usually cited as the primary reason for consumption. However, the majority of confectionary does contain energising properties such as sugar, and non-white chocolate specifically contains theobromine which is a stimulant. As a result, it is possible that confectionary products may be used for 'energy seeking' behaviour.

[97] Zucconi S, Volpato C, Adinolfi F, Gandini E, Gentile E, Loi A, and Fioriti L. Gathering consumption data on specific consumer groups of energy drinks. Supporting Publications 2013; 10(3). doi:10.2903/sp.efsa.2013.

[98] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022; volume 26, issue 3, pages 575 to 585

[99] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

- A final potential option is that children under 16 years change their consumption to non-food products such as entertainment activities, clothing etc. We have considered this in our analysis through the 10% of consumption we estimate to be displaced to elsewhere in the UK economy. This would have the largest beneficial impact on sugar and calorie savings for children under 16 years, however, it would lead to greater losses in retailer sales.

- We did consider the risk that children could displace their consumption to more harmful products such as vapes or alcohol. However, as these are also age restricted products we haven't included this.

*Reformulation*

243. All assumptions discussed largely depend on how the high-caffeine energy drinks and carbonated soft drinks industry respond to the proposed ban. Based on learnings from the Soft Drinks Industry Levy, we are aware that industry may reformulate high-caffeine energy drinks to reduce the caffeine content.

244. However, we think reformulation may be unlikely. Through a voluntary code of practice, manufacturers recognise that high-caffeine energy drinks are not recommended for children and clearly state this on the product label. In addition, many retailers voluntarily ban the sales of these drinks to children under 16 years. We understand from manufacturers that sales to children make up a very small proportion of overall sales. We do not expect costly reformulation to produce a new caffeinated soft drink aimed at children.

245. To reduce the caffeine content of high-caffeine energy drinks to below the high-caffeine content labelling threshold, would generally mean reducing it by around half. The caffeine content may then be comparable to other soft drinks, such as colas. These would not need the high-caffeine content labelling and would be out of scope of the proposed ban. Children consuming any such reformulated drinks may benefit from a reduction in caffeine intake. It is also possible that manufacturers use new ingredients, or increase the proportion of existing ingredients, which have a stimulating effect. However, we are not aware of this type of reformulation as a result of the existing voluntary action across the retail and manufacturing sector or in other countries.

246. Therefore, at this stage, we think that manufacturers are likely to continue to sell the same high-caffeine energy drinks after the ban, and that retailers will ensure they are not sold to those who are under-age. We therefore have assumed there will not be any reformulation as a result of this ban.

247. We will continue to refine our assessment of the potential for reformulation, considering information or evidence received through consultation and other engagement with stakeholders. We will also consider this in the monitoring and evaluation of unintended consequences.

### *Lost sales to retailers*

248. Overall, we estimate that retailers will incur a total loss of sales to the value of £100.5 million over a 25-year appraisal period. We expect retailers to incur lost profits from a reduction in the sale of high-caffeine energy drinks, however this is partially offset by the profit gained from displaced sales to other carbonated soft drinks. We expect the majority of consumers to displace their consumption to carbonated soft drinks products of equal value to retailers. However, a small proportion of sales are displaced to elsewhere in the UK economy, which is where we estimate retailers to incur a loss in profit.

249. To calculate the total lost sales to retailers we calculated the proportion of the estimated annual market value impacted by the ban that would not be displaced to carbonated soft drinks. As discussed previously in the section on Sales displacement on Page 51, we assume that 10% of purchases will not be replaced with sales of other products sold by the retailer but will instead be spent elsewhere in the economy. We therefore estimate the retail value of these sales each year by calculating 10% of the annual market value impacted by the ban.

250. To estimate the profit lost by retailers from sales displaced elsewhere in the UK economy, we applied the average markup that retailers typically earn to the estimated retail value of the non-displaced sales.

251. We based our estimate of retailer markup on data from a United States Department of Agriculture report focusing on UK data,[100] which states that markup in the retail food industry typically ranges from 35% to 70%. In absence of more specific data, we use the midpoint of this range, 53%, as our best estimate of average markup for retailers. This figure is tested in sensitivity analysis to account for uncertainty (see Section 12, Sensitivity Analysis).

252. In addition to the profit lost from sales displaced elsewhere in the UK economy, we also account for profit lost from displaced sales, where children redirect their spending from high-caffeine energy drinks to other carbonated soft drinks sold by the same retailer. As explained previously in the section on Sales displacement on Page 51, we assume that 90% of affected purchases are displaced to other carbonated soft drinks of equal value. Although retailers lose the profit they would have earned from high-caffeine energy drink sales, they gain an equivalent profit from the sale of substitute carbonated soft drinks. Because the retail value and markup are assumed to be the same for both products, the lost profit from displaced high-caffeine energy drinks to carbonated soft drinks is fully offset by the gained profit from carbonated soft drink sales. As a result, we estimate there is no net loss in retailer profit from displaced sales to carbonated soft drinks (see Table 20).

[100] United States Department of Agriculture (2022) Report UK2022-0027: Retail Foods: London 26 July 2022.

*Table 20: Estimated total profits lost to retailers from high-caffeine energy drinks sales (2024 prices, 2027 present value)*

| **Retailers profit lost from high-caffeine energy drink sales** | | | **Total retailers profit gained from replacement sales** | **Total Lost Retailer Profit (profit lost minus profit gained)** |
|---|---|---|---|---|
| *From sales displaced elsewhere in the UK economy* | *From displaced sales to carbonated soft drinks* | *Total* | | |
| £100.5 m | £904.3 m | £1004.8 m | £904.3 m | £100.5 m |

***Lost sales to manufacturers of high-caffeine energy drinks***

253. Over the 25-year appraisal period, we estimate that manufacturers of high-caffeine energy drinks will incur a total loss of sales of £658.9 million. We expect that manufacturers of high-caffeine energy drink to incur lost profits if reduced consumer demand leads retailers to order fewer products from the manufacturer. It should be noted that we estimate gains in sales for manufacturers of carbonated soft drinks. As some manufacturers of high-caffeine energy drinks also manufacture other carbonated soft drinks, some of these losses may be offset.

254. To calculate this, we estimated how much retailers currently pay manufacturers for the high-caffeine energy drinks. From the total retail market value affected by the ban (see Table 18), we removed the retailers profit margin to estimate the revenue manufacturers currently receive from the retailer for high-caffeine energy drinks.

255. To estimate the manufacturers lost profit from these sales, we applied the average markup that manufacturers typically earn. In the absence of more specific data, we use the same markup as used for retailers, as set out in Paragraph 251.

***Gain in sales for carbonated soft drink manufacturers***

256. Over the 25-year appraisal period, we estimate that manufacturers of carbonated soft drinks will see a discounted total gain in sales of £593.0 million. We consider the gain in sales for carbonated soft drink manufacturers as a result of some high-caffeine energy drink sales being displaced by soft drinks of equal value. We assume this displacement leads retailers to increase their orders from carbonated soft drink manufacturers to meet the increase in demand.

257. To calculate this, we estimated the retail value of the replacement carbonated soft drinks sales. We then calculated how much retailers would need to pay manufacturers for the additional carbonated soft drinks. From the total retail market value of the replacement carbonated soft drink sales, we removed the retailers profit margin to estimate of how much money the manufacturers would receive from the retailer for the carbonated soft drinks.

258. To estimate the manufacturers gained profit from these sales, we applied the average markup that manufacturers typically earn. In the absence of more specific data, we use the same markup as used for retailers, as set out in Paragraph 251.

***Total benefit to wider UK economy***

259. Over the 25-year appraisal period, we estimate the discounted total benefit to the wider economy is £166.4 million. We consider the gain to the wider economy as a result of some high-caffeine energy drink sales being displaced by individuals purchasing other goods of equal value in the wider UK economy.

260. To calculate the total profit gained, we combined the profit gained by retailers and manufacturers in the wider economy.

261. We estimated the annual retail value of the non-displaced sales, assumed to be 10% of the annual market value impacted by the ban. We also estimated the profit gained by retailers in the wider economy by applying the average retailer markup to this retail value, as set out in Paragraph 251.

262. The remainder of the retail value, after removing the retailer markup, reflects the value of the sales to manufacturers in the wider economy. We estimated the manufacturers profit gained by applying the same average markup used for retailers, as set out in Paragraph 251.

### 7.1.4. Vending sector

263. This section sets out the expected costs to vending businesses of a complete ban on the sale of high-caffeine energy drinks in vending machines in England, regardless of the age of the person buying them. This is our preferred policy sub-option for the vending sector, as it takes into account lessons learnt from the ban on the sale of tobacco products to children from automated machines. Data showed it was not effective for the retailer to ensure that no one under the age of 18 years used the machine. As a result, the sale of tobacco in automated machines was banned altogether.

264. To understand the costs of this option we consider that businesses and individuals in the vending sector would need to familiarise themselves with the ban and adapt to the new legislation. We assume the costs related to this would be incurred during the transition period.

265. Since the proposed option is a complete ban, we also calculate the ongoing costs of lost sales. However, as it is not possible to distinguish what proportion of these lost sales have already been accounted for in Section 7.1.3 Lost sales, this analysis may result in double counting sales lost from purchases by children under 16 years.

266. In Annex G: Vending sector policy sub-option 2 methodology, we consider the cost of a second policy sub-option for vending machines, where the business or organisation where the vending machine is located is responsible for taking appropriate action to ban the sale of high-caffeine energy drinks to children under 16 years. Based on learning from the automated sale of tobacco, we consider this option may be less effective than a complete ban. In addition, this policy sub-option comes at greater costs to businesses, as we have assumed businesses will need to install age verification software (see Annex G: Vending

sector policy sub-option 2 methodology). We will refine the vending machine analysis following consultation to account for information received.

267. Table 21 summarises the estimated familiarisation and total lost sales costs for the vending sector. The total costs for the vending sector are £9.6 million incurred over a 25-year appraisal period.

*Table 21: Summary of costs to the vending machine sector over a 25-year appraisal period (2024 prices, 2027 present value)*

| **Type of cost** | **Impact** | **Total cost** |
|---|---|---|
| Familiarisation costs | Staff awareness | £0.004 m |
| | Knowledge sharing | £2.3 m |
| | Stock planning | £7.3 m |
| | **Total familiarisation** | **£9.6 m** |
| Lost sales | Lost sales to vending machine businesses or clients | -£32.5 m |
| | Lost sales to high-caffeine energy drink manufacturers | -£186.0 m |
| | Gain in sales to carbonated soft drink manufacturers | +£167.4 m |
| | Gain in sales to the wider economy | +£51.1 m |
| | **Total lost sales** | **£0** |
| **Total cost to vending sector** | | **£9.6 million** |

268. The following sections set out our approach to estimating familiarisation costs and lost sales costs considered.

***Familiarisation Costs***

269. We consider that familiarisation costs for the vending sector would fall under these main categories:

- staff awareness
- knowledge sharing
- stock planning

270. The estimated total familiarisation costs for the vending sector is £9.6 million, incurred in the first year of implementation (see Table 22).

*Table 22: Summary of familiarisation costs to the vending machine sector incurred in the first year of implementation (2024 prices)*

| **Familiarisation cost** | **Total cost** |
|---|---|
| Staff awareness | £0.004 m |
| Knowledge sharing | £2.3 m |
| Stock planning | £7.3 m |
| Total | £9.6 m |

271. The following sections set out detail on these costs and our approach to calculating them. Further detail is set out in Annex C: Vending sector methodology.

*Staff awareness*

272. We assume that all vending machine businesses need to familiarise themselves with the new regulations. As calculated in Annex C: Vending sector methodology, we estimate that there are 211 vending machine businesses operating in England.

273. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for managers and directors in retail and wholesale is £19.78. This wage is used to inform the estimated wage for the head office managers in each vending business.

274. We assume that one head office manager per business will spend 1 hour familiarising themselves with the new regulations. By multiplying this time by the adjusted hourly wage of the head office manager we estimate the costs of staff awareness as £19.78 per business. These figures represent average costs per business, and actual costs may vary depending on the size of the business.

275. By multiplying the average cost per business by the number of vending machine businesses, we estimate the annual staff awareness cost of £0.004 million to businesses in the vending sector.

*Knowledge sharing*

276. We assume that a head office manager from each vending machine business would need to communicate the new regulations to both a head office manager and a stock manager at each vending machine client site.

277. Based on information gathered through stakeholder engagement, we assume that each individual vending machine client site is responsible for stocking its own vending machines. In the absence of specific data, we assume that one stock manager is responsible for stocking vending machines at 2 client sites. As calculated in Annex C: Vending sector methodology, we estimate there are 47,748 vending machine client sites. Therefore, we assume there to be a total of 23,874 stock managers.

278. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for managers and directors in retail and wholesale is £19.78. This wage is used to inform the estimated wage for head office managers in both vending machine businesses and client sites. Additionally, the estimated hourly wage for stock control clerks and assistants is £16.77, which is used to inform the estimated wage for stock managers.

279. We assume that the knowledge sharing process would take 1 hour. y multiplying this time by the number of individuals involved and their respective uprated hourly wages, we estimate the costs of knowledge sharing to be £48 per client site. These figures represent average costs per client site, and actual costs may vary.

280. By multiplying the average cost per client site by the number of vending machine client sites, we estimate a total cost for knowledge sharing of £2.3 million to the vending sector.

*Stock planning*

281. As previously set out in Paragraph 277, we estimate that one stock manager is responsible for stocking vending machines across 2 client sites, resulting in a total of 23,874 stock managers.

282. We assume all stock managers will need to re-plan vending machine stock to ensure high-caffeine energy drinks are no longer stocked.

283. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for stock control clerks and assistants is £16.77. This wage is used to inform the estimated wage for stock managers.

284. We assume that each stock manager would take half a working week (equivalent to 18.25 hours) to re-plan the stock of the vending machine. Due to the uncertainty around this figure, it has been included in the sensitivity analysis.

285. By multiplying the time required by the uprated hourly wage of the stock manager we estimate the cost of stock planning £306 per stock manager, or £153 per client site. These figures represent average costs per stock manager or client site, and actual costs may vary.

286. By multiplying the average cost per client site by the number of vending machine client sites, we estimate a total cost for stock planning of £7.3 million to the vending sector.

***Lost Sales***

287. To introduce a complete ban on the sale of high-caffeine energy drinks from vending machines would lead to a full loss of sales from this product. We assume that sales are displaced by purchases of carbonated soft drinks or other products of equal value, either from the same vending machine or elsewhere in the economy, resulting in no net loss to the overall economy. We estimate that vending machine businesses and high-caffeine energy drink manufacturers would experience a loss in sales, but soft drink manufacturers and the wider economy would benefit from corresponding gains in sales.

288. In this section we consider the following:

- the lost sales to vending machine businesses
- the lost sales to high-caffeine energy drink manufacturers
- the gain in sales to soft drink manufacturers
- the gain in sales to the wider economy

289. Table 23 summarises the estimated lost sales due to a complete ban on the sale of high-caffeine energy drinks in vending machines over a 25-year appraisal period.

290. As set out in Paragraph 287, as we assume that sales are displaced by purchases of other soft drinks or products of equal value, the overall economic cost of lost sales is offset, resulting in no net loss.

*Table 23: Summary of lost sales to the vending machine sector over a 25-year appraisal period (2024 prices, 2027 present value)*

| **Lost sales cost** | **Total cost (£m)** |
|---|---|
| Lost sales to vending machine businesses or clients | -£32.5 m |
| Lost sales to high-caffeine energy drink manufacturers | -£186.0 m |
| Gain in sales to soft drink manufacturers | +£167.4 m |
| Gain in sales to the wider economy | +£51.1 m |
| Total lost sales | £0 |

*Estimating the annual market value of high-caffeine energy drinks bought from vending machines*

291. This section outlines the estimated annual market value of high-caffeine energy drinks bought from vending machines and provides detail on the lost sales considered.

292. As set out in Annex C: Vending sector methodology, we estimate that approximately 18.4 million high-caffeine energy drinks are sold through vending machines each year. This is based on stakeholder engagement with the Vending and Automated Vending Association.

293. According to further information from the Vending and Automated Vending Association, we assume that the average retail price of a high-caffeine energy drink (excluding VAT) is £1.67.

294. By multiplying the average price by the estimated number of high-caffeine energy drink vends per year, we estimate that the total annual market value of high-caffeine energy drinks sold through vending machines in England is £30.7 million.

295. Throughout the appraisal period we assume that without a ban in place the high-caffeine energy drinks market would continue to grow annually by 4.51%. This growth rate is based on the compound annual growth rate calculated for high-caffeine energy drink volumes sold between 2013 and 2023. To calculate the compound annual growth rate, we used data from the British Soft Drinks Association's annual reports, which provide figures on the total volume of sports and high-caffeine energy drinks sold each year. We then applied the annual market share of high-caffeine energy drinks with this combined category to estimate the volume sold specifically for energy drinks per year.

*Lost sales to vending machine businesses or clients*

296. Overall, we estimate that vending machine businesses or clients will incur a loss in sales of £32.5 million over the 25-year appraisal period. We expect this will be from a reduction in sales of high-caffeine energy drinks, but it will be partially offset by the profit gained from displaced sales to other carbonated soft drinks of equal value. We assume that a small proportion of sales (10%) are displaced elsewhere in the UK economy; and we estimate

these reflect a loss in profit to vending machine businesses or clients. The sales displacement assumptions are consistent with those used in the main analysis (see the section on Sales displacement on Page 51).

297. To calculate the lost sales to vending machine businesses we calculate the profit they would normally have earned from selling high-caffeine energy drinks. Specifically, we applied the vending businesses or clients profit margin[101] to the total market value of high-caffeine energy drinks vending sales to estimate the loss in profit resulting from the ban. This resulted in an estimated loss of £325.5 million over the appraisal period. To calculate the gain in sales to vending machine businesses we calculate 90% of the total market value of high-caffeine energy drinks as we assume that this proportion will be replaced with sales of carbonated soft drinks of equal value to the vending machine business. We then applied the vending businesses or clients profit margin[102] to the proportion of sales that will be replaced to estimate the gain in profit resulting from the ban. This resulted in an estimated gain of £292.9 million over the appraisal period.

298. To estimate the total loss in sales to vending machine businesses, we subtracted the estimated profit gain from displaced sales from the estimated profit loss due to the ban on high-caffeine energy drinks.

*Lost sales to high-caffeine energy drink manufacturers*

299. We consider the loss of sales to high-caffeine energy drink manufacturers resulting from the complete ban which removes the vending sector as a sales channel. Over the 25-year appraisal period, we estimate that the discounted total lost profit for high-caffeine energy drink manufacturers is £186.0 million.

300. To calculate this, we estimated how much vending machine businesses or clients currently pay manufacturers for the high-caffeine energy drinks. From the total market value of high-caffeine energy drinks vending sales, we removed the vending businesses or clients profit margin[103] to estimate the revenue manufacturers would have received from the vending machine business or client for the high-caffeine energy drinks.

301. To estimate the manufacturers lost profit from these sales, we applied the average markup that manufacturers typically earn. In the absence of more specific data, we use the same markup as used for retailers and manufacturers in the retail sector, as set out in Paragraph 251.

*Gain in sales to carbonated soft drink manufacturers*

302. We consider the gain in sales for soft drink manufacturers as a result of 90% of all high-caffeine energy drink sales being displaced by soft drinks of equal value. This assumption is also reflected in the main analysis (see the section on Sales displacement on Page 51).

[101] We based the vending machine businesses or clients profit margin on information received through engagement with the Vending and Automated Vending Association.

[102] We based the vending machine businesses or clients profit margin on information received through engagement with the Vending and Automated Vending Association.

[103] We based the vending machine businesses or clients profit margin on information received through engagement with the Vending and Automated Vending Association.

We assume this displacement leads the vending sector to increase their orders from soft drink manufacturers to meet the increase in demand. Over the 25-year appraisal period, we estimate the discounted total gain in sales for soft drink manufacturers is £167.4 million.

303. To calculate this, we estimated the market value of the replacement soft drinks sales. We then calculate how much vending machine businesses or clients would need to pay manufacturers for the additional soft drinks to be stocked in replace of high-caffeine energy drinks within their vending machines.

304. From the total market value of the replacement soft drink sales, we removed the vending machine businesses or clients profit margin[104] to estimate the amount manufacturers would receive from the vending machine businesses or clients for the replacement soft drinks.

305. To estimate the manufacturers gained profit from these sales, we applied the average markup that manufacturers typically earn. In the absence of more specific data, we use the same markup as used for retailers and manufacturers in the retail sector, as set out in Paragraph 251.

*Gain in sales to the wider economy*

306. Over the 25-year appraisal period we estimate the discounted total benefit to the wider economy is £51.1 million. We consider the gain to the wider economy as a result of some high-caffeine energy drink sales being displaced by individuals purchasing other goods of equal value in the wider UK economy.

307. To calculate the total profit gained, we combined the profit gained by retailers and manufacturers in the wider economy.

308. We estimated the annual market value of the non-displaced sales, assumed to be 10% of the annual market value of high-caffeine energy drink vending machine. This assumption is also reflected in the main analysis (see the section on Sales displacement on Page 51). We then adjusted this value to account for retailer and manufacturer markups, recognising that only part of the spending represents actual economic value. This provided an estimate of how much of the displaced spending contributes real value to the wider economy.

### 7.2 Costs to Government

309. For this age of sale ban to be effective in protecting children's health, it must be implemented and enforced. This section sets out the expected cost of enforcing the ban. This is a cost to Government because, as set out in the New Burdens Doctrine, central Government must provide funding to local authorities for any new burden.

310. To inform the overall cost benefit analysis for enforcing the ban we have monetised a scenario that we consider to be reasonable but possibly at the high end of the range of

[104] We based the vending machine businesses or clients profit margin on information received through engagement with the Vending and Automated Vending Association.

plausible costs. We are consulting on the proposed enforcement and will refine this analysis after consultation to consider information received.

311. In the main policy appraisal, we have considered the monetary costs to the Department of Health and Social Care, using the standard discount rate of 3.5%. However, it is the Department's policy to consider the opportunity cost of the spending, as this could represent a displacement from the fixed NHS health budget and therefore, we have included this potential cost as part of our sensitivity analysis.

312. We assume that enforcement authorities are subject to the following costs:

- Familiarisation – awareness of the regulations
- Cost of informal action
- Cost of conducting compliance checks
- Cost of failed compliance checks

313. Table 24 summarises the estimated discounted enforcement costs incurred over a 25-year appraisal period.

*Table 24: Summary of enforcement costs over a 25-year appraisal period (2024 prices, 2027 present value)*

| | **Total cost** |
|---|---:|
| Familiarisation cost | £0.09 m |
| Cost of informal action | £3.9 m |
| Cost of conducting compliance check (i.e. test purchase) | £2.0 m |
| Costs of failed compliance check | £1.4 m |
| Total | £7.4 m |

314. The remainder of this section sets out the methodology used to calculate these costs.

***Familiarisation costs for local authorities***

315. We assume there will be one-off transition costs to local authorities as trading standards officers familiarise themselves with the new regulations.

316. We estimate the average hourly cost of a local authority trading standards officer is £86.56. This figure is from a survey by the Association of Chief Trading Standards Officer of the rates that local authorities charge for trading standards services in cost recovery. It represents the full cost to a local authority of trading standards activity, including all employment and non-employment on-costs.

317. We assume that it will take one trading standards officer per Local Authority 1 day to familiarise themselves with the policy, therefore we estimate the cost of familiarisation per local authority is £606. Using data from the Office for National Statistics that there are 153

local authorities in England,[105] we estimate that familiarisation costs for all local authorities would be £0.09 million.

318. We expect the policy may increase the number of reports of retail non-compliance to trading standards. From engagement with the Association of Chief Trading Standards Officers, we understand that local authorities will manage information obtained in in one of three ways: 1) informal action, 2) a formal compliance check through a test purchase, 3) no action. We assume that 70% will result in informal action, 10% of cases will lead to a formal compliance check, and 20% will result in no further action.

319. The Association of Chief Trading Standards Officers provided data that in 2023 to 2024, roughly 570 compliance checks were undertaken in England and Wales for age restricted products (including products such as fireworks, knives and games, but excluding tobacco, vapes and alcohol). We assume the total number of compliance checks (i.e., test purchases) would increase by one third following the ban on high-caffeine energy drinks to children, resulting in a total of 190 additional compliance checks for trading standards officers per year. The proportion increase is not supported by evidence but has been tested and agreed with the Association of Chief Trading Standards Officers. Due to the uncertainty in this assumption, we have varied it in the sensitivity analysis (see Section 12, Sensitivity Analysis).

320. We estimate that approximately 1,900 reports of non-compliance will be received each year. This is based on the estimate that 190 additional compliance checks (i.e. test purchases) represents 10% of the reports of non-compliance each year. As this represents 10%, we worked backwards to understand the number of checks 100% would represent (i.e., 1,900). Table 25 sets out the estimated number of enforcement actions per year.

*Table 25: Estimated number of actions taken per year*

| | **Estimated number of actions per year** |
|---|---|
| Compliance checks (i.e. test purchases) | 190 |
| Informal action taken | 1,330 |
| No further action | 380 |

321. This information informs the total ongoing costs of enforcement, which are separated by: 1) cost of informal action, 2) cost of undertaking a formal compliance check (i.e. test purchase), and 3) the cost of failing a formal compliance check. The methodology for each cost can be found in the following sections.

*Cost of informal enforcement action*

322. As set out in Table 25 we estimate that 1,330 premises will receive informal enforcement action each year.

323. We assume this informal action would take 2 hours for each trading standards officers time. The exact action is to be determined by the local authority. To send a letter would likely

[105] GOV.UK (2025) Upper Tier Local Authorities (December 2024) Names and Codes in the UK

take less than 2 hours, but a visit to the premise may take more time, especially if it is not combined with enforcement activity on other age-restricted goods.

324. We have multiplied this time by the total hourly cost of a trading standards officer (£86.56), and by the number of premises receiving informal action per year (1,330). This results in a total annual cost of £230,250 for informal enforcement action.

325. Over the 25-year appraisal period, future years costs are discounted at a rate of 3.5% in line with HMT's The Green Book, resulting in a total discounted cost of £3.9 million for informal enforcement action.

*Cost of compliance checks (i.e. test purchases)*

326. As shown in Table 25, we estimate that 190 premises will receive a formal compliance check each year.

327. We assume that each test purchase will need 2 trading standards officers and take half a day each. This is informed by engagement with the Association of Chief Trading Standards Officers.

328. To calculate the cost of each formal compliance check, we multiplied the number of trading standards officers needed, the time taken, and the total hourly cost to local authorities (£86.56). This results in a cost of £632 per compliance check. Multiplying this by the number of premises receiving a formal compliance check (190 premises) each year, this results in a total yearly cost of £120,059 for compliance checks.

329. Over the 25-year appraisal period, future years costs are discounted at a rate of 3.5% in line with HMT's The Green Book, resulting in a total discounted cost of £2.0 million for compliance checks.

*Cost of failed compliance checks (i.e. test purchases)*

330. We assume that a proportion of the 190 formal compliance checks undertaken in retail premises will result in a failed inspection, leading to further action.

331. We assume that 20% of retail stores will fail the test purchase. This uses data provided by the Association of Chief Trading Standards Officers and takes a midpoint between the lowest and highest test purchase failure rate for age-restricted products (19% for tobacco and 25% for vapes, respectively).[106] Using this data, we estimate that 38 retail premises will fail their compliance check relating to high-caffeine energy drinks each year.

332. Following a failed test purchase, we have assumed three possible scenarios: 1) the retailer may be given a warning or informal advice, 2) the retailer may be issued a Fixed Monetary Penalty, or 3) the retailer may be prosecuted (i.e., criminal conviction is sought). Based on our engagement with Association of Chief Trading Standards Officer, we make the assumption that 20% of stores are given a warning or informal advice, 60% are issued a

[106] ACTSO (2024) Impacts and Outcomes Report 23-24 Eng and Wales.

Fixed Monetary Penalty, and 20% are prosecuted. We estimate that 8 premises will be given a warning or informal advice, 23 will be given a Fixed Monetary Penalty, and 8 will be prosecuted.

333. We have assumed that to issue a warning or informal advice will take 2 hours of a trading standards officers time at the total hourly cost to local authorities (£86.56). Therefore costing £173 per case. As we estimate that 8 premises will be issued with a warning or informal advice, we estimate that this costs £1,316 per year.

334. We estimate it will take more time to issue a Fixed Monetary Penalty, which will take a trading standards officer 4 hours at the total hourly cost to local authorities (£86.56). Therefore costing £346 per case. As we estimate that 23 premises will be issued with a Fixed Monetary Penalty, we estimate that this costs £7,894 per year.

335. For a prosecution, it is assumed that this will take a trading standards officer 2 days of time at the total hourly cost to local authorities (£86.56). This includes an assessment by a head of service and solicitor. Additionally, we have assumed prosecution costs per case for a local authority will be on average £5,000 and for His Majesty's Courts and Tribunals Service the cost per case will be £3,000. Therefore costing £9,212 per case. As we estimate that 8 retailers will be prosecuted for non-compliance, we estimate that this costs £70,010 per year.

336. Over the 25-year appraisal period, future years costs are discounted at a rate of 3.5% in line with HMT’s The Green Book, resulting in a total discounted cost of £1.4 million for all failed compliance checks.

337. Should a retailer be found non-compliant with the regulations, they may also face legal and administrative costs as a result. These costs are variable and will depend on the specific sanctions issued locally, rights of appeal, a retailer’s compliance history and other factors. They are avoidable costs that will only be incurred by the non-compliant, and as such are excluded from the cost and benefit calculation. Any costs incurred by the authorities, and not reimbursed by the offender, do count as an unquantified enforcement cost.

338. In addition, if during the enforcement process it is determined that the retailer was in fact compliant and the issue arose due to an error on the part of the trading standards officer, the retailer may still have incurred administrative costs in defending their position. While these costs are a possibility, there is no available data on the frequency of such occurrences. Therefore, for the purposes of this analysis, we do not quantify these costs to retailers and instead assume that all enforcement actions by LAs correctly identify non-compliant retailers.

## 8. Non-monetised costs and unintended consequences

339. This section sets out a summary of the costs we have not been able to quantify and potential unintended consequences. These will be refined following consultation.

## 8.1. Non-monetised costs

340. We have considered several non-monetised costs to retailers, manufacturers, and consumers.

### *Retail and manufacturer impacts*

Lost sales to people aged over 16 years, but who appear under 25 years and are unable to prove their age

341. It is possible that legal sales of high-caffeine energy drinks to people aged 16 years and over are lost, due to the person failing Challenge 25, but not having identification available to prove their age. We have engaged with retailers to understand this potential cost, however, are not aware of data on the proportion of sales of high-caffeine energy drinks which require an identification check (i.e., through the current voluntary sales bans many retailers have in place), or the proportion of these people who are not able to produce identification. Therefore, we are unable to estimate the number of lost sales for this reason. We welcome any further information on this cost through the consultation.

Lost sales due to incorrect product categorisation

342. It is possible that retailers may incorrectly categorise soft drinks as high-caffeine energy drinks, meaning sales of some soft drinks to children under 16 years are lost. Some soft drinks such as cola contain less than 150 milligrams of caffeine per litre. It is not always clear from the name alone whether a product is a soft drink or a high-caffeine energy drink. For example, Lucozade Energy and Lucozade Energy Zero do not contain enough caffeine to be considered a high-caffeine energy drink (at around 120 milligrams per litre), but Lucozade Alert does (at around 320 milligrams per litre).[107] Another example is Prime Energy, a high-caffeine energy drink (at around 420 milligrams per litre), and Prime Hydrate, is a non-caffeinated sport hydration drink.

343. We expect this effect would be minimal. Regulation (EU) No 1169/2011 on Food Information to Consumers,[108] manufacturers must label any drink, except for tea and coffee, that contains over 150 milligrams of caffeine per litre with the words '*High caffeine content. Not recommended for children or pregnant or breast-feeding women'*. However, we recognise that product mis-categorisation is possible, particularly where retailers do not have Electronic Point of Sale systems. We are unable to estimate the number of lost sales for this reason, and welcome further information through the consultation or further stakeholder engagement.

Violence and verbal abuse

344. The Association of Convenience Stores 2015 Crime Report identifies enforcing age restricted sales as one of the top triggers for violence.[109] Therefore, as the ban is expected to lead to a greater number of age verification checks, and more children may be denied the opportunity to purchase a high-caffeine energy drink as a result, this may lead to an

[107] Lucozade (2025) Frequently Asked Questions.

[108] Legislation.GOV.UK (2011) Regulation (EU) No 1169/2011 of the European Parliament and of the Council.

[109] Association of Convenience Stores (2025). The Crime Report 2025.

increase in violence or verbal abuse faced by retail staff. Although this also relates to the sale of other age restricted goods, it is possible that any resulting violence and verbal abuse in stores may lead to other costs, for example providing additional support to staff or costs relating to in store damage. We are unable to monetise these costs.

Extended queue times

345. The introduction of an identification check to a product may increase queue times in retail settings. This may particularly impact self-checkouts where one staff member covers several tills, and customers of any age buying high-caffeine energy drinks will be subject to a Challenge 25 check. We are unable to monetise this cost as we are not aware of data on the number of transactions on self-checkouts and the proportion of transactions containing a high-caffeine energy drink. The additional time will also depend on factors such as supermarkets staffing levels and how busy the store is. It is possible that retailers may need increased staffing, on self-service or at busy periods. However, we are unable to monetise this, and welcome further information through the consultation.

***Consumer impacts***

Loss of consumer surplus

346. We know that currently some children aged under 16 years choose to consume high-caffeine energy drinks. If we assume these individuals are rational utility maximising agents, then consuming high-caffeine energy drinks provides them with maximum consumer surplus. So, banning the sale of these drinks to these individuals would prevent them from maximising their utility. This loss in utility may also likely to occur for individuals aged 16 to 25 years who are unable to prove their age, and therefore unable to complete the transaction and access their desired drink.

Extended queue time

347. As set out in Paragraph 345 the introduction of the ban may increase queue times in retail settings, particularly self-service checkouts. This would have a time cost to consumers, though we are currently unable to monetise this as we are not aware of data on the number of transactions on self-checkouts and the proportion of transactions containing a high-caffeine energy drink.

Identification for people aged 16 to 25 years

348. For people aged 16 to 25 years old who want to purchase age restricted goods, they will need to have valid identification. We are not aware of data on the proportion of 16 to 25 year olds who do not currently have identification, but will want to obtain it so they can purchase high-caffeine energy drinks. We expect this effect may be minimal, as there are wide-spread voluntary bans on the sale of high-caffeine energy drinks to children under 16 years already in place, meaning many retailers will already ask for identification. In addition, identification is required for other age restricted goods. However, obtaining valid identification does have an associated cost (starting at £15 for a Proof of Age Standards Scheme card) and so this may represent a cost to consumers, though we are currently unable to monetise this.

### 8.2 Unintended consequences

349. We have considered unintended consequences to retailers, manufacturers, and consumers that may occur due to the proposed ban. We will refine these after consultation and further stakeholder engagement.

350. Drinks not in scope of the ban may be incorrectly categorised as high-caffeine energy drinks – as set out in Paragraphs 342 and 343. Similarly, consumers may misidentify other drinks as a high-caffeine energy drinks. This may increase costs to retailers and manufacturers through lost sales. In addition, manufacturers may opt to take additional steps to clearly communicate to consumers whether their product is, or is not, a high-caffeine energy drink; this may increase costs to manufacturers.

351. Manufacturers may change or expand their product lines so that they are not in scope of the legislation. This may include introducing new caffeinated food stuffs, such as snack bars, or expanding into other products such as caffeine vapes. Manufacturers may also reformulate existing drinks so that the caffeine content is below the 150 milligrams per litre threshold, meaning they would not be in scope of the ban. Further information on the potential scope of reformulation is set out on Page 54. If this happens, the transfer cost of lost revenue to manufacturers may be reduced.

352. Violence and verbal abuse to retail staff may increase as an unintended consequence of the ban – as set out in Paragraph 352, this may increase costs to retailers.

## 9. Monetised benefits

353. The main objective of the policy is to reduce the consumption of high-caffeine energy drinks to children under 16 years. The aim is to protect children from possible harms associated with the consumption these drinks, including negative outcomes to their physical and mental health, as well as their education.

354. The secondary objective is to contribute to a reduction in children's sugar intake for those which stop consuming sugar sweetened versions of high-caffeine energy drinks. This aim is to contribute towards reducing related outcomes including childhood obesity and dental decay related tooth extractions.

355. In alignment with the objectives, the main impact of the policy will be experienced through a reduction in caffeine consumption from high-caffeine energy drinks. Although we are unable to monetise this impact we expect it could be significant, as set out in Section 10, Non-monetised benefits. The secondary impact of the policy will be experienced through a reduction in sugar and calorie intake. We have monetised this benefit, as set out in this section.

### 9.1 Summary of monetised health benefits

356. Over a 100-year period, the policy is estimated to generate approximately 110,000 quality-adjusted life years (QALYs), reflecting health benefits from reduced mortality and morbidity.

These are valued at £70,000 per QALY, resulting in a total QALY benefit of £7,719 million. Improvements in morbidity are also expected to reduce demand on health services, leading to estimated NHS savings of £127 million and social care savings of £84 million. In addition, an increase in economic output of £1,236 million is estimated, which is primarily driven by higher labour force participation. Due to the limitations of the DHSC Calorie Model and limited evidence base as discussed in the following sections, we expect these are overestimates and have therefore been tested further in Section 12, Sensitivity Analysis.

357. The summarised results from the low, central and high average calorie reduction scenarios are set out in Table 26.

*Table 26: Present value benefits over a 100-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| *Quality Adjusted Life Years* | *95,000* | *110,000* | *138,000* |
| Monetised health benefit | £6,648m | £7,719m | £9,655m |
| NHS Savings | £110m | £127m | £159m |
| Social care savings | £71m | £84m | £105m |
| Economic output | £1,065 | £1,236 | £1,545 |
| **Total benefits** | **£7,894m** | **£9,166m** | **£11,464m** |

### 9.2 Estimating sugar and calorie reduction

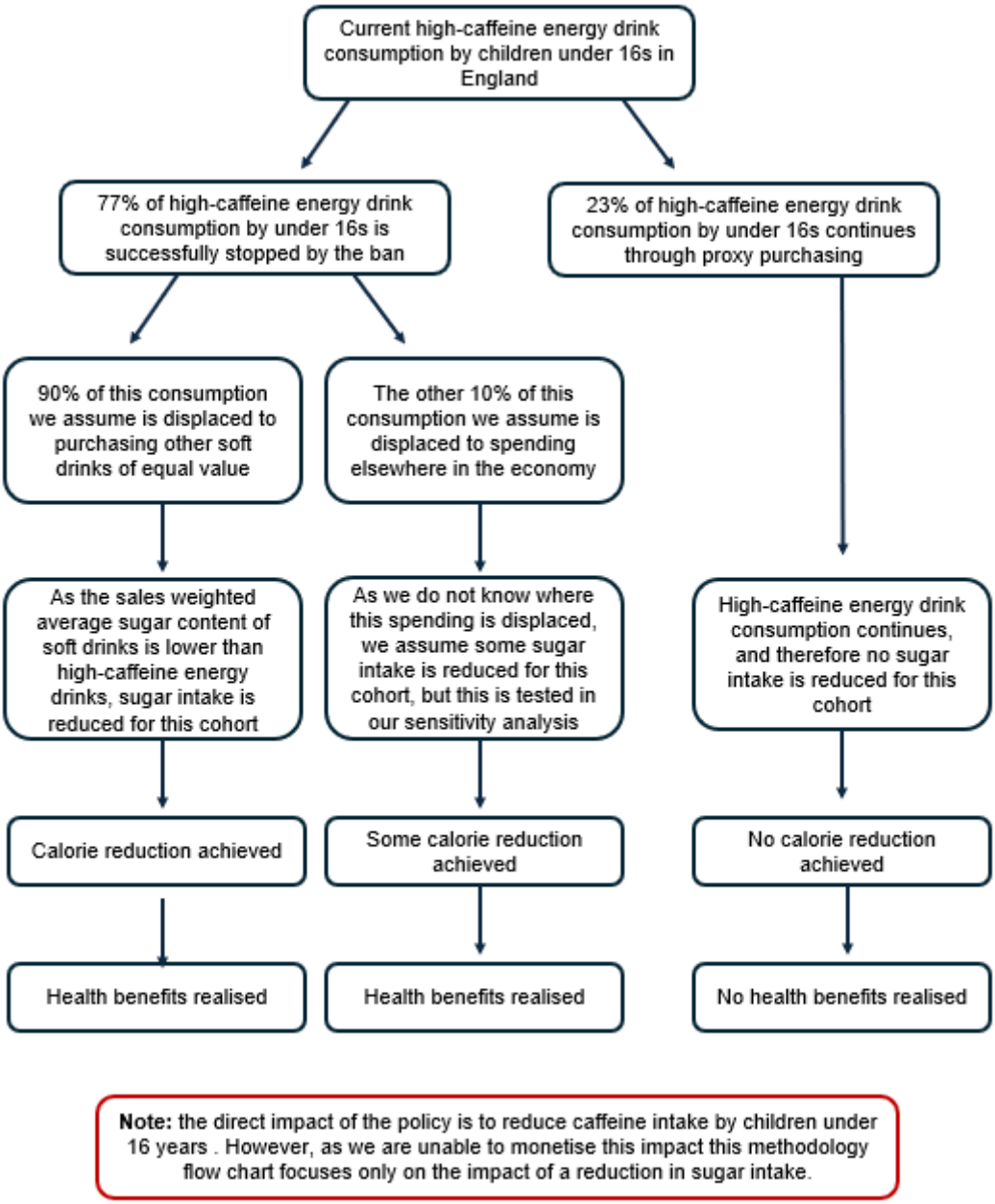
358. High-caffeine energy drinks are generally higher in sugar than other soft drinks, although low and sugar-free versions are available. This means a ban on their sale to children under 16 years would likely remove sugar, and therefore calories, from children's diet.

359. The health impact of excess consumption of sugar sweetened drinks is well known. The Scientific Advisory Committee on Nutrition report on carbohydrates and health[110] found that high intakes of these drinks are associated with increased risk of obesity and related health conditions such as type 2 diabetes. We have monetised the potential benefits of the policy in terms of obesity reduction because of reducing children's sugar and calorie intake from high-caffeine energy drinks.

360. The flow chart in Figure 3 summarises the methodology for how reducing high-caffeine energy drink consumption among children under 16 years may result in reduced sugar and calorie consumption.

[110] Public Health England (2015) SACN Carbohydrates and Health Report.

*Figure 3: The methodology used to estimate the monetised benefits from banning the sale of high-caffeine energy drinks for children under 16 years.*




361. We have estimated current high-caffeine energy drink consumption for children under 16 years using data from the Department for Education Omnibus Survey, conducted in December 2024 to over 1,300 pupils across England.[111] The Omnibus Survey found an estimated 4% of pupils aged 11 to 16 years old consume high-caffeine energy drinks daily or most days, 11% consume them at least once a week, 13% consume them at least once a month and 18% consume them less often. Of the pupils that reported consuming high-caffeine energy drinks daily or most days, or at least once a week, most (63%) state that they consume between 1 to 3 drinks per week and 10% report they consume between 4 to 7 drinks per week. Of the pupils that reported they consume high-caffeine energy drinks at

[111] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 pupil tables

least once a month or less often, 47% state they consume 1-3 drinks a month and 11% report they consume 4 to 7 drinks per month.

362. This provides data on the proportion of pupils that consume high-caffeine energy drinks on a daily, weekly, monthly, or less often basis. It also provides data on the quantity of high-caffeine energy drinks consumed by pupils. Using these data, we calculated the weighted average to understand the number of high-caffeine energy drinks pupils consume each month. This is calculated to be 3.03 drinks in the central scenario (2.61 in the low scenario and 3.79 in the high scenario).

363. Using the Kantar 2023 Take Home dataset, we calculated the sales weighted average sugar content per 100ml of high-caffeine energy drinks and regular carbonated soft drinks. The methods are set out in Annex H: High-caffeine energy drinks and carbonated soft drink sugar content analysis. Both analyses included no or low sugar and sweetened versions of these drinks. High-caffeine energy drinks in the dataset were manually identified and coded by the Department for Health and Social Care. We calculated the sales weighted average sugar content of high-caffeine energy drinks as 4.5g/100ml, and the sales weighted average of other carbonated soft drinks as less than half that at 2.0 g/100ml. Approximately 41% of all high-caffeine energy drinks are no or low sugar versions, contributing to 43% of all sales of these drinks.

364. Approximately 35% of all carbonated soft drinks are no or low sugar versions, contributing to approximately 65% of all sales of these drinks. This suggests that consumers of carbonated soft drinks prefer no or low sugar drinks, whilst sales of the high-caffeine energy drinks are in proportion to the products on offer. Sweetened high-caffeine energy drinks on average contain more sugar than sweetened carbonated soft drinks, with a sales weighted average sugar content of 7.9 g/100ml compared to 5.7/100ml.

365. The sales weighted average sugar content of high-caffeine energy drinks and carbonated soft drinks is needed to calculate the calorie reduction achieved from reducing children's consumption of high-caffeine energy drinks. We know that the average calorie content of 1g of sugar is 3.75 kilocalories.[112] Therefore, by calculating the sugar reduction per person, we can translate this into calorie reduction per person.

366. Using the same Kantar 2023 Take Home dataset (with methods set out in Annex H: High-caffeine energy drinks and carbonated soft drink sugar content analysis), we calculated the sales weighted average size of a high-caffeine energy drink as 472ml. This enables us to convert the quantity of high-caffeine energy drinks pupils consume into ml, to calculate the total volume consumed. This is needed to understand the sugar consumption of pupils who are drinking high-caffeine energy drinks.

367. Once we have established the weighted average consumption of high-caffeine energy drinks per month in ml, we can then calculate the calorie reduction achieved for the three different scenarios (central, low and high) modelled. We conducted sensitivity analysis for

[112] Public Health England (2021) McCance and Widdowson's The Composition of Foods Integrated Dataset 2021

this component of the modelling due to the uncertainty in our assumptions. Key assumptions include that:

- after the introduction of the ban, 23% of children's consumption of high-caffeine energy drinks continues to occur due to proxy purchasing (defined in Paragraph 227). For these children, they continue to consume the same quantity of high-caffeine energy drinks and therefore achieve no sugar reduction or calorie reduction.

- the remaining 77% of children's consumption of high-caffeine energy drinks is blocked by the ban. Of this, we assume that 90% of these children switch their consumption to regular soft drinks of equal value, and the remaining 10% switch their consumption to elsewhere in the economy.

    - For the individuals that switch to regular soft drink consumption we calculated the difference in the sales weighted average sugar content between high-caffeine energy drinks and regular carbonated soft drinks (4.5g/100ml – 2.0g/100ml) and converted this into calories.

    - For the individuals that switch their consumption to elsewhere in the economy, we do not have any evidence to suggest what they will go on to consume instead. They could change to a product with no sugar content, or they could consume a product with equal sugar content to a high-caffeine energy drink. In the absence of data we take a mid-point between 0g/100ml and 4.5g/ml (2.3g/100ml) to assume that some sugar reduction is achieved and convert this into calories. To reflect our uncertainty we have considered this assumption further in the Section 12, Sensitivity Analysis.

### 9.3 Calorie reduction estimates

368. Using the methodology set out in Figure 3, we estimate the average calorie reductions per child per day to be summarised in Table 27.

369. Due to the uncertainty in some of our assumptions, we have conducted sensitivity analysis on this which can be found in Section 12, Sensitivity Analysis.

*Table 27: Average calorie reduction per child per day, resulting from the proposed ban of high-caffeine energy drinks to children under 16 years*

| | Average calorie reduction per child per day for different cohorts of individuals | | | Overall average calorie reduction per child per day |
|---|---|---|---|---|
| | Those who continue to consume high-caffeine energy drinks through proxy purchasing | Those who switch their consumption to other carbonated soft drinks | Those who switch their consumption to elsewhere in the UK economy | |
| Low | 0.00 | 2.67 | 0.27 | **2.93** |
| Central | 0.00 | 3.10 | 0.31 | **3.41** |
| High | 0.00 | 3.88 | 0.39 | **4.26** |

### 9.4 Estimating the monetised health benefits from calorie reduction

370. To estimate the long-term benefits of reducing calorie intake, we use the DHSC Calorie Model Version 4.1. This is a Markov model that follows cohorts of individuals over time, comparing two scenarios: a "control" group where no policy is implemented, and a "treatment" group where average daily calorie intake is reduced.

371. The model's starting point is the estimated reduction in daily calories per person, which is converted into changes in body weight. From there, the model estimates BMI trajectories over time, which in turn affect the risk of developing obesity-related diseases such as type 2 diabetes, heart disease, and some cancers.

372. From these changes in disease risk, the model estimates four main outcomes:

- NHS costs, based on reduced need for treatment
- Social care costs, reflecting the link between obesity and long-term care needs
- Economic output, through reduced mortality and morbidity
- QALYs, which combine length and quality of life.

373. These outcomes are calculated by tracking differences between the control and treatment groups over time. The model uses data from the Health Survey for England to estimate realistic changes in BMI across the life course.

374. Each of these components have been adjusted by the appropriate discount rate[113] to give the approximate present cash value of future benefits, in line with HMT's Green Book

[113] The general discount rate of 1.5% is applied to the Economic Output and Social Care Costs with the health discount rate of 3.5% applied to the Health Benefits and NHS costs.

guidance. QALYs are valued at £70,000 per QALY and the three other components are calculated based on 2019 prices.

375. See Annex I: The DHSC Calorie Model for a full description of the DHSC Calorie Model.

376. To conduct the Calorie Model runs we needed to make the following assumptions to meet the requirements for the model's parameters.

- We have chosen to model a 25-years policy lifetime, which is consistent with other obesity related impact assessments, and a 100-year appraisal period. Meaning, we assume an active policy lifetime of 25 years, and that its legacy lasts a further 75 years. A 100-year appraisal period was chosen to account for the timing of health benefits. While obesity in childhood is known to have negative health impacts,[114] most health consequences are not experienced until later in life. This means that there is a significant lag between implementation of policies to tackle childhood obesity and the health benefits. A figure of 100 years is sufficient that, given current life expectancy, most children exposed to the policy are expected to have passed away at the end of the modelling run.

- We have assumed that children maintain the same average calorie reduction for their entire adulthood. This is a standard assumption that is used in the Calorie Model as we lack robust evidence to suggest whether behaviour is or is not maintained in the long term. We are aware that in reality, it is possible that individuals may begin to consume high-caffeine energy drinks when they reach the age of 16 years and therefore recognise that our health benefits are likely an overestimate. To reflect this uncertainty, we will use a proxy measure to establish what impact this assumption has on the overall health benefits estimates in Section 12, Sensitivity Analysis.

- A consistent daily calorie reduction was applied to all children aged 5 to 18. While younger children (e.g., aged 5 years) are unlikely to consume high-caffeine energy drinks in practice at the time of implementation, including them ensures that the model captures future impacts as they age over time. This may slightly overestimate benefits but is a necessary assumption to capture future benefits.

- Although the policy lifetime is 25 years, the model uses 19 years in practice to exclude cohorts we consider unlikely to benefit from the ban. We determined there to be 6 years of cohorts to be excluded from the benefits appraisal. The first 3 years come from children who are aged 13 to 15 at the time of implementation, who we determined are unlikely to benefit from the ban due to established consumption habits. Due to other assumptions that suggest our benefits are likely to be an overestimate, we think this assumption helps to offset that. The other 3 years come from children aged 16 to 18 at

[114] Sharma V, Coleman S, Nixon J, Sharples L, Hamilton-Shield J, Rutter H, and Bryant M. A systematic review and meta-analysis estimating the population prevalence of comorbidities in children and adolescents aged 5 to 18 years. Obes Rev. 2019 Oct;20(10):1341-1349. doi: 10.1111/obr.12904.

the time of implementation,[115] who we determined to be unlikely to benefit from the ban as they fall outside the scope of the policy.

### *Key limitations of calorie model*

377. In the DHSC Calorie Model, individuals can only develop obesity-related diseases in adulthood, meaning that health benefits are only captured for adults. The model does not estimate any potential impacts of the policy on childhood health, and as a result, benefits may be underestimated for policies with a meaningful, short-term health impact on children.

378. The model assumes that any calorie reduction achieved as a result of the policy is maintained consistently into adulthood. In reality, behaviours may change over time, especially after people age out of a policy's scope. This could mean the model overestimates long-term health benefits.

379. The model estimates average effects across age cohorts, rather than simulating individuals. It does not account for differences in behaviour across groups, such as by gender, deprivation, or ethnicity, which may mean some inequalities in health impacts are missed.

## 10. Non-monetised benefits

380. In Section 9, Monetised benefits, we have set out the benefits of the proposed ban on the sale of high-caffeine energy drinks for children under 16 years that we can monetise. That is, the benefits relating to obesity reduction.

381. However, we expect the policy to have broader benefits to children. There is a large body of consistent evidence that consuming high-caffeine energy drinks is associated with a range of possible negative outcomes on children's physical and mental health, sleep, education, and engagement with other harmful health behaviours.

382. The main objective is to reduce the consumption of high-caffeine energy drinks to children under 16 years. The aim is to protect children from the possible harms associated with the consumption these drinks.

383. This section summarises these broader benefits. We have been unable to monetise these, but we expect they could be significant. If the proposed legislation reduces consumption of these drinks by children under 16 years, then we expect this to contribute towards reducing these outcomes.

### *Data sources*

384. Where available, we have used systematic reviews, umbrella reviews, or secondary analysis of data to inform our understanding of the evidence on high-caffeine energy drinks.

[115] This exclusion occurs due to the parameters of the Calorie Model. The policy is only intended to effect children 15 years and under. However, in order to input calorie reductions into the model we must do this for specific age bounds (5–10-year-olds and 11–18-year-olds). Therefore, we must adjust the policy lifetime to remove the impact of those ages 16 to 18 at the time of implementation as they will not be affected by the policy.

385. The latest and most comprehensive evidence comes from a systematic review of 57 studies, on over 1.2 million children and young people, from more than 21 countries.[116] This updated a previous review published in 2016, and includes studies published until July 2022. Of the studies included, most (49) were rated moderate, whilst eight were rated strong in quality.

386. We also refer to evidence from two reviews commissioned by the Department for Health and Social Care in 2018. These are:

- secondary analysis of existing population level datasets of energy drink consumption by children in the UK,[117] and
- a review of systematic reviews on the consumption of energy drinks by children.[118] Of the reviews included in the overview, all were noted to be of low or critically low quality.

387. To identify more recent literature not captured in these reviews, we searched the literature in November 2024. After removing duplicates and screening studies we identified over 160 peer reviewed articles published since July 2022 on the health outcomes of high-caffeine energy drinks on children and young people in high income countries.

388. It is not possible to say from the type of evidence available that high-caffeine energy drink consumption directly causes the outcomes described, as there are ethical and feasibility issues that limit the ability to undertake causal research on this topic in children. The House of Commons Science and Technology Committee recognised these limits of the scientific evidence in its inquiry on high-caffeine energy drinks in 2018, however it concluded that it might be legitimate for the Government to implement a ban based on societal concerns and qualitative evidence.[119]

### *Physical health outcomes*

389. There is consistent evidence that consuming high-caffeine energy drinks is associated with a range of negative outcomes for children's health.

#### *Physical wellbeing and symptoms*

390. The EPPI-Centre secondary analysis reported that child consumers of high-caffeine energy drinks were two times more likely to have low physical wellbeing compared to those who had never consumed high-caffeine energy drinks.[120] This relationship remained even after

[116] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[117] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[118] Brunton G, Khouja C, Raine G, Stansfield C, Kwan I, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drink use and effects in young people: A rapid overview of systematic reviews*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[119] Science and Technology Committee (Commons) (2018) Energy drinks inquiry. Available: https://committees.parliament.uk/work/4601/energy-drinks-inquiry/

[120] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

controlling for factors such as age, gender, rurality, family affluence, smoking and alcohol status. Commonly reported symptoms include headaches, dizziness and stomach aches.

391. This is consistent with more recent evidence from the systematic review by Ajibo and others[121] which reported associations between consuming high-caffeine energy drinks and headaches, stomach aches, frequent urination, and heart palpitations.

*Cardiovascular health*

392. Of particular concern, a randomised control trial identified a relationship between high-caffeine energy drink consumption and cardiovascular outcomes. In a recent systematic review[122] three studies were identified from one randomised control trial which reported consuming high-caffeine energy drinks was associated with negative effects on heart rate, blood pressure and arterial stiffness. In two further studies from the same trial, high-caffeine energy consumption was linked with higher blood pressure[123] and significantly lower cardiac efficiency[124] in healthy children and adolescents.

393. In a more recent double blind randomised control trial pilot study[125] from the same study group, consumption of high-caffeine energy drinks was reported to cause potential sympathetic-parasympathetic disbalance in healthy children and adolescents. This means the body's autonomic nervous system, which controls involuntary functions like heart rate and digestion, is out of balance and has the potential to lead to various health problems.

*Oral health*

394. As set out in Section 9, Monetised benefits, high-caffeine energy drinks contain more sugar than non-caffeinated carbonated soft drinks on average. The health impact of excess consumption of sugar sweetened drinks is well known.

395. The Scientific Advisory Committee on Nutrition report on carbohydrates and health[126] found that high intakes of these drinks are associated with increased risk of obesity and related health conditions such as type 2 diabetes, in addition to poor oral health and decay-related tooth extractions in children. These are significant health issues impacting children and families, the NHS and society.

396. In a recent systematic review, [127] one identified study reported frequency of high-caffeine energy drink consumption as related to prevalence of dental caries and erosive tooth wear.

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[121] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[122] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[123] Oberhoffer FS, Dalla-Pozza R, Jakob A. et al. Energy drinks: effects on pediatric 24-h ambulatory blood pressure monitoring. A randomized trial. Pediatr Res **94**, 1172–1179 (2023). https://doi.org/10.1038/s41390-023-02598-y

[124] Oberhoffer FS, Li P, Jakob A, Dalla-Pozza R, Haas, NA, and Mandilaras G. *Energy Drinks Decrease Left Ventricular Efficiency in Healthy Children and Teenagers: A Randomized Trial*. Sensors 2022, 22, 7209. https://doi.org/10.3390/s22197209

[125] Mandilaras G, Haas N, Dalla PR, Li P, Oberhoffer FS. *Energy Drinks: The Effects on Heart Rhythm and the Vegetative Nervous System in Children: A Pilot Study*. 2024. The Thoaracic and Cardiovascular Surgeon.

[126] Public Health England (2015) SACN Carbohydrates and Health Report.

[127] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

397. Although we have been unable to monetise this benefit, we expect they may be significant. In NHS data published in 2022, tooth decay was reported as the most common reason for hospital admissions in children aged between 6 and 10 years, and rates for children and young people living in the most deprived communities were nearly 3.5 times that of those living in the most affluent.[128] The Faculty of Dental Surgery at the Royal College of Surgeons suggest that tooth decay is almost entirely preventable.[129]

### *Mental health outcomes*

398. The EPPI-Centre secondary analysis reported that children consuming high-caffeine energy drinks were two times more likely to have low psychological wellbeing compared to those who had never consumed high-caffeine energy drinks.[130] This relationship remained even after controlling for factors such as age, gender, rurality, family affluence, smoking and alcohol status. Additional indications of poorer mental health among children who regularly consumed these drinks included increased irritability and nervousness.

399. The recent systematic review by Ajibo and others adds to this,[131] identifying an association between high-caffeine energy drink consumption and increased risk of emotional difficulties, severe stress, moderate to high psychological distress, increased attention-deficit hyperactivity disorder symptoms, depressive and panic behaviours, and risk of suicide.

400. The earlier EPPI-Centre overview of systematic reviews[132] reported more mixed evidence on the association between high-caffeine energy drink consumption and mental health, however, the quality of the individual studies identified by the review should also be considered with these findings.

401. In more recent evidence from South Korea, regression analysis from a survey of nationally representative sample of adolescents found that both male and females reporting excessive high-caffeine drink consumption exhibited higher anxiety levels.[133] This association proved consistent regardless of sex or other socioeconomic factors.

### *Sleep outcomes*

402. Caffeine consumption may increase sleep disturbances. In their comprehensive review in 2015, the European Food Safety Authority reported that caffeine doses of 1.4 milligram per kilogram of body weight may increase sleep latency and reduce sleep duration in some children and adolescents. This dose is less than half of the current 'level of no safety

[128] Office for Health Improvement and Disparities. (2023). Hospital tooth extractions in 0 to 19 year olds 2022.

[129] Royal College of Surgeons of England (2024) Dental Surgeons: too many children admitted to hospital for tooth decay.

[130] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[131] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[132] Brunton G, Khouja C, Raine G, Stansfield C, Kwan I, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drink use and effects in young people: A rapid overview of systematic reviews*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[133] Cho JA, Kim S, Shin H, Kim H, and Park EC. *The Association between High-Caffeine Drink Consumption and Anxiety in Korean Adolescents.* Nutrients 2024, 16, 794. https://doi.org/10.3390/nu16060794

concern' set for children and adolescents and may easily be exceeded by one serving of high-caffeine energy drink for many children.[134]

403. This is supported by consistent evidence. In the recent systematic review by Ajibo and others,[135] short sleep duration and poor sleep quality were consistently associated with increased frequency of high-caffeine energy drink consumption. In addition, the EPPI-Centre overview of systematic reviews also reported an association between high-caffeine energy drink consumption and sleep difficulties.[136]

404. More recent evidence from international studies continues to support these associations. In a cross-sectional study of Serbian adolescents published in 2022, regular high-caffeine energy drink consumption was an independent risk factors negatively associated with sufficient sleep in both sexes.[137] Linear mixed-effects regression analysis of American adolescents published in 2022 found that caffeine consumption, especially in the afternoons and evenings, affects several components of adolescent sleep health.[138] In addition, a cross-sectional study of Norwegian adolescents also found high-caffeine energy drink consumption to negatively impact on sleep duration. High consumers of high-caffeine energy drinks were reported to have 0.95 hours (i.e., 57 min) less sleep on average than those who never consumed high-caffeine energy drinks.[139] Although these were not undertaken in the UK, when considered with the broader evidence, it suggests there may be a link between consuming high-caffeine energy drinks and sleeping problems.

***Educational outcomes***

405. In the systematic review by Ajibo and others, high-caffeine energy drink consumers were more likely to report lower academic performance and achievement. [140]

406. This is consistent with previous evidence. The EPPI-Centre secondary analysis[141] identified a consistent relationship between high-caffeine energy drink consumption and education behaviours and attitudes. Children who consumed high-caffeine energy drinks each day were over four times more likely to have low educational wellbeing, than their peers who never consume these drinks. The relationship remained even after controlling for factors such as age, gender, rurality, family affluence, smoking and alcohol status. Low

[134] European Food Safety Authority (EFSA) panel on dietetic products, nutrition and allergies. Scientific opinion on the safety of caffeine. EFSA Journal 2015: volume 13, issue 5, article number 4102

[135] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[136] Brunton G, Khouja C, Raine G, Stansfield C, Kwan I, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drink use and effects in young people: A rapid overview of systematic reviews*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education

[137] Tomanic M, Paunovic K, Lackovic M, Djurdjevic K, Nestorovic M, Jakovljevic A, and Markovic M. *Energy Drinks and Sleep among Adolescents. Nutrients* 2022, *14*, 3813. https://doi.org/10.3390/nu14183813

[138] Lunsford-Avery JR, Kollins SH, Kansagra S, Wang KW, and Engelhard MM. *Impact of daily caffeine intake and timing on electroencephalogram-measured sleep in adolescents*. J Clin Sleep Med. 2022;18(3):877–884.

[139] Kaldenbach S, Leonhardt M, Lien L. et al. Sleep and energy drink consumption among Norwegian adolescents – a cross-sectional study. BMC Public Health 22, 534 (2022). https://doi.org/10.1186/s12889-022-12972-w

[140] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281.

[141] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education

educational wellbeing can include disliking school, self-rating educational performance as below average, and previous truancy or school exclusion.

407. Both the secondary analysis, and the overview of systematic reviews[142] also reported negative impacts on school attendance and academic achievement for children consuming high-caffeine energy drinks weekly. The overview also identified two studies reporting an association between high-caffeine energy drink consumption and hyperactivity and inattention.

408. Teachers have also reported concerns about childrens consumption of high-caffeine energy drinks. In a recent Department for Education Omnibus, 61% of teachers surveyed agreed that the consumption of high-caffeine energy drinks negatively impacts the health and wellbeing of pupils at their school.[143] In a small qualitative study published in 2022, some teachers interviewed expressed alarm at how consumption of these drinks is associated with effects on pupils' school attendance and ability to learn.[144] Furthermore, in a survey by the NASUWT teaching union in 2017, 13% of teachers and school leaders identified high-caffeine energy drinks as a main contributor to poor behaviour among children in school, and a barrier to engaging with learning.[145]

### *Associations with other harmful health behaviours*

409. In addition to the outcomes on physical and mental health and education, the systematic review by Ajibo and others[146] also suggests a strong link between consuming high-caffeine energy drinks and other harmful behaviours among children. This includes smoking and vaping, alcohol use, binge drinking and other substance use, as well as the intention to initiate these behaviours.

410. This is supported by previous research. The EPPI Centre secondary analysis[147] identified that children who currently smoke or have smoked, or consumed alcohol in the past week, were more likely to consume high-caffeine energy drinks than those who never consume these drinks. In the EPPI overview of systematic reviews, several cross-sectional studies were identified which reported a positive relationship between high-caffeine energy drink consumption and smoking, as well as use of alcohol and other substances.[148]

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[142] Brunton G, Khouja C, Raine G, Stansfield C, Kwan I, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drink use and effects in young people: A rapid overview of systematic reviews*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education

[143] Department for Education (2025) School and college voice: omnibus surveys for 2024 to 2025. School and college voice data tables: 2024 to 2025 academic year, December 2024 teacher tables.

[144] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022: volume 26, issue 3, pages 575 to 585

[145] NASUWT Big Question Survey 2017, 2017. Available from: https://www.nasuwt.org.uk/article-listing/nasuwt-victory-on-energy-drinks-ban.html

[146] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281.

[147] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[148] Brunton G, Khouja C, Raine G, Stansfield C, Kwan I, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drink use and effects in young people: A rapid overview of systematic reviews*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

411. There is evidence of an association between high-caffeine energy drink consumption and sensation seeking,[149-150] and more limited evidence of an association with norm breaking behaviour, and less healthy dietary behaviours.[151]

412. In addition, there is a vast amount of evidence on young people who consume high-caffeine energy drinks mixed with alcohol (AmED users). Research has identified concerning outcomes for older adolescent and young adult AmED users, ranging from increased risk of problem gambling[152], substance use-related unsafe driving,[153] perpetrating violent acts,[154] and a range of other associations.[155]

## 11. Risks and assumptions

413. This section sets out the key risks and assumptions associated with the data and evidence used in this impact assessment. We provide a view on the quality of evidence used throughout and highlight our key evidence gaps.

414. Evidence used in this impact assessment are of mixed quality. We believe some evidence used is robust. However, in some instances we have had to make assumptions in applying them. These include:

- Understanding the consumption of high-caffeine energy drinks by 11 to 16-year-olds. This evidence was collected through the December 2024 wave of the Department for Education Omnibus Survey which collated data from over 1300 pupils in England. We believe this to be a robust source of evidence, though we recognise it also includes the consumption of children aged 16 years who are out of scope of the proposed ban. We are unable to disaggregate the data by relevant age groups and so for the purposes of our analysis we assume the proportion of children under 16 years consuming high-caffeine energy drinks is consistent with the proportion of 11 to 16 years consuming them, and recognise this may be an overestimate.

- Understanding the number of businesses impacted by the proposed ban. This is informed by Nomis business counts data published by the Office for National Statistics, and data provided by the Institute of Grocery Distribution. To use this data for our analysis, we have applied an England weighting (see Paragraph 139), and further

[149] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281..

[150] Brunton G, Khouja C, Raine G, Stansfield C, Kwan I, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drink use and effects in young people: A rapid overview of systematic reviews*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[151] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281.

[152] Vieno A, Canale N, Potente R, Scalese M, Griffiths MD, and Molinaro S. *The multiplicative effect of combining alcohol with energy drinks on adolescent gambling*, Addictive Behaviors, Volume 82, 2018, Pages 7-13, doi.org/10.1016/j.addbeh.2018.01.034.

[153] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281.

[154] Speroni J, Fanniff AM, Edgemon JM, Martini V, and Haas AL. *Alcohol mixed with energy drinks and aggressive behaviors in adolescents and young adults: A systematic review,* Clinical Psychology Review, Volume 104, 2023, doi.org/10.1016/j.cpr.2023.102319.

[155] Scalese M, Cerrai S, Benedetti E, *et al.* Combined alcohol and energy drinks: consumption patterns and risk behaviours among European students. *J Public Health (Berl.)* (2024). doi.org/10.1007/s10389-024-02342-8

assumptions to understand what proportion of businesses currently have a voluntary ban in place.

- Understanding the familiarisation and ongoing costs for the retail sector. We have engaged with external stakeholders to test the assumptions used to calculate the familiarisation costs the retail sector will incur such as the time taken for training, and the installation of new shelf labelling or signage, as there is no official data source to base these assumptions on. We will continue to refine these after consultation.

- Understanding the sugar content of high-caffeine energy drinks and other carbonated soft drinks. This is calculated using the Kantar 2023 Take Home dataset. This is the key input used to monetise the health benefits of this policy.

415. There are some areas of the analysis that we consider to be informed by limited evidence, for example:

- Understanding the rate of proxy purchasing. We have obtained a range of different pieces of evidence to inform our assumptions around the rate of proxy purchasing. This includes data from the Smoking, Drinking and Drug Use among Young People Survey[156] which enables us to estimate the rate of proxy purchasing for cigarettes when this was legal. We have also collected data through the Department for Education Omnibus Survey[157] to understand where children self-report accessing high-caffeine energy drinks. We used these two data sources to estimate a range for proxy purchasing rates, and calculated a mid-point for our central analysis. This is tested further in Section 12, Sensitivity Analysis.

- Understanding familiarisation and ongoing costs. As set out in Section 7, Monetised costs, we have engaged with stakeholders to test the assumptions used to inform the familiarisation and ongoing costs for businesses impacted by the proposed ban. However, we received limited information related to the out of home sector and online retailers and so have applied retailer assumptions to these sectors.

- Understanding the costs to the vending machine sector from the two policy sub-options. We have engaged with stakeholders to understand the size of the vending machine market for high-caffeine energy drinks in the UK and the possible impact of a ban on the sector.

- Understanding the enforcement costs associated with the ban. We have engaged with stakeholders to agree the assumptions used to estimate the enforcement costs, as there is no official data source to base these assumptions on.

[156] Table 2.11 and Table 2.14 in NHS England (2022) Smoking, Drinking and Drug Use among Young People in England, 2021: Data Tables.

[157] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 parent tables.

416. The main evidence gaps of this impact assessment, listed in descending order of impact on our analysis, include:

- Evidence on whether the impact of the ban on reducing consumption of high-caffeine energy drinks in children aged under 16 years will continue when they reach the age of 16 years and older. So that is, evidence on whether the benefits we have assessed will be maintained into adulthood.

- Data on the number of high-caffeine energy drinks sold per transaction. This is a key assumption used to inform the ongoing costs of age verification for high-caffeine energy drink sales, any change in this input will have a significant impact on the overall costs of the policy.

- Evidence which quantifies the impact of reducing consumption of high-caffeine energy drinks on the identified health and education outcomes. As we do not have these data, we have not been able to quantify these benefits, so instead have produced a qualitative assessment in Section 10, Non-monetised benefits.

- Evidence on how sales of high-caffeine energy drinks to children under 16 years may be displaced if the ban is introduced, and the value of these displaced sales. This is a key unevidenced input to our modelling and is discussed in Section 12, Sensitivity Analysis.

- Data on the number of sales of high-caffeine energy drinks to children under 16 years, and the retail settings in which these sales happen.

- Data on the prevalence of high-caffeine energy drink consumption by children aged under 11 years.

- Evidence of the effectiveness of the existing voluntary sales ban. In the analysis we assume it is effective and therefore most of the consumption by children under 16 years is purchased in stores without a voluntary ban. However, we assume 23% of consumption is purchased in stores with a voluntary ban through proxy purchasing.

## 12. Sensitivity Analysis

417. We have several uncertain assumptions in our analysis of the costs and benefits. Therefore, we have undertaken a range of sensitivity analyses to show the impact of these assumptions.

418. This section sets out the main areas we have conducted sensitivity analysis for.

419. For both costs and benefits we have conducted sensitivity analysis for the rate of proxy purchasing and sales displacement assumptions.

420. For benefits only, we have conducted sensitivity analysis for:

- the duration of calorie reduction

- the change in sugar consumption of those who switch their consumption to elsewhere in the economy

421. For costs only, we have conducted sensitivity analysis for:

- the opportunity cost of Departmental spending
- the number of premises that receive informal action per year which informs our enforcement costs
- the number of high-caffeine energy drinks bought in a transaction which informs the ongoing age verification costs
- the time required for age verification checks
- the proportion of costs that are incurred by businesses/stores that currently have a voluntary ban in place, this informs familiarisation costs for retailers
- the proportion of staff in large and medium out of home businesses that are in contact with customers and the proportion of sports facilities, museums etc. that we estimate to currently sell high-caffeine energy drinks and are therefore in scope of the policy. This informs the familiarisation and ongoing costs for the out of home sector
- the average markup for retailers and manufacturers which informs lost sales
- the time taken to update IT systems which informs online familiarisation costs
- the number of head office managers and stock managers of vending machine client sites which informs the vending sector knowledge sharing costs
- the number of stock managers involved in stock planning and how long stock planning takes which informs vending sector stock planning costs

422. We have also conducted critical value analysis to understand how much the costs and benefits would need to change by to generate a zero net present value.

*Proxy purchasing*

423. We have limited evidence to inform the proxy purchasing rate that currently occurs or is expected to occur in the future. In the central analysis we used a rate of 23% which is informed by taking a mid-point between two estimates. The lower bound of 10% is informed by the calculated proxy purchasing rate for cigarettes from the time period that proxy

purchasing was legal (i.e. up to 2014).[158] The upper bound of 36% is informed by data collected through the Department for Education Omnibus Survey.[159]

424. As a result, we have conducted sensitivity analysis for the costs and benefits for the following scenarios.

*Table 28: Low, central and high proxy purchasing assumptions*

| | Low | Central | High |
|---|---|---|---|
| Proxy purchasing rate | 10% | 23% | 36% |

425. Table 29 summarises how variations in proxy purchasing rates impact our estimated costs of the policy. A higher proxy purchasing rate means more high-caffeine energy drink sales continue despite of the ban, resulting in smaller profit losses for retailers and high-caffeine energy drink manufacturers. However, due to our displacement assumptions, this also means that carbonated soft drink manufacturers and the wider economy gain fewer sales. As a result, total lost sales remain at zero.

426. Total retail ongoing costs are influenced by the proxy purchasing rate as the rate affects our estimate of high-caffeine energy drink transactions for children under 16 years. A higher proxy purchasing rate suggests that the existing voluntary ban is less effective, meaning fewer transactions occur in stores without an existing voluntary ban. Since the cost of age verification checks only applies to stores without an existing voluntary ban (see Paragraph 172), a higher proxy purchasing rate results in fewer additional age verification checks, reducing total ongoing retail costs. Variation in these inputs changes the total costs by ±14%.

[158] Table 2.11 and Table 2.14 in NHS England (2022) Smoking, Drinking and Drug Use among Young People in England, 2021: Data tables.

[159] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 pupil and parent tables.

*Table 29: Present value costs, varying our proxy purchasing assumption, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Lost sales to retailers (including physical stores, online, out of home sector and vending machine sales) | £137.3m | £100.5m | £69.4m |
| Lost sales to high-caffeine energy drink manufacturers | £900.2m | £658.9m | £455.2m |
| Gain in sales for carbonated soft drink manufacturers | £810.1m | £593.0m | £409.7m |
| Total benefit to wider economy | £227.3m | £166.4m | £114.9m |
| Total lost sales | £0m | £0m | £0m |
| Total retail ongoing costs | £743.7m | £636.3m | £528.9m |
| **Total costs** | £871.6m | £764.2m | £656.8m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

427. Table 30 summarises the impact this variation in proxy purchasing rates has on our estimated health benefits of the policy. A lower proxy purchasing rate means the implementation of the ban to children under 16 years is able to deliver higher benefits as more children are restricted from consuming high-caffeine energy drinks and therefore reduce their sugar and calorie intake by switching to the consumption of carbonated soft drinks. A higher proxy purchasing rate means more children are able to continue to obtain and consume high-caffeine energy drinks after the implementation of the ban and therefore maintain their current sugar and calorie intake. Variation in these inputs changes the total benefits by ±17%. This input has the most significant impact on our total benefits, of the inputs covered by our sensitivity analysis.

*Table 30: Present value benefits, varying our proxy purchasing assumption, over a 100-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| *Quality Adjusted Life Years* | *129,000* | *110,000* | *92,000* |
| Monetised health benefit | £9,020m | £7,719m | £6,412m |
| NHS Savings | £149m | £127m | £106m |
| Social care savings | £97m | £84m | £69m |
| Economic output | £1,444m | £1,236m | £1,027m |
| **Total benefits** | **£10,711m** | **£9,166m** | **£7,614m** |

*Sales displacement*

428. Our sales displacement assumptions are based on combining the available evidence with behavioural science theory as outlined in the section on Sales displacement on Page 51. We recognise the uncertainty in these assumptions and therefore have conducted sensitivity analysis for the costs and benefits for the following scenarios.

429. The low scenario is informed by internal analysis of consumption data[160] across 16 EU countries which found that the primary motivation for high-caffeine energy drinks was 'taste' for 59% of children. We therefore believe it is a good proxy for how many children may switch their consumption to carbonated soft drinks. However, as set out in the section on Sales displacement on Page 51, there are a variety of reasons and rationale that suggest why children may switch their consumption to carbonated soft drinks beyond just taste. This therefore informs our central scenario of 90%. We do not know what a realistic high scenario would be and therefore we have increased it to 100% to show the maximum possible impact.

*Table 31: Low, central and high values for sales displacement assumptions*

| | Low | Central | High |
|---|---|---|---|
| Proportion of sales that are displaced to other carbonated soft drinks | 60% | 90% | 100% |
| Proportion of sales that are displaced to elsewhere in the UK economy | 40% | 10% | 0% |

430. The variation in sales displacement rates affects the distribution of our estimated lost sales across the sectors impacted, but it does not change the overall costs of the policy. As shown in Table 32, a lower proportion of sales being displaced to other carbonated soft

[160] Zucconi, S., Volpato, C., Adinolfi, F., Gandini, E., Gentile, E., Loi, A. and Fioriti, L., 2013. Gathering consumption data on specific consumer groups of energy drinks. EFSA Supporting Publications, 10(3).

drinks or elsewhere in the wider economy increases lost sales for retailers. However, this is offset by greater gains for carbonated soft drinks manufacturers and the wider economy.

*Table 32: Present value costs, varying our sales displacement assumption for retailers, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Lost sales to retailers (including physical stores, online, out of home sector and vending machine sales) | £401.9m | £100.5m | £0.0m |
| Lost sales to high-caffeine energy drink manufacturers | £658.9m | £658.9m | £658.9m |
| Gain in sales for carbonated soft drink manufacturers | £395.3m | £593.0m | £658.9m |
| Total benefit to wider economy | £665.5m | £166.4m | £0.0m |
| Total lost sales | £0.0m | £0.0m | £0.0m |
| **Total costs (excluding vending)** | £764.2m | £764.2m | £764.2m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

431. Table 33 shows the impact of the variation in sales displacement assumptions on the vending sector costs. Like what is shown for lost sales in retailers (see Paragraph 430), a lower proportion of sales being displaced to other carbonated soft drinks or elsewhere in the wider economy increases lost sales to vending machine businesses or clients. However, this is offset by greater gains for carbonated soft drinks manufacturers and the wider economy.

*Table 33 Present value costs, varying our sales displacement assumption for the vending sector, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Lost sales to vending machine businesses or clients | £130.2m | £32.5m | £0.0m |
| Lost sales to high-caffeine energy drink manufacturers | £186.0m | £186.0m | £186.0m |
| Gain in sales to carbonated soft drink manufacturers | £111.6m | £167.4m | £186.0m |
| Gain in sales to the wider economy | £204.6m | £51.1m | £0.0m |
| Total lost sales | £0.0m | £0.0m | £0.0m |
| **Total costs (vending only)** | £9.6m | £9.6m | £9.6m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

432. Table 34 summarises the impact this variation in sales displacement rates has on our estimated health benefits of the policy. A lower proportion of our sales being displaced to other carbonated soft drinks, means a higher proportion of our sales are displaced to elsewhere in the UK economy. This means the sugar and calorie intake of individuals is reduced more than in our central scenario as we assume individuals switch to consuming a product that has half the sugar content of a high-caffeine energy drink. Variation in these inputs has minimal impact on the overall health benefits.

*Table 34: Present value benefits, varying our sales displacement assumption, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| *Quality Adjusted Life Years* | *107,000* | *110,000* | *111,000* |
| Monetised health benefit | £7,476m | £7,719m | £7,797m |
| NHS Savings | £123m | £127m | £128m |
| Social care savings | £81m | £84m | £85m |
| Economic output | £1,197m | £1,236m | £1,249m |
| **Total benefits** | **£8,877m** | **£9,166m** | **£9,259m** |

*Calorie reduction duration*

433. In our central scenario we assume that children maintain the same average calorie reduction for their entire adulthood. This is a standard assumption that is used in the DHSC

Calorie Model as we lack robust evidence on whether behaviour is or is not maintained in the long term. We are aware it is possible that individuals may begin to consume high-caffeine energy drinks when they reach the age of 16 years and therefore recognise that our health benefits are likely an overestimate.

434. We are unable to directly vary this variable due to the limitations of the DHSC Calorie Model. However, we have used a proxy measure to help illustrate what the impact of a variation might be.

435. In reality, some individuals may never consume a high-caffeine energy drink in their lifetime while some individuals may start consuming them as soon as they reach 16 years of age. This would therefore affect the number of years the policy has an impact upon certain individuals. Therefore, as a proxy we have decided to vary the number of years the policy is implemented for. In the central scenario we assume the policy implementation period is 25 years; however, we have reduced this to 11 years to test this assumption. We have chosen this policy lifetime as (with our 6 year adjust included), this is the lowest policy lifetime we are able to input into the Calorie Model.

436. We maintain our assumption that although the policy lifetime is 25 years (or 11 years), the model uses 19 years (or 5 years) in practice to exclude 6 years of cohorts we consider unlikely to benefit from the ban. The first 3 years come from children who are aged 13 to 15 years at the time of implementation, who we consider are unlikely to benefit from the ban due to established consumption habits. Due to other assumptions that suggest our benefits are likely to be an overestimate, we think this assumption helps to offset that. The other 3 years come from children aged 16 to 18 years at the time of implementation, who we consider will not benefit from the ban as they fall outside the scope of the policy.

*Table 35: Low and central values for the policy implementation period*

| | Low | Central |
|---|---:|---:|
| Policy implementation period | 11 years | 25 years |

437. Table 36 summarises the impact this variation has on our estimated health benefits of the policy. This shows that a 56% reduction in the policy lifetime input leads to a 37% reduction in the estimated health benefits.

*Table 36: Present value benefits, varying the policy lifetime, over a 100-year appraisal period in 2024 prices*

| | Low | Central |
|---|---|---|
| *Quality Adjusted Life Years* | *69,000* | *110,000* |
| Monetised health benefit | £4,808m | £7,719m |
| NHS Savings | £86m | £127m |
| Social care savings | £58m | £84m |
| Economic output | £841m | £1,236m |
| **Total benefits** | **£5,793m** | **£9,166m** |

*Sugar consumption of those who choose to spend their money elsewhere in the UK economy*

438. In our central scenario we assume 10% of sales are displaced to elsewhere in the UK economy. As we have no data or evidence to suggest where individuals might divert their consumption, we have modelled three scenarios. The low scenario assumes individuals will switch their consumption to a product that contains no sugar. The high scenario assumes individuals switch their consumption to a product that contains an equal amount of sugar as the sales weighted average sugar content of a high-caffeine energy drink. Our central scenario assumes a mid-point between the two estimates.

439. We have conducted sensitivity analysis for benefits for the following scenarios, this input has no impact on the costs.

*Table 37: Low, central and high values for the sugar content assumptions*

| | Low | Central | High |
|---|---|---|---|
| Sugar content of the products an individual may go on to consume elsewhere in the UK economy | 0g / 100ml | 2.27g / 100ml | 4.54g / 100ml |

440. Table 38 summarises the impact this has on our estimated health benefits of the policy. The low scenario leads to higher health benefits as it assumes all individuals in this cohort eliminate their current sugar and calorie intake as a result of the policy. The high scenario leads to lower health benefits as it assumes all individuals in this cohort maintain their current sugar and calorie intake and therefore the health benefits rely solely on the cohort of individuals who switch their consumption to carbonated soft drinks. Variation in these inputs changes the total benefits by ±9%, which is higher than the variation in sales displacement assumptions but not as high as the variation in proxy purchasing.

*Table 38: Present value benefits, varying our assumption on the sugar consumption of those who choose to spend their money elsewhere in the UK economy, over a 100-year appraisal period in 2024 prices*

| | Low | Central | High |
|---|---|---|---|
| *Quality Adjusted Life Years* | *120,000* | *110,000* | *100,000* |
| Monetised health benefit | £8,417m | £7,719m | £7,016m |
| NHS Savings | £139m | £127m | £116m |
| Social care savings | £91m | £84m | £76m |
| Economic output | £1,348m | £1,236m | £1,123m |
| **Total benefits** | **£9,996m** | **£9,166m** | **£8,331m** |

*The opportunity cost of departmental spending on enforcement*

441. We propose that the Department of Health and Social Care will reimburse local authorities for the cost of enforcing this policy and would budget accordingly. In the main policy appraisal, we have considered the monetary costs to the Department, using the standard discount rate of 3.5%. However, it is the Department's policy to consider the opportunity cost of the spending, as this could represent a displacement from the fixed NHS health budget and therefore, we have included this potential cost as part of our sensitivity analysis.

442. At the margin, it is estimated that the NHS can purchase a QALY for £15,000. It is also estimated that a QALY is valued at £70,000 by society. The enforcement costs are divided by £15,000 to calculate the number of QALYs this spending will displace. Once we know the number of QALYs displaced, we multiplied this by 70,000 to estimate the societal value lost by covering these enforcement costs from the fixed health budget.

443. In addition to this, we use the 1.5% health discount rate (instead of the standard 3.5% rate) in accordance with HMT's Green Book Guidance, as this sensitivity analysis assumes we will be displacing the fixed health budget. Health is discounted at a lower rate as it only includes pure time preference (0.5%) and catastrophic risk discounting (1%), it does not include the 2% of 'wealth effect' discounting. This increases the opportunity cost further.

444. The estimated total cost of enforcement appraised over a 25-year period is £7.4m (2024 prices, 2027 present value), which will be incurred by the Department. Using the methodology set out within this section we estimate the opportunity cost of this spending to be £42.6 million.

*Enforcement costs*

445. In our central scenario we have assumed that the total number of compliance checks (i.e. test purchases) conducted under business-as-usual conditions would increase by one third following the ban on high-caffeine energy drinks to children under 16 years. However, this assumed increase is not supported by evidence, so has been varied within this sensitivity analysis. Since we estimate the number of non-compliance reports based on this number of

additional compliance checks (see Paragraph 320), these changes in figures also impact the number of premises that receive informal action within the sensitivity analysis.

446. We have conducted sensitivity analysis for the following scenarios, this input has no impact on the benefits.

*Table 39 Low, central and high values for enforcement assumptions*

| | Low | Central | High |
|---|---|---|---|
| Compliance checks (i.e. test purchases) | Increase by one quarter | Increase by one third | Increase by a half |
| Number of compliance checks (i.e. test purchases) | 132 | 190 | 264 |
| Number of premises that receive informal action | 922 | 1,330 | 1,845 |

447. The variation in the number of compliance checks, and therefore the number of premises that receive formal action, has minimal impact on the total enforcement costs and changes the overall costs of the policy by less than ±1%. As shown in Table 40, an increase in the number of compliance checks (i.e. test purchases) and premises that receive informal action does lead to higher costs, but the overall effect remains small.

*Table 40 Present value costs, varying our enforcement assumptions, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Total enforcement costs | £5.1m | £7.3m | £10.2m |
| **Total costs (excluding vending)** | £762.0m | £764.2m | £767.1m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Number of high-caffeine energy drinks purchased in a transaction*

448. In our central scenario we assume that one high-caffeine energy drink is bought per transaction. We are aware that this is likely results in an overestimation of the total number of high-caffeine energy drink transactions as consumers may purchase multiple high-caffeine energy drinks in a single transaction as they can be bought as multipacks. However, in the absence of data on purchase volumes, this assumption provides a conservative upper-bound estimate of the potential cost impact. It reflects the maximum number of transactions that could be affected and is therefore used to ensure we do not underestimate costs.

449. We have conducted sensitivity analysis for the following scenarios, this input has no impact on the benefits. We only test a lower bound scenario as the central assumption already represents a conservative upper bound.

*Table 41 Low and central values for the number of energy drinks purchased per transaction assumptions*

| | Low | Central |
|---|---|---|
| Number of energy drinks bought per transaction | 2 | 1 |

450. Table 42 summarises the impact this variation in number of high-caffeine energy drinks bought per transaction has on our estimated retail ongoing costs of the policy. This variable directly affects the number of transactions assumed, and therefore reduces the number of required ongoing age verifications checks. Variation in this input changes the total costs by just over 40%.

*Table 42 Present value costs, varying our number of high-caffeine energy drinks purchased per transaction assumption, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central |
|---|---|---|
| Total retail ongoing costs | £318.2m | £636.3m |
| **Total costs (excluding vending)** | £446.1m | £764.2m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Time required for age verification checks*

451. In our central scenario we assume that an age verification check takes 0.017 hours (1 minute). This was informed by engagement with the Association for Convenience Stores, but we recognise that it likely results in an overestimation of the age verification costs as it is higher than the assumptions used in other impact assessments. However, in the absence of robust data on the time required for these checks, this assumption provides a conservative upper-bound estimate of the potential cost impact.

452. We have conducted sensitivity analysis for the following scenarios, this input has no impact on the benefits.

*Table 43: Low, central and high values for the time required for age verification checks*

| | Low | Central | High |
|---|---|---|---|
| Time required for age verification checks | 0.008 hours (30 seconds) | 0.017 hours (1 minute) | 0.033 hours (2 minutes) |

453. Table 44 summarises the impact this variation in time required for age verification has on our estimated retail ongoing costs of the policy. Variation in this input changes the total costs by -40% and +78%. **This input has the most significant impact on our total costs in comparison to the other inputs covered by our sensitivity analysis.**

*Table 44 Present value costs, varying our time required for age verification checks assumption, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Total retail ongoing costs | £299.4m | £636.3m | £1235.2m |
| **Total costs (excluding vending)** | £427.3m | £764.2m | £1363.1m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Reduction in costs if imposing voluntary ban*

454. In our central scenario we assume businesses that already have a voluntary ban in place will incur a 50% reduction in costs, compared to businesses that do not have a voluntary ban in place. We have tested the impact of our assumptions regarding cost reductions for retailers that had an existing voluntary ban prior to this policy. This variable is included in the sensitivity analysis because the assumptions used in the central scenario are not supported by evidence and impact the retail familiarisation costs.

455. We have conducted sensitivity analysis for the following scenarios, this input has no impact on the benefits.

*Table 45 Low, central and high values for voluntary ban reduction assumptions*

| | Low | Central | High |
|---|---|---|---|
| Reduction in cost if imposing voluntary ban | 75% | 50% | 25% |

456. The variation in these values has minimal impact on the total retail familiarisation costs. The variation results in changes to the overall costs of the policy by less than ±1%. As shown in Table 46, the lower the reduction in costs for retailers imposing a voluntary ban, higher the total retail familiarisation costs, but the overall effect remains small.

*Table 46 Present value costs, varying our voluntary ban assumptions, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Total retail familiarisation costs | £10.8m | £16.8m | £22.8m |
| **Total costs (excluding vending)** | **£758.2m** | **£764.2m** | **£770.2m** |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Out of home sector familiarisation and ongoing costs*

457. We have tested two variables that inform the familiarisation and ongoing costs for the out of home sector:

- the proportion of staff in large and medium businesses not in contact with customers,
- the proportion of sports facilities, museums, cinemas, amusement parks, botanical gardens and nature reserves that sell high-caffeine energy drinks.

458. These variables have been included in the sensitivity analysis because the assumptions used in the central scenario are not supported by evidence.

459. We have conducted sensitivity analysis for the following scenarios, this input has no impact on the benefits.

*Table 47: Low, central and high values for out of home sector familiarisation and ongoing costs assumptions*

| | Low | Central | High |
|---|---|---|---|
| Proportion of staff in large and medium businesses not in contact with customers | 25% | 50% | 75% |
| Proportion of sports facilities, museums, cinemas, amusement parks, botanical gardens and nature reserves that sell high-caffeine energy drinks | 5% | 10% | 25% |

460. The variation in these values has minimal impact on the total out of home familiarisation and ongoing costs. The variation results in changes to the overall costs of the policy by less

than ±1%. As shown in Table 48, an increase in these proportions does lead to higher costs, but the overall effect remains small.

*Table 48: Present value costs, varying our out of home sector familiarisation and ongoing cost assumptions, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Total out of home familiarisation costs | £7.1m | £7.4m | £8.1m |
| Total out of home ongoing costs | £6.6m | £7.0m | £8.3m |
| **Total costs (excluding vending)** | £763.4m | £764.2m | £766.2m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Average markup for retailers and manufacturers*

461. In our central scenario, our estimate for retailers and manufacturers markup is taken from United States Department of Agriculture report focusing on UK data,[161] which states that markup in the retail food industry typically ranges from 35% to 70%. For our central scenario we have taken a midpoint of this range. We therefore have assumed that in the sensitivity analysis the markup would reflect the lower and upper bounds of this range.

462. Since the United States Department of Agriculture reports publication in 2022, rising food costs and inflation may have affected current retailer and manufacturer markups, introducing additional uncertainty. This highlights the importance of this sensitivity analysis in accounting for possible variation.

463. We have conducted sensitivity analysis for the following scenarios, this input has no impact on the benefits.

*Table 49: Low, central and high values for the average markup assumptions*

| | Low | Central | High |
|---|---|---|---|
| Average markup % | 35% | 53% | 70% |

464. The variation in the average markup affects the estimated value of both lost and gained sales but does not impact the overall cost of the policy. As shown in Table 50, a lower average markup reduces the value of lost sales for retailers and high-caffeine energy drink manufacturers, as well as the value of gains for carbonated soft drink manufacturers and

[161] United States Department of Agriculture (2022) Report: Retail Foods. Available: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Retail%20Foods_London_United%20Kingdom_UK2022-0027.pdf

the wider economy. However, because gains continue to offset losses, the total net lost sales remain zero, resulting in no change to the total policy costs.

*Table 50: Present value costs for retailers, varying our average markup assumption, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Lost sales to retailers (including physical stores, online, out of home sector and vending machine sales) | £75.7m | £100.5m | £120.2m |
| Lost sales to high-caffeine energy drink manufacturers | £560.5m | £658.9m | £707.0m |
| Gain in sales for carbonated soft drink manufacturers | £504.5m | £593.0m | £636.3m |
| Total benefit to wider economy | £131.7m | £166.4m | £190.9m |
| Total lost sales | £0.0m | £0.0m | £0.0m |
| **Total costs (excluding vending)** | £764.2m | £764.2m | £764.2m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

465. We also test the impact of this variation on vending sector lost sales as in the absence of more specific data we also use the markup values from the United States Department of Agriculture report focusing on UK data[162] to inform manufacturer markups. As seen in Table 51, the variation in markup does not impact the lost sales to vending machine businesses. However, a lower average markup reduces the value of lost sales for high-caffeine energy drink manufacturers, as well as the value of gains for soft drink manufacturers and the wider economy. However, because gains continue to offset losses, the total net lost sales remain zero, resulting in no change to the total policy costs.

[162] United States Department of Agriculture (2022) Report: Retail Foods. Available: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Retail%20Foods_London_United%20Kingdom_UK2022-0027.pdf

*Table 51: Present value costs for the vending sector, varying our average markup assumption, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Lost sales to vending machine businesses | £32.5m | £32.5m | £32.5m |
| Lost sales to high-caffeine energy drink manufacturers | -£140.0m | -£186.0m | -£222.4m |
| Gain in sales for soft drink manufacturers | +£126.0m | +£167.4m | +£200.2m |
| Gain in sales to the wider economy | +£46.6m | +£51.1m | +£54.8m |
| Total lost sales | £0m | £0m | £0m |
| **Total costs (vending only)** | **£9.6m** | **£9.6m** | **£9.6m** |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Time taken to update IT systems*

466. We adopt the same assumption for the time it takes an IT professional to update IT systems as was used in the impact assessment on restricting checkout, end-of-aisle, and store entrance sales of food and drinks high in fat, salt, and sugar.[163] The information for this was received through stakeholder engagement which identified that it would take an IT professional between 20 to 30 days to make updates to their IT systems. The 200 hours in our central scenario is based on the midpoint of 25 days (200 hours based on 8 hour working days). We therefore have assumed that in the low scenario it would take 20 days and in the high scenario 30 days, this equates to the hours shown in Table 52. This input has no impact on the benefits.

*Table 52: Low, central and high values for the time taken to update IT systems assumptions*

| | Low | Central | High |
|---|---|---|---|
| Time taken to update IT systems (hours) | 160 | 200 | 240 |

467. The variation in the time taken to update IT systems has minimal impact on the total online familiarisation costs and changes the overall costs of the policy by just over ±2%. As shown in Table 53, an increase in the time taken does lead to higher costs, but the overall effect remains small.

[163] Department of Health and Social Care (2020) Impact Assessment: Restricting volume promotions for high fat, sugar, and salt (HFSS) products.

*Table 53: Present value costs, varying our time taken to update IT systems assumption, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Total online familiarisation costs | £71.0m | £88.5m | £106.0m |
| **Total costs (excluding vending)** | £746.7m | £764.2m | £781.7m |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Number of head office managers and stock managers of vending machine client sites*

468. We are uncertain about our assumptions for the number of head office managers and stock managers at vending client sites as they are unevidenced. Vending clients vary widely in their organisational structures, with some sites potentially sharing management resources. Due to this variability and lack of available data we have conducted sensitivity analysis for the following scenarios, this input has no impact on the benefits.

*Table 54: Low, central and high values for the varying professionals per each vending client site assumptions*

| | Low | Central | High |
|---|---|---|---|
| Number of head office managers per vending client site | 0.5 | 1 | 1 |
| Number of stock managers per vending client site | 0.5 | 0.5 | 1 |

469. The variation in the number of professions per client site has minimal impact on the total vending sector knowledge sharing costs and changes the overall costs of the policy by less than ±5%. As shown in Table 55, an increase in the number of professionals per client site does lead to higher costs, but the overall effect remains small.

*Table 55: Present value costs, varying our professionals per each vending client sites assumptions, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Knowledge sharing costs | £1.8m | £2.3m | £2.7m |
| **Total costs (vending only)** | **£9.1m** | **£9.6m** | **£10.0m** |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Number of stock managers involved in stock planning and how long stock planning takes*

470. As set out in Paragraph 469, we are uncertain about our assumptions for the number of stock managers at vending client sites as they are unevidenced. In addition, we do not know how long it will take to plan the re-stock of the vending machine to remove all stock of high-caffeine energy drinks and replace with something of equal value and our central scenario is unevidenced. The time taken will likely vary depending on the number of high-caffeine energy drinks stocked within the vending machine and availability of suitable replacement products of equal value. Due to this variability and lack of available data we have conducted sensitivity analysis for the following scenarios, this input has no impact on the benefits.

*Table 56 Low, central and high values for the vending machine stock planning assumptions*

| | Low | Central | High |
|---|---|---|---|
| Number of stock managers per vending client site | 0.5 | 0.5 | 1 |
| Time taken for stock planning (hours) | 7.3 | 18.3 | 36.5 |

471. Table 57 summarises the impact this variation in number of stock managers per client site and the time take for stock planning has on our estimated stock planning costs. There is considerable variation in how these inputs changes the total costs, driven mainly by the variation in the amount of time needed for stock planning. This input has the most significant impact on our total costs in comparison to the other vending sector inputs covered by our sensitivity analysis.

*Table 57: Present value costs, varying our vending machine stock planning assumptions, over a 25-year appraisal period (2024 prices, 2027 present value)*

| | Low | Central | High |
|---|---|---|---|
| Stock planning costs | £2.9m | £7.3m | £29.2m |
| **Total costs (vending only)** | **£5.2m** | **£9.6m** | **£31.5m** |

*Note: The costs outlined in this table will not sum to the value of the total costs listed. This is because we have chosen to only present a sub-set of the costs that are affected by the variation in this particular input.*

*Critical value analysis*

472. As discussed throughout the impact assessment, there are a number of factors that impact the costs and benefits appraisal that are uncertain. To place results in context, critical value analysis has been conducted. This poses the question: *by how much would policy effectiveness need to be reduced to generate a zero Net Present Value?*

473. Our central estimate suggests the total benefits of the policy to be £9,166m, and total costs to be £773.8m. This means that around 90% of the benefits would need to be offset for the

policy not to be deemed socially beneficial, or alternatively over an 1000% increase in costs would be needed.

474. While the true scale of uncertainty remains unbounded, the scale of the necessary changes needed to mean the policy is not cost effective does provide supportive evidence that the policy would realise benefits that outweigh the costs.

## 13. Distributional and wider impacts

475. This impact assessment has considered impacts on a range of stakeholders. This section, as well Sections 14 and 15, set out our provisional consideration of the relevant specific impact tests considered, and on different groups, based on the preferred option (Option 2). These will be refined after the consultation.

### 13.1. Equalities

476. The proposed ban on the sale of high-caffeine energy drinks to children under 16 years aims to: a) protect children from the possible harms associated with the consumption of high-caffeine energy drinks and b) contribute to a reduction in children's sugar intakes (see Section 4, Policy objective).

477. To fulfil our requirements under the Equality Act 2010, we will develop a full equalities impact assessment for the policy. This will include an assessment of the policy against the protected characteristics: age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex and sexual orientation. We will also consider the policy against marriage and civil partnership. In the consultation, we ask for information and evidence to support this assessment.

478. It is our provisional assessment that the ban will affect groups of people who shared four main protected characteristics: age, sex, race, and disability. We also assess the policy to have the potential to reduce inequalities in health.

479. **Age**: We expect the proposed ban to impact, and deliver benefits to, all children under 16 years. However, it is possible that older children in scope of the policy may have greater benefit both in terms of the benefits relating to caffeine and obesity reduction. Research suggests that children consume more high-caffeine energy drinks on a weekly basis as they get older,[164] and that rates of childhood overweight and obesity generally increase with age.[165] We recognise that the ban could be seen as discriminatory on the basis of age. However, we believe that any potential discrimination is justified on the basis that it would protect children under 16 years from the possible negative outcomes associated with consuming high-caffeine energy drinks, and that this measure is proportionate and necessary to achieve this objective.

[164] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.
[165] NHS England (2020) Health Survey for England 2019 [NS].

480. Generally, we do not expect the policy to have any material impacts on anyone aged 16 or over, although we recognise that some individuals aged 16 and over who do not have means to prove their age may be prevented from buying a high-caffeine energy drink if they become age-restricted. The exception is our preferred sub-option on vending. This option would prevent people aged over 16 years from purchasing high-caffeine energy drinks in vending machines, although they could continue to purchase them in other retail settings. As set out in Section 5, Summary of preferred option, we think it is appropriate to take this approach to protect the public health of children. We ask for views on this proposal through the consultation and will consider the responses carefully.

481. **Sex**: We expect the ban to impact, and deliver benefits to, children of both sexes who consume high-caffeine energy drinks. However, research consistently reports that boys consume more high-caffeine energy drinks than girls,[166] so the impact may be greater among boys both in terms of preventing them from purchasing high-caffeine energy drinks, and reducing the possible negative health and education outcomes associated with their consumption.

482. **Race***:* We expect the ban to impact, and deliver benefits to, children of all races who consume high-caffeine energy drinks. Research indicates no difference in consumption of high-caffeine energy drinks between ethnic groups,[167] however, we know that children from certain ethnic minority family backgrounds are more likely to have obesity.[168] So, the expected benefits of the policy in terms of obesity reduction may be greater among children from certain ethnic minority family backgrounds.

483. **Disability:** We expect the ban to impact, and deliver benefits to, children under 16 years with and without a disability. We are not aware of any relationship between consuming high-caffeine energy drinks and disability, although research suggests that children with poorer mental wellbeing are more likely to consume these drinks.[169] Research indicates that people with a disability are more likely to have obesity,[170] so the expected benefits of the policy in terms of obesity reduction may be greater among children with a disability.

484. **Inequalities**: We expect the proposed ban to impact, and deliver benefits to, all children in scope, but that there may be a greater impact on children from more deprived areas and lower income households. Research suggests that both the consumption of high-caffeine energy drinks,[171] and rates of obesity,[172] are higher among children from more deprived areas. Therefore, children from these areas and households may be more impacted by the

[166] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[167] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[168] OHID (2025) Patterns and trends in child obesity in England.

[169] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[170] Public Health England (2014) Obesity and Disability – Children and Young People.

[171] Brunton G, Kneale D, Sowden A, Sutcliffe K, and Thomas J. *Caffeinated energy drinks and effects in UK young people: A secondary analysis of population-level datasets*. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education.

[172] OHID (2025) Patterns and trends in child obesity in England.

ban both in terms of preventing them from purchasing high-caffeine energy drinks and receiving greater benefits relating to caffeine and obesity reduction.

485. For the remaining protected characteristics of gender reassignment, pregnancy and maternity, religion or belief, sexual orientation, and marriage and civil partnership, we are not currently aware of data on the consumption of high-caffeine energy drinks. We do not expect any significant impact on these groups. We will update our assessment of the impact on these groups if we become aware of relevant data or research for the final impact assessment.

### 13.2. Environment

486. The sale and consumption of high-caffeine energy drinks will have an overall environmental impact from the production, processing, transport, packaging, refrigeration and waste disposal of these drinks. These activities may involve energy use, fuel use, water use, land use, and emissions.

487. To the extent that consumption of these products decreases in children under 16 years following the sales ban, this could lead to a reduction in the carbon emitted from these activities. The ban will lead to lost sales of high-caffeine energy drinks which would otherwise have been bought by children under 16 years (see Section 7.1.3 Lost sales). However, we have assumed that 90% lost sales from the ban from the ban will be displaced with other sales at the same retailer on soft drinks not in scope of the ban, and that 10% will be spent elsewhere in the economy. Therefore, we expect that any potential reduction in energy use and emissions from a reduction in the consumption and sale of high-caffeine energy drinks will be mitigated by these displaced sales and the environment impacts associated with those goods.

488. We do not have specific data on how much carbon is emitted through the production and sale of high-caffeine energy drinks. We assume it would be similar to the carbon emitted through the production and sale of soft drinks. It was estimated in 2013 that the overall carbon emitted by the production of carbonated soft drinks was 1.5 million tonnes per year.[173]

489. We therefore assess that this policy is likely to have negligible environmental impacts.

### 13.3. Rural Proofing

490. The legislation proposes to ban the sale of high-caffeine energy drinks to all children under 16 years in England, regardless of whether they live in a rural or an urban area.

491. The proportion of the population of children under 16 years is slightly greater in urban areas than in rural areas. Table 58 sets out relevant data from DEFRA's Population Statistics for Rural England published in March 2025.

[173] Amienyo D, Gujba H, Stichnothe H. *et al.* Life cycle environmental impacts of carbonated soft drinks. *Int J Life Cycle Assess* **18**, 77–92 (2013). doi.org/10.1007/s11367-012-0459-y

*Table 58: Percentage of the total population in mid-2020, by age band, in all Rural and Urban areas in England (%)*[174]

| 2011 Rural-Urban Classification of Areas | 0-4 years | 5-9 years | 10-14 years | 15-19 years |
|---|---|---|---|---|
| All Rural | 4.6 | 5.5 | 5.8 | 5.2 |
| All Urban | 6.0 | 6.4 | 6.1 | 5.6 |
| England | **5.7** | **6.3** | **6.1** | **5.5** |

492. In their 2024 systematic review on the consumption of high-caffeine energy drinks by children and young people, Ajibo et al.[175] reported that living in rural areas was associated with higher consumption of high-caffeine energy drinks. This finding appears to be based on a single study from Norway.[176] It is not clear whether this would apply to England. If it does, then there may be a greater benefit seen for the children under 16 years living in rural areas.

493. It is possible that the cost of delivering enforcement of the ban could be greater for local authorities in rural areas, due to a greater geographical dispersion of businesses. As part of the New Burdens Doctrine,[177] we intend to provide funding to local authorities for the costs that will arise from enforcement action.

494. In Section 8.2 Unintended consequences, we note that it is possible that the ban may lead to an increase in the risk of violence towards members of staff, e.g. in retail, as children under 16, or individuals without identification, could respond aggressively or violently if they are prevented from purchasing a high-caffeine energy drink. It is possible this risk could be greater in rural areas, as the greater geographic dispersion of businesses may mean that children prevented from purchasing a high caffeine energy drink have no alternative premises to attempt to purchase from.

495. Overall, we assess that there will be similar impacts on rural and on urban communities resulting from this policy.

### 13.4. Justice Impact

496. Restricting the sale of high-caffeine energy drinks would create a new offence, meaning we could expect new prosecutions for individuals that do not comply with the restrictions. Local Authorities can, as an alternative, issue a Fixed Monetary Penalty to businesses, which means we would not expect only a small proportion of cases to reach prosecution. We have set out our provisional assessment of the impacts on the justice system as part of Section

[174] Department for Environment, Food and Rural Affairs (2025) Population Statistics for Rural England – May 2025. *The data presented in this table does not add up to 100%, as we have only extracted the age ranges relevant for the ban.*

[175] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[176] Degirmenci N, Fossum IN, Strand TA. *et al*. Consumption of energy drinks among adolescents in Norway: a cross-sectional study. *BMC Public Health* **18**, 1391 (2018). doi.org/10.1186/s12889-018-6236-5

[177] Ministry of Housing, Communities and Local Government (2022) New burdens doctrine: guidance for government departments.

7.2 Costs to Government. We will consider any additional evidence gathered during the consultation to update this for the final stage impact assessment.

497. A full justice impact test for this proposal will be developed and agreed with the Ministry of Justice.

### 13.5. New Burdens Assessment

498. The New Burdens Doctrine[178] is clear that anything which issues a new expectation on local government should be assessed for new burdens. If the policy qualifies as a new burden, it should be funded comprehensively by central government.

499. We have set out our provisional assessment of the costs for local authorities to enforce the policy in Section 7.2 Costs to Government. In the consultation, we ask respondents that are responding on behalf of a local authority to provide views on the possible impact of the proposed enforcement approach, including any further information, evidence or data that we should consider in our new burdens assessment. We will consider any additional evidence gathered during the consultation to update this for the final stage impact assessment.

500. A full new burdens assessment for this proposal will be developed and agreed with the Ministry of Housing, Communities and Local Government.

### 13.6. Labour Market and Economic Growth

501. We do not think the policy will have immediate effects on the labour market or on economic growth, given it is focused on children. However, we estimate that the ban's benefits will include a small reduction in obesity prevalence, and we know that obesity can increase the risk of ill-health which can impact an individual's labour market outcomes.[179] As such, we expect there could be benefits to the labour market and economic growth in future years.

502. Our estimates are provided alongside the description of the calorie model. Additionally, as evidence indicates that high-caffeine energy drink consumption is associated with detrimental educational effects,[180] it is possible that the ban could contribute to an improvement in educational outcomes for some children. There is some evidence that higher attainment in key stage 2 test scores is associated with improved labour market outcomes such as a higher change of being employed and higher earnings.[181]

503. We do not believe the policy will have a significant impact on the retailer, out of home, vending, and online sectors as we assume the majority of sales of high-caffeine energy drinks that will not be allowed under the ban will be displaced to the sale of other carbonated soft drinks. We also assume that all sales are displaced within the UK

[178] Ministry of Housing, Communities and Local Government (2022) New burdens doctrine: guidance for government departments.

[179] Obesity is estimated to cost £8.9bn per year through increased sickness absence, and early death reduces workforce productivity by putting a burden on businesses and the economy. Source: Frontier Economics (2023) The Rising Cost of Obesity in the UK.

[180] Ajibo C, Van Griethuysen A, Visram S, and Lake AA. Consumption of energy drinks by children and young people: a systematic review examining evidence of physical effects and consumer attitudes. Public Health 2024; volume 227, pages 274-281

[181] Department for Education (2023). Key stage 2 attainment and early labour market outcomes: research report.

economy, so there will be no impact on economic growth. Additionally, many retailers have already adopted a voluntary ban on the sales of high-caffeine energy drinks to children under 16 years. Impacts on trade specifically are considered in Section 16, Potential trade implications.

## 14. Impact on small and micro businesses

504. We recognise that under Better Regulation Framework guidance, the starting point is that small and micro-businesses should be exempt from the requirements of new regulatory provisions. However, we think the majority of major supermarkets and around 79% of Association of Convenience Stores members already have a voluntary ban in place. It's therefore likely that the majority of children under 16 years are currently buying high-caffeine energy drinks from small and micro businesses. We therefore believe that, if a full or a partial exemption is applied, a large part if not almost all of the intended benefits of this policy would be lost.

505. We propose that the ban will apply to businesses of all sizes in England, with no exclusions for small and micro businesses. It is important for smaller retailers to be in scope of any ban, as research suggests these stores may be a continued source of access to these products for young people,[182] despite voluntary action across the retail sector.

506. In addition, we believe that a level playing field for all businesses will help ensure the ban is consistently applied across the relevant sectors by making it easy for consumers to understand and for retailers to implement. This may make the market simpler, as presently there is variation in whether the voluntary ban is applied or not.

507. Businesses that are not already taking voluntary action are likely to incur the greatest costs, and we recognise this may affect a greater proportion of small and micro businesses. This section breaks down the impact of the preferred policy option on small and micro businesses for each affected sector. If we receive further information on the impacts of the policy on small and micro businesses through the consultation, we will consider updating our assessment.

### *Estimating the impact of the policy on small and micro businesses*

508. Only costs incurred by retailers and out of home businesses are quantified for this Small and Micro Business Assessment (SaMBA), as manufacturers and vending machine businesses are generally not expected to be operating as small or micro businesses.

509. While we acknowledge that a limited number of manufacturers or vending machine businesses may qualify as small or micro businesses, we do not have sufficient data to reliably estimate the associated costs, and they are therefore excluded from this assessment.

[182] Vogel C, Shaw S, Strömmer S, Crozier S, Jenner S, Cooper C, Baird J, Inskip H and Barkeret M. Inequalities in energy drink consumption among UK adolescents: a mixed-methods study. Public Health Nutrition 2022: volume 26, issue 3, pages 575 to 585

510. This assessment considers the costs for retailers and out of home businesses under our central estimate of the ban, including familiarisation and ongoing costs. It also considers lost sales across all sectors based on current drinking habits of children under 16 years, however we only account for the loss of sales to retailers.

511. Table 59 summarises the estimated costs over a 25-year appraisal period for each sector explored. Further details on the calculations are provided in the following sections.

*Table 59: Summary of total costs to small and micro businesses over a 25-year appraisal period (2024 prices, 2027 present value)*

| Sector | Impact | Cost/benefit | Quantified | Estimate |
|---|---|---|---|---|
| Retailers (including online) | Familiarisation | Cost | Yes | £93.3 m |
| | Ongoing-costs – training new delivery drivers | Cost | Yes | £0.3 m |
| | Age verification | Cost | Yes | £329.0 m |
| | **Total costs to small and micro retailers** | | | **£422.6 m** |
| Out of home | Familiarisation | Cost | Yes | £6.7 m |
| | Ongoing-costs – training new staff | Cost | Yes | £6.2 m |
| | Age verification | Cost | No | - |
| | **Total costs to small and micro out of home businesses** | | | **£12.9 m** |
| All Sectors | Retailers lost markup from fall in high-caffeine energy drink sales | Transfer cost | Yes | £996.4 m |
| | Retailers gained markup from increase in non-energy drink sales | Transfer cost | Yes | £896.7 m |
| | **Total lost sales*** | | | **£99.6 m** |
| | | | **Total monetised costs (including lost sales)** | **£535.2 m** |
| | | | **Total monetised costs (excluding lost sales** | **£435.5 m** |

**These figures reflect the impacts on retailers only and do not take into account our assumption that lost sales will be offset by gains elsewhere in the economy, resulting in no overall net economic loss.*

512. Overall, we assess that there is limited disproportionate impacts on small and micro businesses. Please note the distribution of costs is skewed as we calculate the ongoing age verification costs in the retail sector only, though this in reality covers this cost across both sectors.

- We estimate that small and micro businesses make up 99% of the retail sector, but we estimate that they will bear 57% of the costs.

- We estimate that small and micro businesses make up 84% of the out of home sector, but we estimate they will bear 90% of the costs.

*Retail*

513. With respect to small and micro retailers, this assessment considers the following impacts:

- Familiarisation costs including creating guidance, creating producing and implementing shelf labels, staff training and awareness, updating Electronic Point of Sale systems, and updating IT systems.

- Ongoing costs including new staff training and age verification

514. The methodology used to identify the number of businesses that are in scope of this policy is set out in Annex A: Retail sector methodology. Table 60 sets out a summary of the businesses in scope identified as small and micro businesses.

*Table 60: Summary of small and micro retail businesses within scope of the policy*

| | **Micro** | **Small** | **Total (small and micro)** |
|---|---|---|---|
| **Total businesses** | **35,125** | **3,498** | **38,623** |
| - With an existing voluntary ban | 0 | 2,763 | 2,763 |
| - Without an existing voluntary ban | 35,125 | 734 | 35,859 |
| **Businesses with an EPOS system** | **27,046** | **2,693** | **29,739** |
| - With an existing voluntary ban | 0 | 2,128 | 2,128 |
| - Without an existing voluntary ban | 27,046 | 566 | 27,612 |
| **Businesses with an online offering** | **11.943** | **1.189** | **13,132** |

515. Online only retailers are not considered in this assessment as we assume they are large businesses, but we do consider the costs for small and micro businesses assumed to have an online offering.

516. The methodology used to identify the number of stores that belong to the businesses that are in scope of this policy is set out in Annex A: Retail sector methodology. Table 61 sets out a summary of the number of stores in scope that are identified as small and micro.

*Table 61: Summary of small and micro retail stores within scope of the policy*

| | Micro | Small | Total (small and micro) |
|---|---|---|---|
| **Total stores** | **36,927** | **16,172** | **53,099** |
| - With an existing voluntary ban | 0 | 13,580 | 13,580 |
| - Without an existing voluntary ban | 36,927 | 2,592 | 39,519 |

517. The methodology used to identify the number of employees working in the stores in scope of the ban is set out in Annex A: Retail sector methodology. Table 62 sets out a summary of the number of employees in scope that are identified as working in small and micro stores.

518. Based on the proportion of convenience stores who provide local grocery delivery from the Association of Convenience Stores local shop report,[183] we assume that 34% of total delivery drivers, which are calculated in Paragraph 141, deliver for small and micro businesses.

*Table 62: Summary of employees working in small and micro retail stores within scope of the policy*

| | Micro | Small | Total (small and micro stores) |
|---|---|---|---|
| **Total employees** | **91,490** | **240,952** | **332,442** |
| Working in store with an existing voluntary ban | 76,828 | 202,338 | 279,166 |
| Working in store without an existing voluntary ban | 14,662 | 38,614 | 53,276 |
| **Employees working with an EPOS system** | **70,447** | **185,533** | **255,980** |
| Working in store with an existing voluntary ban | 59,157 | 155,800 | 214,958 |
| Working in store without an existing voluntary ban | 11,290 | 29,733 | 41,022 |
| **Delivery Drivers** | **Unknown (part of total)** | **Unknown (part of total)** | **12,137** |

[183] The Association of Convenience Stores (2024) ACS Local Shop Report.

*Retail sector familiarisation costs*

519. The familiarisation costs to retailers are set out in Section 7.1.1, Retail sector (including online. However, this applies to all retailers. The assessment in this section follows the same methodology but focuses only on the impacts to small and micro retailers.

520. We calculated the total familiarisation costs to small and micro retailers by multiplying the relevant costs by the corresponding number of businesses, stores, or employees subject to the familiarisation cost. To remain consistent with the main methodology, a 50% cost reduction is applied in all cases where a voluntary ban is already in place. Total familiarisation costs are summarised in Table 63.

*Table 63: Summary of familiarisation costs to small and micro retail businesses over a 25-year appraisal period (2024 prices, 2027 present value)*

| **Cost** | **Micro** | **Small** | **Total (small and micro)** |
|---|---|---|---|
| Creating guidance | £1.8 m | £0.1 m | £1.9 m |
| Creating and producing shelf labels or signage | £1.8 m | £0.1 m | £1.9 m |
| Installation of shelf labels or signage | £0.5 m | £0.1 m | £0.6 m |
| Updating EPOS systems | £0.1 m | £0.007 m | £0.1 m |
| Updating IT systems (online only) | £78.3 m | £7.8 m | £86.1 m |
| Staff training (physical store staff) | £0.4 m | £1.2 m | £1.6 m |
| Staff training (delivery drivers) | Unknown (part of total) | Unknown (part of total) | £0.09 m |
| Knowledge sharing (online only) | £0.8 m | £0.08 m | £0.8 m |
| | | **Total familiarisation costs** | **£93.3 m** |

*Retail sector ongoing costs*

521. Section 7.1.1, Retail sector (including online sets out the ongoing costs for all retailers including age verification. The assessment in this section follows the same methodology but focuses specifically on the ongoing costs subject to small and micro retailers.

522. We estimated the total age verification costs to small and micro retailers by applying relevant cost assumptions to the number of additional transactions subject to the policy (transactions from businesses without an existing voluntary ban). Total age verification costs are summarised Table 64.

*Table 64: Summary of ongoing costs to small and micro retail businesses over a 25-year appraisal period (2024 prices, 2027 present value)*

| Cost | Micro | Small | Total (small and micro) |
|---|---|---|---|
| Age verification | £228.8m | £100.2m | £329.0 m |
| | | **Total ongoing costs** | £329.0 m |

*Out of home sector*

523. In relation to small and micro businesses in the out of home sector, this assessment considers the following impacts:

- Familiarisation costs including creating guidance, staff training and awareness, updating Electronic Point of Sale systems, and new signage.

- Ongoing costs including new staff training.

524. In Section 7.1.2 Out of home sector, we set out the methodology used to estimate the number of businesses in the out of home sector in scope of the ban. Table 65 sets out a summary of those businesses in scope that are identified as small and micro businesses. We assume no micro or small businesses in museums, cinemas, amusement parks, botanical gardens or nature reserves sell high-caffeine energy drinks.

*Table 65: Summary of small and micro out of home businesses within scope of the policy*

| OOH Sector | Micro | Small | Total (small and micro) |
|---|---|---|---|
| Licensed restaurants | 11,199 | 6,538 | 17,737 |
| Unlicensed restaurants and cafes | 2,372 | 558 | 2,930 |
| Take away food shops and mobile food stands | 33,505 | 2,835 | 36,340 |
| Public houses and bars | 797 | 382 | 1,179 |
| Sports Facilities | 1,231 | 301 | 1,532 |

525. The methodology used to identify the number of employees working in the out of home establishments that are in scope of ban is set out in Annex B: Out of home sector methodology. Table 66 sets out a summary of the number of employees in scope that are identified as working in small and micro establishments.

*Table 66: Summary of employees working in small and micro out of home businesses within scope of the policy*

| | Micro | Small | Total (small and micro) |
|---|---|---|---|
| **Working in licensed restaurants** | **50,272** | **225,070** | **275,342** |
| - Working with an EPOS system | 15,082 | 225,070 | 240,152 |
| - Working without an EPOS system | 35,191 | 0 | 35,191 |
| **Working in unlicensed restaurants and cafes** | **10,992** | **18,966** | **29,958** |
| - Working with an EPOS system | 3,298 | 18,966 | 22,263 |
| - Working without an EPOS system | 7,695 | 0 | 7,695 |
| **Working in take away food shops and mobile food stands** | **109,255** | **93,543** | **202,798** |
| - Working with an EPOS system | 32,777 | 93,543 | 126,319 |
| - Working without an EPOS system | 76,479 | 0 | 76,479 |
| **Working in public houses and bars** | **3,339** | **15,581** | **18,920** |
| - Working with an EPOS system | 1,002 | 15,581 | 16,583 |
| - Working without an EPOS system | 2,337 | 0 | 2,337 |
| **Working in sports facilities** | **4,434** | **11,438** | **15,872** |
| - Working with an EPOS system | 1,330 | 11,438 | 12,768 |
| - Working without an EPOS system | 3,104 | 0 | 3,104 |

*Out of home sector familiarisation costs*

526. The familiarisation costs to the out of home sector are provided in Section 7.1.2 Out of home sector. However, this applies to all size establishments. The assessment in this section follows the same methodology but focuses only on the impacts to small and micro out of home establishments.

527. We calculate the total familiarisation costs to small and micro out of home businesses by multiplying the relevant costs by the corresponding number of businesses, stores, or employees subject to the familiarisation cost. Total familiarisation costs are set out in Table 67.

*Table 67:Summary of familiarisation costs to small and micro out of home businesses over a 25-year appraisal period (2024 prices, 2027 present value)*

| **Cost** | **Micro Costs** | **Small Costs** | **Total Small and Micro costs** |
|---|---|---|---|
| Creating guidance | £1.7 m | £0.4 m | £2.1 m |
| Staff training | £2.1 m | £2.5 m | £4.5 m |
| Updating EPOS systems | £0.04 m | £0.03 m | £0.07 m |
| New signage | £0.2 m | £0.04 m | £0.2 m |
| | | **Total familiarisation costs** | **£6.7 m** |

*Out of home sector ongoing costs*

528. The section on the Out of home sector outlines the ongoing costs for all out of home establishments who are not already licensed to sell age-restricted products. The assessment in this section follows the same methodology but focuses specifically on the ongoing costs subject to small and micro out of home sector businesses.

529. We estimate the total training costs to small and micro out of home sector businesses by applying relevant cost assumptions to the number of new employees who require training. Total ongoing costs are set out in Table 68.

*Table 68: Summary of ongoing costs to small and micro out of home businesses over a 25-year appraisal period (2024 prices, 2027 present value)*

| **Cost** | **Micro** | **Small** | **Total (small and micro)** |
|---|---|---|---|
| Training new employees | £4.0 m | £2.2 m | £6.2 m |
| | | **Total ongoing costs** | **£6.2 m** |

*Lost sales across all sectors*

530. Section 7.1.3, Lost sales sets out the lost sales as a result of the policy for all retailers across all sectors. The assessment in this section follows the same methodology but focuses specifically on the lost sales costs incurred by small and micro retailers. We do not make an assessment of impacts on potential small and micro manufacturers.

531. Although this section sets out the estimated lost sales costs specifically for small and micro retailers, our displacement assumptions suggest that these losses are offset elsewhere in the economy. As a result, we estimate no overall net economic loss.

*Retailer lost sales*

532. In the absence of specific data, we assume that small and micro retailers account for a proportion of the annual high-caffeine energy drinks market equivalent to their representation in the total business population. Specifically, we assume that 9% of the market is attributable to small retailers and 90% to micro retailers.

533. Using the same methodology as set out in the Section 7.1.3, Lost sales we calculate that small and micro retailers will incur a total loss of sales valued at £99.6 million over a 25-year appraisal period. Lost profits from reduced sales of high-caffeine energy drinks are estimated at £996.4 million, however this is partially offset by an estimated £896.7 million in profits gained from displaced sales to other carbonated soft drinks.

*Local Authorities*

534. The definition of small and micro businesses is not applicable to local authorities as they are public bodies. We have therefore not considered them in this specific impact test assessment.

***Mitigations***

535. We have considered whether other mitigations could be applied to reduce the impact of the ban on small and micro businesses, in line with the Better Regulation Framework Guidance.[184]

536. In the consultation, we are asking for views on the length of time that businesses will need to prepare to implement the ban. We proposed that a 6-month implementation period is appropriate for all retailers regardless of businesses size, since many retailers already have processes for the sale of other age-restricted products that they can build on. These may include voluntary bans on the sale of high-caffeine energy drinks, or systems and procedures that enable age verification for other products. We will review responses received during the consultation to inform the final approach that will be taken for the implementation period.

537. We do not believe that there could be different requirements by business size. To achieve the intended public health benefits, we need to apply the ban consistently in all settings where children can buy high-caffeine energy drinks. This could be undermined if smaller businesses can still sell these drinks, or if they are exempted from enforcement.

538. We do, however, think that different fines may be appropriate for different sized businesses. We set out the proposed penalties in the consultation, which includes lower fines for micro and small businesses (see Table 69). In the consultation, we ask respondents if they agree

[184] Department for Business and Trade (2023) Better Regulation Framework guidance.

with the proposed amounts or, if not, what the fixed monetary penalty for the two categories should be. We will review responses received during the consultation to inform the final approach that will be taken for fines and penalties.

*Table 69: Proposed fixed monetary penalties for underage sales of high-caffeine energy drinks*

| Person or business | Sum of the fixed monetary penalty | Sum to discharge liability (50% of the fixed monetary penalty) within the specified time | Sum for any penalty that is unpaid and has not been appealed after the specified time |
|---|---|---|---|
| Individual, micro and small businesses (less than 50 employees) | £1,500 | £750 | £2,250 |
| Medium and large businesses (50 employees or more) | £2,500 | £1,250 | £3,750 |

539. We set out in the consultation document that we will develop guidance, in consultation with stakeholders, that enforcement bodies and businesses can use to help them comply with the regulations. We will work with stakeholders to ensure this is clear for businesses of all sizes, including small and micro businesses. Generally, the ban should be straightforward for businesses to comply with because:

- the vast majority of retailers, of all sizes, are likely to already have processes for the sale of age restricted products such as alcohol or tobacco

- our definition is consistent with that of industry guidance, meaning businesses and consumers will be able to identify high-caffeine energy drinks in scope of the age of sale ban by checking for the high caffeine content label.

540. We do not believe that the other mitigations listed for consideration in the Better Regulation Framework Guidance[185] would be applicable to the ban, as we are not proposing businesses to register, be licenced, pay fees, or redesign any of their products.

# 15. Other impacts

## 15.1. Competition

541. We have assessed the impact that the proposed ban may have on competition including considering the Competition and Market Authority's guidance on competition assessments.

***Will the measure directly or indirectly limit the number or range of suppliers?***

542. The proposed ban will not directly or indirectly limit the number of suppliers in the market for any of the affected sectors, although we recognise that the policy may lead to a loss of

[185] Department for Business and Trade (2023) Better Regulation Framework guidance.

sales for retailers and manufacturers of high-caffeine energy drinks (including the out of home and vending sectors), that otherwise would have been made to children under 16 years. We believe the majority of this will be displaced to soft drinks. We have assessed the degree to which this may affect the profits of manufacturers of high-caffeine energy drinks (see Section 7.1.3, Lost sales), but we have not assessed whether this might influence some manufacturers to leave the market. However, as many manufacturers have signed up to the British Soft Drinks Association voluntary code of practice which seeks to limit sales to children under 16 years, we would not expect a significant negative impact.

543. There is no requirement to register or gain a licence being introduced as part of this policy.

***Will the measure limit the ability of suppliers to compete?***

*Manufacturers*

544. The proposals will not limit businesses' ability to compete on quality, geographical location, or price. The proposed legislation will apply to the sale of all high-caffeine energy drinks in England, from all manufacturers, so there should be a limited effect on their ability to compete in the high-caffeine energy drink market. In addition, as many manufacturers have signed up to the British Soft Drinks Association voluntary code of practice which seeks to limit sales to children under 16 years, we would not expect a significant negative impact.

545. The British Soft Drinks Association's voluntary code of practice commits its members to not directly market, or sample high-caffeine energy drinks with children under 16 years.[186] This means that members of this association are already not directly marketing to children under 16 years, and therefore these restrictions should not disadvantage any supplier's promotion or marketing. In addition, the Committee of Advertising Practice's guidance on media placement restrictions states that media placement restrictions prohibit age-restricted marking communications from appearing in media for children or young people, and where children and young people make up a significant proportion of the audience.[187] We expect this to apply to high-caffeine energy drinks when the ban comes into force. This reinforces the point that the restrictions will not disadvantage supplier's marketing.

546. Our impact assessment assumes that 90% of high-caffeine energy drink sales to children under 16 years will be displaced to other soft drinks. Therefore, based on this assumption, other soft drink companies may indirectly benefit. If the purchase is of a brand owned by the same company then it may not be affected, although sales could potentially move to cheaper or more expensive products with different profit margins.

*Retailers*

547. We have assumed that when children are unable to buy a high-caffeine energy drink from their chosen retailer due to the age restriction, they will continue to spend their money in the same retailer on another soft drink in 90% of cases. In this case, the sale will remain in

[186] British Soft Drinks Association. (2010) Code of practice on high caffeine soft drinks.

[187] Committee of Advertising Practice (2017) Media placement restrictions: protecting children and young people

the same businesses, although we recognise that profit margins may differ between products.

548. It is possible that some displacement may occur between different retail types (e.g. supermarket, corner shop), if an individual has been refused sale in one shop due to lack of identification and they try another. However, all retailers should implement similar age verification processes and therefore one retailer should not be at an advantage over another in selling high-caffeine energy drinks if they are all implementing the ban. If online retailers carry out less stringent identification checking measures, then it is possible that some displacement may occur from physical retailers to online retailers.

549. It may be possible that children bought high-caffeine energy drinks in smaller convenience retailers rather than larger retailers because they were less likely to operate a voluntary ban. Following a mandatory ban where children are unable to buy high-caffeine energy drinks in any retailer, we assume they decide to buy another product from the same retailer. However, they may choose to buy another product (e.g., a soft drink) in a different, larger retailer instead of remaining with a smaller retailer. There could be various reasons why this may occur, e.g., price point, location, range of product, which would be similar to the competition retailers experience for other products.

550. Therefore, we do not anticipate the proposal to have any significant impacts on the ability of retailers to compete.

***Will the measure limit suppliers'* incentives to compete?**

551. The proposed ban does not exempt businesses from general competition law, introduce or amend intellectual property regime or increase the costs to customers of switching between suppliers.

***Will the measure affect consumers' ability to engage with the market and make choices that align with their preferences?***

552. The ban will prevent children under 16 years from buying high-caffeine energy drinks. However, it will not prevent them from deciding from whom they purchase other drinks, change the information available to them, or reduce their 'mobility' by increasing the cost of changing suppliers (e.g., it won't affect their ability to purchase soft drinks and other non-high caffeine energy drinks from different retailers, or to shop around).

553. The proposed ban does not affect the ability of consumers aged over 16 years to engage with the market and make choices that align with their preferences. High-caffeine energy drinks will continue to have the high caffeine content labelling, which will support consumers and retailers to identify which drinks are in scope and cannot be sold to children under 16 years.

***Will the measure affect suppliers' ability and/or incentive to introduce new technologies, products or business models?***

554. We do not anticipate an effect on businesses abilities or incentives to introduce new technologies, products, or business models. If anything, manufacturers of high-caffeine

energy drinks may be incentivised to reformulate or expand their product range to produce appropriate products for children under 16 years. Given there is already voluntary action in place, bans in other countries, and the government committed in its manifesto to ban the sale of high-caffeine energy drinks to children under 16 years, some manufacturers of high-caffeine energy drinks may already be diversifying their product ranges in anticipation.

## 16. Potential trade implications

555. We have set out our assessment of the potential implications for trade from the proposed ban, and we are in the process of consulting with other government departments where appropriate. We will keep this section under review and update it following consultation.

### 16.1. Available data on international trade of high-caffeine energy drinks

556. The proposed ban on the sale of high-caffeine energy drinks to children under 16 years will likely reduce the number of these drinks sold in England. Whilst the size of any reduction is not expected to be significant as the majority of retailers already implement a voluntary ban, this ban could impact the overall number of high-caffeine energy drinks imported into, or produced in, England. We have assumed that 90% of the lost sales will be displaced to carbonated soft drinks, meaning that imports and production of these drinks could increase. Some of these carbonated soft drinks may be from the same manufacturer as the high-caffeine energy drink, others may not.

557. To understand the potential impact on trade, we reviewed available trade and manufacturing data, including data on sales, imports and exports of high-caffeine energy drinks. We did not identify a specific product code for high-caffeine energy drinks within UK commodity codes.[188] We believe the most applicable category is '11071930 (CN 220210), Waters, with added sugar, other sweetening matter or flavoured, i.e. soft drinks, INCLUDING: mineral and aerated', which is likely to include high-caffeine energy drinks, as well as carbonated soft drinks like colas.

558. In 2023, the UK manufacturing sales for this category was £6.3bn (14.8bn litres),[189] and the UK imported £658m of goods and exported £475m.[190] The top three countries the UK imported these goods from were Netherlands (£129m), France (£100m) and Belgium (£100m).

559. There are limitations to the use of these data. They are not specific to high-caffeine energy drinks, purchases by children under 16 years old, or sales in England only. Therefore, the sales, imports and exports relevant to children under 16 years are likely to make up a much smaller proportion of the above figures558. It is therefore difficult to quantitatively estimate the impact on trade from this regulation. People aged 16 years and over will still be able to buy high-caffeine energy drinks, and we expect the vast majority of lost sales from children under 16 years will be displaced to carbonated soft drinks. We therefore assess that it is

[188] HM Revenue and Customs (2018) Finding commodity codes for imports into or exports out of the UK.

[189] Office for National Statistics (2024) UK manufacturers' sales by product (Table 5)

[190] HM Revenue and Customs. Overseas Trade in Good Statistics (OTS), 2023

likely that the vast majority of the international trade in this product category will be unaffected, and that the overall impact on trade volumes is likely to be small.

### 16.2. Technical Barriers to Trade

560. We considered whether the proposed ban was in scope of the World Trade Organisation Agreement on Technical Barriers to Trade. The proposed ban does not introduce any changes to the product itself, such as changes to labelling. There is already a label of *'High caffeine content. Not recommended for children or pregnant or breast-feeding women*' required for any drink, other than tea or coffee, that contains over 150 milligrams of caffeine per litre. Both imported and locally produced high-caffeine energy drinks will be treated equally; all will be subjected to the age of sale ban. Therefore, we do not consider the proposed ban to introduce a technical barrier to trade.

### 16.3. Sanitary and Phytosanitary Measures

561. We are considering whether the proposed ban is in scope of the World Trade Organisation Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures.

562. The only possible applicable limb of the agreement defines the purpose of a sanitary or phytosanitary measure as a measure applied ‘to protect human or animal life or health within the territory of the Member from risks arising from additives, contaminants, toxins or disease-causing organisms in foods, beverages or feedstuffs’.

563. We are consulting with officials in the Food Standards Agency and DEFRA on whether caffeine meets definitions of an additive, or any of the other terms mentioned in this limb of the agreement. At present we believe that caffeine is used in high-caffeine energy drinks for its physiological effect, and that when used in high-caffeine energy drinks it does not have a technological function on food. This would mean it is a food ingredient (as opposed to an additive).

564. We searched the sanitary and phytosanitary measure notifications platform for countries that we know to have introduced bans on the sale of high-caffeine energy drinks to children, including Romania, Lithuania, Latvia and Poland, with the phrases ‘caffeine’ and ‘energy drinks’ and found no evidence that notifications were made for these regulations.

565. At this stage, we view it unlikely that the ban would be a sanitary and phytosanitary measure. We will take any necessary actions if our assessment changes.

### 16.4. The UK Internal Market

566. High-caffeine energy drinks is a devolved policy area, with each nation in the UK responsible for deciding its own policy. The proposed ban applies to England only. We have therefore considered whether the proposed ban could have an impact on the UK internal market. This includes any implications that may arise from the UK Internal Market Act 2020 and the market access principles defined within it.

567. We assess that the ban would constitute a ‘manner of sale requirement’ (i.e., a statutory requirement that governs how goods are sold, including to whom) and as such is out of scope of the mutual recognition principle of the UK internal market. The ban will introduce no technical barriers between England and the other countries of the UK, and the movement of qualifying Northern Ireland goods between Northern Ireland and Great Britain (or any part of it) will not be affected. All high-caffeine energy drinks across the UK will have the high caffeine content warning label.

568. The ban will not directly discriminate against businesses with relevant connections with other parts of the UK, as it will apply equally to products made in or imported to England. All high-caffeine energy drinks, regardless of which part of the UK they may have a connection with, will be in scope of the age of sale ban.

569. We are considering whether the ban might give rise to indirect discrimination under the Act. Indirect discrimination under the Act would only apply if the policy cannot reasonably be considered a necessary means of achieving a legitimate aim. As set out in Section 4, Policy objective, the main objective of the policy is to reduce the consumption of high-caffeine energy drinks to children under 16 years, and the aim is to protect children from possible harms associated with the consumption these drinks, including negative outcomes to their physical and mental health, as well as their education.

570. Under Section 3, Policy options considered, we set out a range of possible options to achieve this objective. This included: doing nothing and continuing with a voluntary, business-led approach; our preferred option and the government’s manifesto commitment to ban the sale of high-caffeine energy drinks to children under 16 years old; and various alternative options such as restricting advertising, minimum unit pricing, educating the public, introducing clearer caffeine content labelling requirements, or restricting can/bottle size. Subject to the outcomes of the consultation, we believe banning the sales of high-caffeine energy drinks to children is the best option to achieve the policy objectives. We consider that doing nothing is unlikely to lead to a further reduction in children’s consumption of high-caffeine energy drinks. The alternative options were ruled out for various reasons described under policy options considered, including, for example, that: they are likely to have limited impact; or, they may introduce a technical barrier to trade (which we want to avoid if possible). As we consider other options to be insufficient means of achieving the policy aim, which we believe to be legitimate, we therefore assess that the ban is a necessary means to achieve a legitimate aim.

571. Regardless, we expect that UK drinks manufacturers/importers may be affected slightly differently depending on what other products they offer. For example, manufacturers that have high-caffeine energy drinks in scope of the ban may see their sales of those drinks drop when the ban comes into force. However, manufacturers of soft drinks which are not in scope of the ban could see their sales of those drinks rise, as the sales of high-caffeine energy drinks to children under 16 years are expected to be displaced to other soft drinks. It is possible that this could affect the volumes of intra-UK trade if, for example, these children swap high-caffeine energy drinks produced by manufacturers associated with one part of the UK to soft drinks produced by manufacturers associated with a different part of the UK.

We are not aware of data that sets out intra-UK trade on high-caffeine energy drinks or soft drinks.

572. The British Soft Drinks Association represents producers of soft drinks from across the UK. It's voluntary Code of Practice on energy drinks aims to limit sales of these drinks to children under 16 years, and we therefore expect that many manufacturers across the UK will already be trying to limit the sales of their high-caffeine energy drinks to this age group. This minimises any potential impact on intra-UK trade further.

## 17. Monitoring and Evaluation

573. The proposed ban on the sale of high-caffeine energy drinks to children under 16 years will introduce new legislation. To fulfil requirements set out in the Small Businesses, Enterprise and Employment Act 2015, the Department of Health and Social Care will publish a comprehensive post implementation review of the policy within 5 years of commencement.

574. The aim of the post implementation review is to establish whether the regulation:

a) has achieved its objectives

b) has objectives that remain appropriate

c) is still required, and remains the best option for achieving the objective

d) could be achieved in another way which involves less onerous regulatory provision to reduce the burden on business and/or increase overall societal welfare

575. The Department is also required to review the enforcement of the policy, as set out in the Regulatory Enforcement and Sanctions Act 2008, within 3 years of implementation.

576. In addition to fulfilling legislative requirements, the Department intends to commission an independent evaluation of the policy, covering both outcome and process evaluation. We are exploring the appropriate route for commissioning this work. This will aim to assess:

a) how well did the intervention meet its objectives?

b) were there unexpected outputs, outcomes or unintended effects?

c) were costs, benefits, and delivery times as predicted?

d) was delivery achieved as expected and were any changes needed?

e) what can be learnt for future interventions.

577. This section sets out our provisional plans for monitoring and evaluation; informed by HM Treasury's Green Book, Magenta Book, and the Department for Business and Trade Better Regulations guidance on post implementation reviews. We expect the evaluation to use a mixture of qualitative and quantitative methods. Final details, including the scale and timing of evaluation, will continue to be refined for the final stage impact assessment.

578. As set out in Section 4, Policy objective, the main and secondary objectives of the policy are to:

- reduce the consumption of high-caffeine energy drinks to children under 16 years; and
- contribute to a reduction in children's sugar intake for those which stop consuming sugar sweetened versions of high-caffeine energy drinks

579. We consider the main external factors that may affect the success of the policy to include compliance by retailers (particularly small and micro-businesses), enforcement of the policy by local authorities, and the behaviour of parents, carers, or other people over the age of 16 years who may decide to purchase high-caffeine energy drinks on behalf of a child.

580. As set out above, the Department is required to publish the post implementation review within 5 years of the policy commencing. This allows sufficient time for implementation and enforcement, and for the Department to have time for any additional research needed, for example to better understand emerging issues or policy changes needed, to inform the post implementation review.

581. We have identified data needed to understand if the policy objectives have been achieved. This includes a combination of existing and commissioned data sources to assess the following four key areas:

a) Children's consumption of high-caffeine energy drinks
b) Impacts on retailers
c) Impacts on manufacturers
d) Enforcement and compliance

582. We have set out further information on each of these areas below.

*Children's consumption of high-caffeine energy drinks*

583. We intend to measure changes in the frequency and volume of consumption of high-caffeine energy drinks by children under 16 years, and how children access these drinks, including whether they buy them for themselves or are bought them by friends or family (i.e., proxy purchasing). In addition, we want to review whether children consume other types of caffeinated drinks (i.e., tea or coffee) and will seek to assess if consumption patterns for these drinks change.

584. We have already commissioned the baseline data collection on children's consumption and purchasing of high-caffeine energy drinks through a commercial survey provider, which we intend to repeat in the post-implementation period. In addition, we commissioned data via the Department for Education Omnibus Survey to support our impact assessment, which we may seek to repeat if we assess this to be needed. There are also several other existing surveys which collect data on the frequency of children's consumption of high-caffeine energy drinks such as the Health Behaviour of School Children survey. These may be a

useful data source to support the evaluation, although they are collected on a less frequent basis.

585. We will also seek to estimate changes in the amount of sugar consumed by children from high-caffeine energy drinks. This can be done using commissioned data on children's consumption of high-caffeine energy drinks (i.e. the baseline survey, and other sources described above) and commercial data on volume sales of high-caffeine energy drinks and their nutrition information; the Department purchases these data for other monitoring.

586. We intend to include questions in the post-implementation survey to identify unintended consequences due to wider system changes, for example, increases in children's consumption of other caffeine sources, or child targeted marketing of caffeinated products.

*Impacts on retailers*

587. We intend to review, where possible, impacts of the policy on retailers, particularly small and micro-businesses, and any potential unintended consequences of the introduction of the regulations. This may be provided through qualitative data collection methods carried out as part of the process evaluation.

*Impacts on manufacturers*

588. We intend to understand how manufacturers respond to the regulation, for example whether they reformulate existing products to reduce the caffeine content, introduce new products which contain caffeine in a level below the threshold for the ban in addition to other stimulating substances, or expand other product lines such as cold, canned coffees. This can be informed by commercial sales data purchased by the Department for other monitoring purposes.

*Enforcement and compliance*

589. We will use the pre and post-implementation survey (see Paragraph 584) to collect data on the extent to which children self-report being able to buy high-caffeine energy drinks, and from which type of retailer, as an indirect measure of compliance.

590. We intend to commission research to review enforcement of the ban, including enforcement activity undertaken and experiences of enforcement from local authorities and, if possible, retailers, and complainants, as part of our process evaluation.

## Annex A: Retail sector methodology

### Number of retail stores in scope of the ban

591. We have used a combination of 2023 Institute of Grocery Distribution retail data that was received through stakeholder engagement and 2024 ONS business count data to calculate the number of stores in scope of the ban.[191]

592. Data by the Institute of Grocery Distribution received through stakeholder engagement assesses the UK grocery market, and in 2023 identified that there were 57,951 stores involved in grocery retail in the UK. The data does not specifically identify where in the UK these stores are located, so we have applied the England weighting (as defined in Paragraph 139), to estimate the number of grocery retail stores in England.

*Table 70: Estimated number of grocery retail stores in England, by store type*

| Type of Store | Estimated number of grocery retail stores in England |
|---|---|
| Convenience stores (including forecourts) | 39,882 |
| Supermarkets and Hypermarkets | 4,952 |
| Discounters | 4,140 |
| Total | 48,974 |

593. To calculate the burden on small and micro businesses, we have grouped the stores based on the size of the business they belong to, according to number of employees. Table 71 shows the grocery retail sector split by size; micro (0 to 9 employees), small (10 to 49 employees), medium (50 to 249 employees) and large (over 250 employees).

*Table 71: Estimated number of grocery retail stores in England, by store type and business size*

| | Micro | Small | Medium | Large |
|---|---|---|---|---|
| Convenience (including forecourts) | 25,767 | 14,114 | - | - |
| Supermarkets and Hypermarkets | - | - | 43 | 4,909 |
| Discounters | - | - | 36 | 4,104 |

594. For convenience stores, we used sales space in-store data, which categorises stores based on the amount of floor space dedicated to selling products, from the Association of Convenience Stores local shop report[192] and the number of convenience stores from data by the Institute of Grocery Distribution to estimate the proportion of stores that are considered small (35%) and micro (65%). From data by the Association of Convenience Stores, there were no medium stores in this sub-sector of the market.

595. In addition, we assume that supermarkets, hypermarkets and discount stores are part of medium or large businesses. For medium and large businesses, we assume that businesses with more than 25 stores were large (corresponding to 10 employees per

[191] Nomis Official Census and Labour Market Statistics (2024) UK Business Counts.
[192] The Association of Convenience Stores (2024). ACS Local Shop Report 2024.

store). Below this amount, we manually checked businesses on Companies House[193] to determine their size.

596. In addition to the grocery retail stores listed in the 2023 Institute of Grocery Distribution data, these regulations would also impact any specialist retail stores which sell high-caffeine energy drinks. We have used the Inter Departmental Business Register data,[194] which contains information on the number of local units in all industry sectors, to estimate the number of additional specialist retail stores in scope.

597. We reviewed Standard Industrial Classification (SIC) codes to identify specialist retailer groups which may sell high-caffeine energy drinks. We assume that the 2023 Institute of Grocery Distribution data includes data from the SIC codes 4711 'Retail sale in non-specialised stores with food, beverages or tobacco predominating' and 473 'Retail sale of automotive fuel in specialised stores'. The other SIC codes identified are set out in Table 72. However, we are uncertain how many businesses in some of the industries identified sell high-caffeine energy drinks, we have reduced the total number of local units by 50% to reflect this uncertainty.

*Table 72: Description of the specialist retailer groups with their associated SIC code, and indication of whether we have reduced the total number of units we consider as we don't expect all units to sell high-caffeine energy drinks*

| SIC Code | Description | Industry Down Weighted |
|---|---|---|
| 47250 | Retail sale of beverages in specialised stores | No |
| 47260 | Retail sale of tobacco products in specialised stores | Yes |
| 47240 | Retail sale of bread, cakes, flour confectionery and sugar confectionery in specialised stores | Yes |
| 47290 | Other retail sale of food in specialised stores | Yes |
| 47620 | Retail sale of newspapers and stationery in specialised stores | Yes |

598. We applied down weighting on some industries to provide estimates of the total number of specialist retailer stores in scope of the ban, by employment size. These are set out in Table 73.

[193] GOV.UK (N.D.) Companies House.

[194] Nomis Official Census and Labour Market Statistics (2024) UK Business Counts.

*Table 73: Estimated number of specialist retailer stores in scope of the ban, by business size*

| Number of stores by size | Total number of specialist retailer stores |
|---|---|
| Micro | 11,160 |
| Small | 2,058 |
| Medium | 25 |
| Large | - |
| Total | 13,243 |

599. Collectively, these calculations provide an estimate of the total number of retail stores in England which are in scope of the ban (62,216 stores). Table 74 sets out how these stores are split by business size, based on number of employees.

*Table 74: Estimated number of grocery retail stores that are in scope of the ban, by store type and business size*

| | Micro | Small | Medium | Large |
|---|---|---|---|---|
| Convenience (including forecourts) | 25,767 | 14,114 | - | - |
| Supermarkets and Hypermarkets | - | - | 43 | 4,909 |
| Discounters | - | - | 36 | 4,104 |
| Specialist retailers | 11,160 | 2,058 | 25 | - |
| Total | 36,927 | 16,172 | 104 | 9,013 |

**Number of businesses in scope of the ban**

600. To estimate the number of retail businesses that the stores belong to, we used the Inter Departmental Business Register[195] which contains information on the number of different businesses in all industry sectors.

601. We used the SIC codes to identify relevant industries (see Table 75) and calculate the number of businesses in scope of the ban. We are uncertain how many businesses in some industries sell high-caffeine energy drinks, so we have reduced the total number of businesses by 50% to reflect this uncertainty.

[195] Nomis Official Census and Labour Market Statistics (2024) UK Business Counts.

*Table 75: Description of the businesses SIC codes, and indication of whether we have reduced the total number of units we consider as we don't expect all units to sell high-caffeine energy drinks*

| SIC Code | Description | Industry Down Weighted |
|---|---|---|
| 4711 | Retail sale in non-specialised stores with food, beverages or tobacco predominating | No |
| 473 | Retail sale of automotive fuel in specialised stores | No |
| 47250 | Retail sale of beverages in specialised stores | No |
| 47260 | Retail sale of tobacco products in specialised stores | Yes |
| 47240 | Retail sale of bread, cakes, flour confectionery and sugar confectionery in specialised stores | Yes |
| 47290 | Other retail sale of food in specialised stores | Yes |
| 47620 | Retail sale of newspapers and stationery in specialised stores | Yes |

602. Applying this down weighting on some industries leaves us with an estimate of the total number of businesses in scope of the ban, by business size, based on number of employees.

*Table 76: Total number of businesses in scope of the ban, by business size*

| Number of businesses by Size | Total number of businesses |
|---|---:|
| Micro | 35,125 |
| Small | 3,498 |
| Medium | 265 |
| Large | 63 |
| Total | 38,950 |

**Number of businesses with an online offering and online only retailers**

603. We have estimated the number of retailers with an online offering by business size.

604. We have assumed that 60% of medium and large businesses would have an online offering. This is based on stakeholder engagement so far with the retail sector, and therefore is not a conclusive estimate representing the whole sector. But, without any further evidence we assume this assumption is a fair assessment of the proportion of businesses with an online offering. We will refine this with any further evidence received in consultation.

605. We assume that 34% of small and micro businesses would have an online offering. This is based on data from the Association of Convenience Stores Local Shop Report 2024[196] which estimates that 34% of convenience stores provide a grocery home delivery service.

[196] Association of Convenience Stores (2024) ACS Local Shop Report 2024 (low res).pdf

606. Data on the number of online only retailers is not available. Our stakeholder engagement so far has identified two large online only retailers. Without any further information to base this assumption on, these two retailers have been captured in our analysis, although we are aware this may be an underestimate.

*Table 77: Estimated number of businesses with an online offering, by business size*

| Size of Business | Businesses with an online offering | Online only businesses |
|---|---|---|
| Micro | 11,943 | - |
| Small | 1,189 | - |
| Medium | 159 | - |
| Large | 38 | 2 |
| Total | 13,328 | 2 |

**Number of stores and businesses with an existing voluntary ban**

607. According to stakeholder engagement with the British Retail Consortium, several major retailers have already voluntarily banned the sale of high-caffeine energy drinks to children under 16 years. These include Tesco, Sainsbury's, Waitrose, Asda, Morrisons, The Cooperative, Lidl, Aldi, Booths, BP, Iceland, M&S, and all Co-operative Societies. The figures within this section exclude any other retailers who may have introduced a voluntary ban, and any non-grocery retailers with a voluntary ban, such as Boots and WH Smiths. Using the list of retailers provided in our stakeholder engagement so far, and applying England weighting (see Paragraph 139), we estimate that 84% of retail stores in England have a voluntary ban on the sale of high-caffeine energy drinks to children under 16 years.

608. Many convenience stores also implement voluntary bans. The Association for Convenience Stores estimated that 79% of convenience stores already implement a voluntary ban, based on their 'Voice of Local Shop Polling' in 2022.

609. By combining the proportion of major retailers and convenience stores with voluntary bans, we estimate that 84% of all stores (52,246 out of 62,216) currently implement a voluntary ban.

610. The major retailers set out in Paragraph 607 were also counted as businesses with a voluntary ban (excluding Boots and WH Smith). We again assume that 79% of all remaining retailer businesses not on this ban list have a voluntary ban in place.

611. Of the two online-only retailers identified; we reviewed their websites and found that one has a voluntary ban on high-caffeine energy drink sales, but the other does not specify. Based on this, we assume that 50% of online-only retailers implement a voluntary ban.

612. The total number of stores and businesses we estimate have a voluntary ban are set out in Table 78.

*Table 78: Estimated total number of stores and businesses with a voluntary ban currently place*

| | Stores | Businesses operating physical stores | Online only businesses |
|---|---|---|---|
| **Total in scope of policy** | 62,216 | 38,950 | 2 |
| Known voluntary bans | 14,738 | 25 | 1 |
| Assumed voluntary bans | 37,508 | 30,751 | 1 |
| Estimated total with voluntary ban | 52,246 | 30,776 | 1 |
| Proportion with a voluntary ban | 84% | 79% | 50% |

**Summary of stores and businesses in scope of the high-caffeine energy drinks ban to children under 16 years**

613. Table 79 summarises the main information in this section. These estimates are used within the cost and benefit calculations.

*Table 79: Estimated total number of stores and businesses with a voluntary ban currently in place, by business size*

| Size of business | Number of stores | Number of stores with an existing voluntary ban | Number of businesses | Number of businesses with an online offering and online only businesses | Number of businesses with an existing voluntary ban |
|---|---|---|---|---|---|
| Micro | 36,927 | 30,111 | 35,125 | - | 27,753 |
| Small | 16,172 | 14,480 | 3,498 | 1,154 | 2,764 |
| Medium | 104 | 87 | 265 | 159 | 209 |
| Large | 9,013 | 7,569 | 63 | 40 | 50 |
| Total | 62,216 | 52,246 | 38,950 | 1,353 | 30,776 |

**Number of employees employed by businesses in scope of the ban**

614. To calculate the total number of employees within the retail sector, we use the number of businesses in each business size category from the Inter Departmental Business Register.[197]

615. For all employment size bands up to Large (1000+), we use the midpoint as a proxy for the average number of employees per business as shown in Table 80. To improve accuracy, we use narrower employment size bands, for example, ‘micro 0 to 4’ and ‘micro 5 to 9’ rather than broader categories like ‘micro 0 to 9’.

[197] Nomis Official Census and Labour Market Statistics (2024) UK Business Counts.

616. To estimate the average number of employees per large business with 1000+ employees, we calculated the average number of employees at the major grocery retailers listed in Kantar's grocery market share report (excluding Ocado).[198] The employee numbers per business were based on each businesses annual report or company information pages. The resulting average number of employees was 82,787 employees per business.

*Table 80: Average number of employees per business, by business size*

| Business employment size band | Average number of employees per business |
|---|---|
| Micro (0 to 4) | 2 |
| Micro (5 to 9) | 7 |
| Small (10 to 19) | 15 |
| Small (20 to 49) | 35 |
| Medium (50 to 99) | 75 |
| Medium (100 to 249) | 175 |
| Large (250 to 499) | 375 |
| Large (500 to 999) | 750 |
| Large (1000+) | 82,787 |

617. We multiplied the number of businesses in each employment size band by the corresponding average number of employees per business to estimate a total of 2,813,871 employees across the retail sector.

*Table 81: Estimated number of employees per business in the retail sector*

| Business employment size band | Number of businesses | Total number of employees |
|---|---|---|
| Micro (0 to 4) | 23,265 | 46,531 |
| Micro (5 to 9) | 6,423 | 44,959 |
| Small (10 to 19) | 2,204 | 31,952 |
| Small (20 to 49) | 754 | 26,021 |
| Medium (50 to 99) | 167 | 12,434 |
| Medium (100 to 249) | 53 | 9,217 |
| Large (250 to 499) | 17 | 6,330 |
| Large (500 to 999) | 6 | 4,750 |
| Large (1000+) | 30 | 2,488,698 |
| Total | 32,918 | 2,813,871 |

[198] Kantar Grocery Market Share Grocery Market Share - Kantar

## Annex B: Out of home sector methodology

618. We do not have specific data on the proportion of businesses in the out of home sector that sell high-caffeine energy drinks. However, we have access to analysis that was previously conducted by MCA using 2018 sales data to produce a proxy measure. We recognise this is now outdated data but have been unable to access more recent information. So, we have manually updated the MCA 2018 methodology, where possible.

### Data

619. Sales data from MCA 2018, analysed by Public Health England, provides information on the different types of businesses where respondents purchase high-caffeine energy drinks, and the percentage of high-caffeine energy drink and cola serving per business type.

620. The survey includes both adults and children, but due to data quality issues related to the children's data, we have opted to use adult consumption data for this analysis. It is important to note that the survey required the respondent to self-identify a drink as a high-caffeine energy drink. So, it is possible that there is some error in these definitions – some people may consider a product a high-caffeine energy drink when it is not (e.g., cola or a sports hydration drink), whereas other people may consider a product not a high-caffeine energy drink when it is.

621. Some larger businesses are named within the dataset (e.g., McDonald's, KFC) and others are labelled by their type of business (e.g. Fast Food Outlet) and as 'Brand unspecified'. In these cases, we can assume they are a named brand, but their name did not fall within the pre-specified list provided by MCA. The remainder are smaller businesses, not considered brands – these are identified as the type of business (e.g. Fast Food Outlet) and as 'Independent'. A small sample of businesses are classified as 'Don't know/don't remember'.

### Assumptions

622. We assume branded businesses, named in the dataset, are 'large' businesses. This is an unevidenced assumption but seems reasonable given that MCA would have had to identify businesses with a large enough customer base across the country to warrant their named inclusion in the survey methodology.

623. We assume 'brand unspecified' businesses are medium businesses. This is an unevidenced assumption; however, they are considered a 'brand' which suggests they are a chain business and therefore of a considerable size. Despite this, they were not named in the survey, which may suggest they do not have a large enough customer base to lead to inclusion in the survey as a named business.

624. We assume businesses classified as 'independent' are small or micro. This is an unevidenced assumption; however, we consider it a reasonable assumption, given the explanation used for medium and large businesses. We are unable to distinguish between small and micro businesses from the data.

625. The MCA data provides the proportion of sales in different types of businesses for both high-caffeine energy drinks and cola. We assume all out of home businesses sell cola. This is unevidenced.

626. Our modelling of the costs to the out of home sector relies on the use of Standard Industry Classification (SIC) codes. The MCA data does not classify businesses by SIC codes, and so the categories need to be aligned to SIC codes. Our methodology is outlined in Table 82.

*Table 82: Mapping of MCA data categories to SIC codes*

| SIC | MCA |
|---|---|
| Licensed restaurants | Chain restaurant |
| | Fine dining restaurant |
| | Local independent restaurant |
| Unlicensed restaurants | Coffee shop and café |
| | Department store/garden centre café |
| | Local café/sandwich shop |
| Take away food shops and mobile food stands | Fast food outlet |
| | Sandwich retailer |
| | Juice/soft drink bar |
| | Street food vendor |
| Public houses and bars | Pub restaurant |

**Original methodology**

627. We calculated the percentage of 'large' businesses who sell high-caffeine energy drinks compared to cola. We assume all out of home businesses sell cola of some sort, so we used the number of large businesses mentioned selling cola as a proxy for all large businesses. This assumes that all large businesses are included in the dataset, but we recognise this is unlikely to be the case given the number of businesses mentioned. For example, we know that 16 named licensed restaurant chains are included in the MCA data; however, Nomis data suggests there are about 120 large, licensed restaurants in England.[199] However, it does provide us with a proxy measure.

628. Table 83 sets out a hypothetical excerpt of the MCA data; from this, we know that 4 out of 10 named licensed restaurants sell high-caffeine energy drinks (Licensed restaurants A to J). We assume these are large businesses, as they are named in the dataset. Therefore, we assume that 40% of large, licensed restaurants sell high-caffeine energy drinks.

[199] Nomis Official Census and Labour Market Statistics (N.D.). UK Business Counts for Enterprises and Local Units.

*Table 83: Example excerpt of MCA data for licensed restaurants category, figures are not accurate*

| | SIC Code | Sells High-caffeine energy drinks | Sells cola | Number of energy drink servings | Number of cola servings |
|---|---|---|---|---|---|
| Local independent restaurant | Small/ micro | Yes | Yes | 3.5 million | 126.3 million |
| Chain restaurant (brand unspecified) | Medium | Yes | Yes | 1.0 million | 52.4 million |
| Licensed restaurant A | Large | Yes | Yes | 0.3 million | 55.1 million |
| Licensed restaurant B | Large | Yes | Yes | 2.1 million | 49.5 million |
| Licensed restaurant C | Large | Yes | Yes | 0.5 million | 12.9 million |
| Licensed restaurant D | Large | Yes | Yes | 0.4 million | 4.4 million |
| Licensed restaurant E | Large | | Yes | | 2.4 million |
| Licensed restaurant F | Large | | Yes | | 1.1 million |
| Licensed restaurant G | Large | | Yes | | 26.2 million |
| Licensed restaurant H | Large | | Yes | | 11.8 million |
| Licensed restaurant I | Large | | Yes | | 0.9 million |
| Licensed restaurant J | Large | | Yes | | 6.9 million |

629. We cannot use the same methodology for medium, small and micro businesses as the data is not detailed enough to give us names of businesses – they are grouped (as detailed and shown in Table 83) into 'brand unspecified' or 'independent' businesses. Therefore, we consider the ratio of high-caffeine energy drink servings sold to adults compared to colas in medium and small/micro businesses and use this as a multiplier compared to the large business percentage calculated. This is a key limitation as the use of the multiplier assumes an even distribution of energy drinks sales between businesses.

630. In Table 83, the hypothetical example suggests that 3.3 million high-caffeine energy drinks are served by large businesses. This compares to 171.2 servings of cola in licensed restaurants. This suggests that 52 times as many cola servings are sold by large, licensed restaurants than high-caffeine energy drink servings.

631. In brand unspecified chain restaurants, which we assume are medium sized businesses, there are 52.4 times as many colas sold as high-caffeine energy drinks. This is relatively similar to the ratio sold in large businesses. Therefore, we assume 40% of medium size licensed restaurants sell high-caffeine energy drinks.

632. In terms of small and micro businesses (identified here as 'independent'), 36 times as many colas are sold compared to high-caffeine energy drinks. This suggests high-caffeine energy

drinks are sold relatively more frequently than in medium and large businesses; therefore, we applied a multiplier (52/36 = 1.4) to the 40% of large businesses. This suggests that 58% of small and micro businesses sell high-caffeine energy drinks.

633. Using this, and qualitative information gathered from stakeholders, we arrive at an estimate of medium, small and micro businesses selling high-caffeine energy drinks. We have grouped small and micro businesses together because the data is not detailed enough to allow us to produce separate estimates for these.

**Update to the analysis in 2025**

634. As we were unable to obtain more recent data, we manually updated the previous MCA 2018 sales data analysis. To do this, we undertook manual web scraping to assess whether the businesses identified in the previous analysis still sell high-caffeine energy drinks.

635. Following the web scraping, we manually changed the number of large businesses selling high-caffeine energy drinks. We did this by 1) adding businesses that previously did not sell high-caffeine energy drinks, but it is now clear that they do, and 2) removing those that were identified as selling high-caffeine energy drinks but no longer do.

636. The methodology from this point on remains as stated above.

637. We recognise that this approach is not perfect, but in the absence of more recent data we felt this was the most proportionate approach we can take.

**Summary**

638. Table 84 sets out the estimated proportion of out of home businesses selling high-caffeine energy drinks, by business size.

*Table 84: Estimated proportions of out of home businesses selling high-caffeine energy drinks, by business size*

| | Large | Medium | Small/Micro |
|---|---|---|---|
| Licensed restaurants | 19% | 19% | 69% |
| Unlicensed restaurants and cafes | 21% | 3% | 13% |
| Take away food shops and mobile food stands | 38% | 100% | 100% |
| Public houses and bars | 70% | 100% | 5% |

**Estimating the number of businesses in the out of home sector in scope of policy**

639. For the out of home sector, we consider that high-caffeine energy drinks can be purchased from:

- Licensed restaurants

- Unlicensed restaurants and cafes
- Take away food shops and mobile food stands
- Public houses and bars
- Sports facilities
- Museums, cinemas, amusement parks, botanical gardens and nature reserves

640. To estimate the number of out of home businesses within each sector, we use the Inter Departmental Business Register[200] which contains information on the number of different businesses in all industry sectors.

641. We used the industries listed by the SIC codes outlined in Table 85 to calculate the estimated number of businesses in scope.

*Table 85: Description of the industry SIC codes used in the analysis*

| OOH sector | SIC code | Description |
|---|---|---|
| Licensed restaurants | 56101 | Licensed restaurants |
| Unlicensed restaurants and cafes | 56102 | Unlicensed restaurants and cafes |
| Take away food shops and mobile food stands | 56103 | Take away food shops and mobile food stands |
| Public houses and bars | 56302 | Public houses and bars |
| Sports facilities | 93110 | Operation of sports facilities |
| | 93120 | Activities of sport clubs |
| | 93130 | Fitness facilities |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | 59140 | Motion picture projection activities |
| | 91030 | Operation of historical sites and buildings and similar visitor attractions |
| | 91040 | Botanical and zoological gardens and nature reserve activities |
| | 93210 | Activities of amusement parks and theme parks |

642. We assume that all business sizes (micro, small, medium and large) in the following sectors are likely to sell high-caffeine energy drinks:

- Licensed restaurants
- Unlicensed restaurants and cafes
- Takeaway food shops and mobile food stands

[200] Nomis Official Census and Labour Market Statistics (2024) UK Business Counts.

- Public houses and bars.

643. For museums, cinemas, amusement parks, botanical gardens, and nature reserves, we assume only medium and large businesses are likely to sell high-caffeine energy drinks.

644. Applying these assumptions provides an estimate of the total number of businesses that may sell high-caffeine energy drinks within each sector. We applied further assumptions to understand how many of these businesses we estimate do sell high-caffeine energy drinks, and therefore are considered in scope of the policy, in the following section.

*Table 86: Number of businesses we expected may sell high-caffeine energy drinks, by business type*

| **Type of out of home sector business** | **Number of businesses likely to sell high-caffeine energy drinks** |
|---|---|
| Licensed restaurants | 26,595 |
| Unlicensed restaurants and cafes | 22,905 |
| Take away food shops and mobile food stands | 36,590 |
| Public houses and bars | 25,290 |
| Sports facilities | 15,975 |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | 225 |
| **Total** | 127,580 |

645. As we do not have a data on proportion of out of home businesses that sell high-caffeine energy drinks, we have estimated this using the best available data that we can obtain. The full methodology can be found in the first section of this annex and summarised in Paragraph 638.

646. For sports facilities, museums, cinemas, amusement parks, botanical gardens and nature reserves we assume, in the absence of evidence, that 10% of businesses sell high-caffeine energy drinks. Due to the uncertainty around this we have tested this assumption within the sensitivity analysis (see Section 12, Sensitivity Analysis).

647. We applied the appropriate proportions to the number of businesses to estimate the total number of businesses within each out of home sector which sell high-caffeine energy drinks and are in scope of the ban.

*Table 87: Estimated number of out of home businesses in scope of the policy, by business type*

| OOH Sector | Number in scope |
|---|---|
| Licensed restaurants | 17,886 |
| Unlicensed restaurants and cafes | 2,970 |
| Take away food shops and mobile food stands | 36,562 |
| Public houses and bars | 1,539 |
| Sports facilities | 1,598 |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | 23 |
| **Total** | 60,578 |

**Number of employees in the out of home sector**

648. To calculate the total number of employees within the out of home sector, we use the number of businesses split by business size from the Inter Departmental Business Register (IDBR).[201]

649. For each employment size band, we use the midpoint as a proxy for the average number of employees per business as shown in Table 88. To improve accuracy, we use narrow employment size bands, for example, 'micro 0 to 4' and 'micro 5 to 9' rather than broader categories like 'micro 0 to 9' (see Table 80).

650. We then multiplied the number of businesses within each employment size band by the corresponding average number of employees per business to estimate a total of 2,006,883 employees across the out of home sector.

*Table 88: Estimated number of employees in out of home sector businesses, by business size*

| Out of home sector | Number of employees | | | | |
|---|---|---|---|---|---|
| | *Micro* | *Small* | *Medium* | *Large* | *Total* |
| Licensed restaurants | 73,125 | 327,383 | 101,588 | 11,238 | 513,333 |
| Unlicensed restaurants and cafes | 84,435 | 145,680 | 161,263 | 13,110 | 404,488 |
| Take away food shops and mobile food stands | 109,255 | 93,543 | 14,548 | 1,873 | 219,218 |
| Public houses and bars | 70,560 | 329,305 | 58,278 | 3,745 | 461,888 |
| Sports facilities | 44,340 | 114,375 | 130,615 | 42,463 | 331,793 |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | 4,450 | 22,635 | 32,840 | 16,240 | 76,165 |
| **Total** | 386,165 | 1,032,920 | 499,130 | 88,668 | 2,006,883 |

651. To calculate the proportion of these employees that work in businesses that sell high-caffeine energy drinks, we used the proportions calculated in Paragraph 638, alongside the

[201] Nomis Official Census and Labour Market Statistics (2024) UK Business Counts.

assumption that for sports facilities, museums, cinemas, amusement parks, botanical gardens and nature reserves 10% of large and medium businesses only sell high-caffeine energy drinks. We estimate that a total of 813,007 employees work in businesses selling high-caffeine energy drinks.

*Table 89: Estimated number of employees in out of home sector businesses that sell high-caffeine energy drinks, by business size*

| **Out of home sector** | **Number of employees from businesses in scope** | | | | |
|---|---|---|---|---|---|
| | *Micro* | *Small* | *Medium* | *Large* | *Total* |
| Licensed restaurants | 50,272 | 225,070 | 19,048 | 2,107 | 296,497 |
| Unlicensed restaurants and cafes | 10,992 | 18,966 | 4,996 | 2,760 | 37,714 |
| Take away food shops and mobile food stands | 109,255 | 93,543 | 14,548 | 702 | 218,047 |
| Public houses and bars | 3,339 | 15,581 | 58,278 | 2,622 | 79,819 |
| Sports facilities | 44,340 | 114,375 | 13,062 | 4,246 | 17,308 |
| Museums, cinemas, amusement parks, botanical gardens and nature reserves | N/A | N/A | 3,284 | 1,624 | 4,908 |
| **Total** | 218,198 | 467,534 | 113,214 | 14,061 | 813,007 |

## Annex C: Vending sector methodology

652. This Annex sets out our approach to estimating the number of vending machine businesses, client sites, and high-caffeine energy drinks sold in vending machines across the sector.

### Vending machine businesses

653. Based on information provided in stakeholder engagement with the Vending & Automated Retail Association, we assume that there are 211 vending machine businesses operating in England.

654. We calculated this estimate by taking the number of businesses with the Vending & Automated Retail Association membership and dividing it by the proportion of total UK vending market turnover accounted for by the Vending & Automated Retail Association members. This provides an estimate of the total number of vending machine businesses in the UK.

655. We then applied a weighting to reflect the proportion of the UK market based in England (see Paragraph 139), to produce an estimate of vending machine businesses operating specifically in England.

### Vending machine client sites

656. Based on information obtained through stakeholder engagement with the Vending & Automated Retail Association, we assume that there are 47,748 vending machine client sites in England.

657. This estimate is based on the total number of cold beverage and combination vending machines in the UK, as provided by the Vending & Automated Retail Association. We only include these machine types because they are the only ones likely to sell high-caffeine energy drinks, given they are the only types of vending machine that sell soft drinks. Other machine types which are not included are dedicated snack or food machines, and hot beverage machines.

658. We then applied a weighting to reflect the proportion of the UK market based in England (see Paragraph 139), to estimate the total number of vending machines that sell soft drinks in England (76,396).

659. Using the Vending & Automated Retail Association data received through stakeholder engagement on the average number of machines per client site, we divided the total number of soft drink vending machines in England to estimate the total number of vending machine client sites in England.

**Number of high-caffeine energy drinks sold in vending machines**

660. Based on information obtained through stakeholder engagement with the Vending & Automated Retail Association, we assume that 18.4 million high-caffeine energy drinks are sold in vending machines in England each year.

661. This estimate is based on the total number of vends from cold beverage and combination vending machine in the UK, as provided by the Vending & Automated Retail Association. We only include these machine types because they are the only ones likely to sell high-caffeine energy drinks, given they are the only types of vending machine that sell soft drinks. Other machine types which are not included are dedicated snack or food machines, and hot beverage machines.

662. To calculate the number of high-caffeine energy drinks sold in vending machines, we first calculate the number of soft drinks vending machines in England (see Paragraph 658).

663. Using Vending & Automated Retail Association data, received through stakeholder engagement, on the average number of soft drink vends per machine per week, we estimate the total number of soft drinks vends per year.

664. We applied the Vending & Automated Retail Association's estimate that 13% of soft drink vends are high-caffeine energy drinks, resulting in our final estimate of the total number of high-caffeine energy drinks that are sold in vending machines in England each year.

## Annex D: ASHE wage estimates

665. Throughout this impact assessment we use 2024 Annual Survey of Hours and Earnings (ASHE) median hourly wage rates to inform hourly wage estimates for multiple professions.[1]

666. We adjust the ASHE median hourly wage rates by 19%[2] to account for non-wage labour costs, such as national insurance and pensions.

667. The adjusted wage estimates shown in Table 90 are used to inform the hourly wage assumptions for various professions.

*Table 90: Median hourly wage rate and associated adjusted hourly wage rate of employees, by profession*

| ASHE Profession | ASHE median hourly wage | Adjusted hourly wage |
|---|---|---|
| Retail cashiers and check-out operators | £11.55 | £13.72 |
| Delivery drivers and couriers | £12.26 | £14.56 |
| Managers, directors and senior officials | £25.64 | £30.45 |
| Managers and directors in retail and wholesale | £16.62 | £19.78 |
| Information technology professionals | £27.60 | £32.78 |
| Restaurant and catering establishment managers and proprietors | £14.47 | £17.18 |
| Publicans and managers of licensed premises | £15.84 | £18.81 |
| Bar staff | £11.50 | £13.66 |
| Waiters and waitresses | £11.44 | £13.59 |
| Stock control clerks and assistants | £14.09 | £16.77 |
| Electrical and electronic technicians | £18.91 | £22.50 |

[1] Office for National Statistics (2024). Earnings and hours worked, occupation by four-digit SOC: ASHE Table 14.

[2] Based on data on the non-wage percentage of labour costs from Office for National Statistics (2020) Index of Labour Costs per Hour, UK.

## Annex E: High-caffeine energy drink consumption methodology

668. This section sets out the methodology used to calculate both the number of high-caffeine energy drinks consumed and the equivalent litres of high-caffeine energy drinks consumed. This reflects the absence of specific data on the number of high-caffeine energy drinks consumed per year in England by children under 16 years.

### Number of high-caffeine energy drinks consumed by children under 16 years

669. We calculated the number of high-caffeine energy drinks consumed by children under 16 years by combining Office for National Statistics (ONS) population estimates[1] with high-caffeine energy drink consumption estimates from a Department for Education (DfE) omnibus survey conducted in December 2024.[2]

670. In the DfE Omnibus survey, 12.6% of secondary school aged children identified that they drink high-caffeine energy drinks monthly, but not weekly, and 15.7% said they drink high-caffeine energy drinks at least once a week.

671. Using UK ONS population estimates,[3] we estimate that this translates into 627,466 children aged 10 to 15 years drinking high-caffeine energy drinks monthly (but not weekly), and 784,620 drinking them weekly.

672. For the monthly (but not weekly) consumers, the DfE omnibus survey indicated that each person drinks on average 2.87 high-caffeine energy drinks per month. Combining this with our estimate for the number of children who drink high-caffeine energy drinks monthly we estimate that 1.8 million drinks are drunk monthly, equating to 21.6 million drinks annually.

673. For the weekly consumers, the DfE omnibus survey indicated that each person drinks on average 3.12 high-caffeine energy drinks per week. Multiplying this with our estimate of the number of children who drink high-caffeine energy drinks weekly, we estimate that 2.4 million drinks are drunk weekly, equating to 127.4 million drinks annually.

674. This approach is used as a proxy to estimate the total number of high-caffeine energy drinks consumed annually by UK children under 16 years. By combining the estimated figures for monthly and weekly consumers, we are able to produce an overall UK consumption figure of 149.0 million high-caffeine energy drinks annually. While this method does not capture every individual case, it provides a reasonable and evidence-based approximation for the current number of high-caffeine energy drinks drunk by children under 16 years.

[1] Office for National Statistics (2024). Estimates of the population for the UK, England, Wales, Scotland, and Northern Ireland

[2] Department for Education (2025) Parent, pupil and learner voice: omnibus surveys for 2024 to 2025. Parent, pupil and learner voicer data tables: 2024 to 2025 academic year, December 2024 pupil tables

[3] Office for National Statistics (2024). Estimates of the population for the UK, England, Wales, Scotland, and Northern Ireland

**Litres of high-caffeine energy drinks consumed by children under 16 years**

675. To calculate the number of litres of high-caffeine energy drinks consumed by children under 16 years we used the estimate calculated above that 149.0 million high-caffeine energy drinks are consumed by UK children under 16 years annually.

676. Using the Kantar 2023 Take Home dataset, we calculated the sales weighted average size of a high-caffeine energy drink as 0.472 litres (472ml). This allowed us to convert the estimated number of high-caffeine energy drinks consumed by children under 16 years (149.0 million) into litres. Based on this, we estimate that children under 16 years consume 70.4 million litres of high-caffeine energy drinks annually in the UK.

677. Throughout the appraisal period we assume that without a ban in place the high-caffeine energy drinks market for children under 16 years would grow annually by 4.51% (see Table 91). This growth rate is based on the compound annual growth rate (CAGR) calculated for high-caffeine energy drink volumes sold between 2013 and 2023. To calculate the CAGR, we used data from the British Soft Drinks Association's annual reports, which provide figures on the total volume of sports and high-caffeine energy drinks sold each year. We then applied the annual market share of high-caffeine energy drinks with this combined category to estimate the volume sold specifically for high-caffeine energy drinks in litres per year.

*Table 91: Overview of estimated high-caffeine energy drink consumption within England across the 25-year appraisal period*

| Year | Estimated high-caffeine energy drink consumption (litres) |
|---|---|
| Year 0 | 70.4 m |
| Year 1 | 73.6 m |
| Year 2 | 76.9 m |
| Year 3 | 80.3 m |
| Year 4 | 84.0 m |
| Year 5 | 87.7 m |
| Year 6 | 91.7 m |
| Year 7 | 95.8 m |
| Year 8 | 100.1 m |
| Year 9 | 104.7 m |
| Year 10 | 109.4 m |
| Year 11 | 114.3 m |
| Year 12 | 119.5 m |
| Year 13 | 124.9 m |
| Year 14 | 130.5 m |
| Year 15 | 136.4 m |
| Year 16 | 142.5 m |
| Year 17 | 148.9 m |
| Year 18 | 155.7 m |
| Year 19 | 162.7 m |
| Year 20 | 170.0 m |

| Year | Estimated high-caffeine energy drink consumption (litres) |
|---|---|
| Year 21 | 177.7 m |
| Year 22 | 185.7 m |
| Year 23 | 194.1 m |
| Year 24 | 202.8 m |

## Annex F: High-caffeine energy drink transactions methodology

678. In the absence of data relating to the number of high-caffeine energy drinks transactions that occur per year in England to enable consumption by children under 16 years we use the following methodology to calculate this.

679. We first calculate the total number of high-caffeine energy drinks consumed by children under 16 years annually above in Annex E: High-caffeine energy drink consumption methodology. We then applied the assumption provided by the Association of Convenience stores during stakeholder engagement that there is 1 high-caffeine energy drink purchased per transaction. This assumption is tested in Section 12, Sensitivity Analysis.

680. To calculate the total number of high-caffeine energy drink transactions that occur annually we multiplied the total number of drinks consumed annually by the number of drinks purchased in a transaction. This results in a total estimate of 62.9 million transactions. However, in order to sufficiently inform our analysis, we need to understand how many transactions occur in stores with an existing voluntary ban and stores that do not.

681. We assume that children under 16 years are prevented from directly purchasing high-caffeine energy drinks in stores with an existing voluntary ban. However, children under 16 years may still consume high-caffeine energy drinks purchased from a store with an existing voluntary ban through proxy purchasing. Therefore, we assume that 23% (see Paragraph 233) of transactions occur in a store with an existing voluntary ban. In this scenario, we assume a friend or relative over the age of 16 is making the transaction, but the drink is being consumed by a child under 16 years.

682. We assume that the remaining 77% of high-caffeine energy drinks that we estimate to be consumed by children under 16 years annually, are purchased by themselves in a store that does not have an existing voluntary ban.

683. The total number of high-caffeine energy drink transactions we estimate to occur per year in England is set out in Table 92.

684. Throughout the appraisal period we assume that without a ban in place the high-caffeine energy drinks market for children under 16 years would grow annually by 4.51% (see Table 92). This growth rate is based on the compound annual growth rate (CAGR) calculated for high-caffeine energy drink volumes sold between 2013 and 2023. To calculate the CAGR, we used data from the British Soft Drinks Association's annual reports, which provide figures on the total volume of sports and energy drinks sold each year. We then applied the annual market share of energy drinks with this combined category to estimate the number of high-caffeine energy drinks transactions that occur each year.

*Table 92: Overview of estimated high-caffeine energy drink transactions within England across the 25-year appraisal period*

| Year | Estimated high-caffeine energy drink transactions in a store with a voluntary ban | Estimated high-caffeine energy drink transactions in a store without a voluntary ban |
|---|---|---|
| Year 0 | 29.0 m | 96.9 m |
| Year 1 | 30.3 m | 101.3 m |
| Year 2 | 31.6 m | 105.9 m |
| Year 3 | 33.0 m | 110.6 m |
| Year 4 | 34.5 m | 115.6 m |
| Year 5 | 36.1 m | 120.8 m |
| Year 6 | 37.7 m | 126.3 m |
| Year 7 | 39.4 m | 132.0 m |
| Year 8 | 41.2 m | 137.9 m |
| Year 9 | 43.1 m | 144.2 m |
| Year 10 | 45.0 m | 150.7 m |
| Year 11 | 47.0 m | 157.4 m |
| Year 12 | 49.2 m | 164.5 m |
| Year 13 | 51.4 m | 172.0 m |
| Year 14 | 53.7 m | 179.7 m |
| Year 15 | 56.1 m | 187.8 m |
| Year 16 | 58.6 m | 196.3 m |
| Year 17 | 61.3 m | 205.1 m |
| Year 18 | 64.0 m | 214.4 m |
| Year 19 | 66.9 m | 224.1 m |
| Year 20 | 69.9 m | 234.2 m |
| Year 21 | 73.1 m | 244.7 m |
| Year 22 | 76.4 m | 255.7 m |
| Year 23 | 79.8 m | 267.3 m |
| Year 24 | 83.4 m | 279.3 m |

## Annex G: Vending sector policy sub-option 2 methodology

685. This annex sets out the expected costs of the second policy sub-option considered for the vending sector. In this sub-option, the business or organisation where the vending machine is located is responsible for taking appropriate action to ban the sale of high-caffeine energy drinks in vending machines to children under 16 years.

686. We consider that businesses and individuals in the vending sector would need to familiarise themselves with the ban and adapt to the new legislation. We assume the costs related to this would be incurred during the transition period.

687. Since this option bans the sale of high-caffeine energy drinks to children under 16 years, we consider that the lost sales from selling high-caffeine energy drinks to children under 16 years are covered within the main analysis (see Section 7.1.3, Lost Sales). However, we do acknowledge that the vending machine businesses or clients would incur an additional cost per transaction for age verification.

688. Table 93 sets out the expected familiarisation and total lost sales costs for the vending sector under vending sub-option 2. For this sub-option, the total expected costs for the vending sector are £31.5 million, incurred over a 25-year appraisal period.

*Table 93 Summary of costs to the vending machine sector (sub-option 2) over a 25-year appraisal period (2024 prices, 2027 present value)*

| Type of cost | Impact | Total cost |
|---|---|---|
| Familiarisation costs | Staff awareness | £0.004 m |
| | Knowledge sharing | £2.3 m |
| | Staff training | £0.2 m |
| | Vending machine adjustments | £8.6 m |
| | New signage | £0.06 m |
| | **Total familiarisation** | **£11.1 m** |
| Ongoing costs | Training new staff | £2.2 m |
| | Maintenance of age verification hardware | £7.5 m |
| | **Total ongoing** | **£9.6 m** |
| Lost sales | Lost sales to vending machine businesses or clients | £10.7 m |
| | **Total lost sales** | **£10.7m** |
| **Total cost to vending sector** | | **£31.5 m** |

689. The methodology for how we estimate the number of vending machine businesses, client sites, and high-caffeine energy drinks sold in vending machines can be found in Annex C: Vending sector methodology.

690. The following sections will set out our approach to estimating the familiarisation, ongoing and lost sales costs considered for this policy option.

**Familiarisation costs**

691. We consider that familiarisation costs for the vending sector would fall under these main categories:

- Staff awareness
- Knowledge sharing
- Staff training
- Vending machine adjustments
- New signage

692. Table 94 sets out the familiarisation costs for the vending sector under vending sub-option 2. Under this sub-option, the total familiarisation costs for the vending sector is £11.1 million incurred in the first year of implementation.

*Table 94 Summary of familiarisation costs to the vending machine sector (sub-option 2) incurred in the first year of implementation (2024 prices)*

| **Familiarisation cost** | **Total cost** |
|---|---:|
| Staff awareness | £0.004 m |
| Knowledge sharing | £2.3 m |
| Staff training | £0.2 m |
| Vending machine adjustments | £8.6 m |
| New signage | £0.06 m |
| Total | £11.1 m |

693. The following sections will set out our approach to calculating these familiarisation costs.

*Staff awareness & knowledge sharing*

694. To estimate these costs we assume that the same level of staff awareness and knowledge sharing across the vending sector would be required as for vending sub-option 1 (see Vending sector').

695. We estimate the total costs for staff awareness as £0.004 million and knowledge sharing as £2.3 million across the 25-year appraisal period.

*Staff training*

696. We consider the costs of training all employees that work in vending machine businesses that sell soft drinks to ensure that they are aware of the new regulations.

697. Based on information obtained through stakeholder engagement with the Vending & Automated Retail Association, we assume that there are 8,541 employees in vending machine businesses that sell soft drinks in England.

698. This estimate is calculated by taking the number of direct employees of the Vending & Automated Retail Association members and dividing it by the proportion of total UK vending market turnover accounted for by the Vending & Automated Retail Association members. This provides us with an estimate of the total number of employees working in vending machine businesses across the UK.

699. Since the new regulation applies specifically to vending businesses in the soft drink industry, we calculated the proportion of employees working in businesses that operate soft drink vending machines. To do this, we applied the proportion of employees in cold beverage and combination vending to the total number of vending machine employees.

700. We then applied a weighting to reflect the proportion of the UK market based in England (see Paragraph 139), to produce an estimate of the number of employees working in soft drink vending machine businesses in England.

701. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for managers and directors in retail and wholesale is £19.78. We used this wage to inform the estimated wage for employees in vending businesses.

702. We assume that each employee will require 1 hour of training on the new regulations. By multiplying this time by the estimate uprated hourly wage of the employees, we estimated the costs of staff training as £19.78 per employee. These figures represent average costs per employee, and actual costs may vary.

703. We then multiplied the average cost per employee by the number of employees that work in vending machine businesses that sell high-caffeine energy drinks. This provides an estimated total cost of £0.2 million to businesses in the vending sector for staff training.

*Vending machine adjustments*

704. To comply with the ban, we assume that soft drinks vending machines in public places which can be accessed by children under 16 years will be adjusted to include age verification hardware.

705. Based on stakeholder engagement with the Vending & Automated Retail Association, we understand that 18% of vending machines are located in public places. The remainder are located in workplaces. Therefore, to estimate the total number of soft drinks vending machines in public places, we applied this proportion to our estimate of the total number of soft drinks vending machines (76,396), as calculated in Annex C: Vending sector methodology. This provides an estimate that 13,751 soft drinks vending machines are in public places in England which can be accessed by children under 16 years, and so will require adjustment to include age verification hardware.

706. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for electrical and electronic technicians is £22.50. We used this wage to inform the estimated wage for vending machine technicians. These figures represent average wage estimates, and actual wages may vary depending on the size of the establishment.

707. We assume that installation of the age verification hardware requires one vending machine technician to work for 3 hours per vending machine, and needs parts costing £560 per machine, based on information provided by the Vending & Automated Retail Association.

708. By multiplying the time required by the average uprated hourly wage of the vending machine technician and adding on the additional costs of parts, we estimated the average cost of vending machine adjustments for age verification hardware as £628 per vending machine.

709. Multiplying the cost per vending machine by the number of vending machines in public places results in an estimated total cost of £8.6 million to the vending sector for vending machine adjustments for age verification hardware.

*New signage*

710. We assume that each vending machine in a public place accessible to children under 16 years will need to display signage to reflect the new age restrictions.

711. We estimate the cost of new signage by multiplying our estimate of the number vending machines in public places in England, by the typical cost of a new sign (£4.00).[1] We estimate this to total £0.06 million.

**Ongoing costs**

712. We consider that ongoing costs for the vending sector would fall under these main categories:

- Training new staff
- Maintenance of age verification hardware

713. Table 95 sets out the ongoing costs for the vending sector under vending sub-option 2. Under this sub-option, the total ongoing costs for the vending sector is estimate as £9.6 million across the 25-year appraisal period.

*Table 95 Summary of ongoing to the vending machine sector over a 25-year appraisal period (2024 prices, 2027 present value)*

| **Ongoing cost** | **Total cost** |
|---|---:|
| Training new staff | £2.2 m |
| Maintenance of age verification hardware | £7.5 m |
| Total | £9.6 m |

714. The following sections will set out our approach to calculating these ongoing costs.

[1] Price as of 28 April 2025 in Age Check Certification Scheme (2025). Energy Drinks Poster.

*Training new staff*

715. We assume that any new staff which need to be aware of the regulations would need training. This includes all new employees of soft drink vending machine businesses, in addition to new head office managers, and stock managers of vending machine client sites.

716. Based on Office for National Statistics analysis we assume that the annual staff turnover rate is 9%.[2] The analysis found that this was the average rate of people who changed jobs each year between 2000 and 2018.

717. We used this annual turnover rate to estimate the number of new staff by applying it to the total number of employees that need to be aware of the regulations. Based on the assumption that each employee who leaves is replaced, we estimate that a total 7,215 new staff members will require training each year.

*Table 96: Estimated number of new staff joining the vending machine sector per year*

| **Profession** | **Estimated number of new staff per year** |
|---|---|
| Employees of soft drink vending machine businesses | 769 |
| Head office managers of vending machine client sites | 4,297 |
| Stock managers of vending machine client sites | 2,149 |

718. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for managers and directors in retail and wholesale is £19.78. We used this wage to inform the estimated wage for head office managers in both vending machine businesses and client sites. Additionally, the estimated hourly wage for stock control clerks and assistants is £16.77, which we used to inform the estimated wage for stock managers. These figures represent average wage estimates, and actual wages may vary depending on the size of the establishment.

719. We assume that that the training time for new staff members is 1 hour, in line with our assumptions for familiarisation costs. We multiplied the time taken by the number of individuals involved and their respective average uprated hourly wages, to estimate the total cost of training for new staff members per employee.

720. By multiplying the number of new staff members by the cost of training per employee, we estimated the annual cost of £0.1 million for training new staff.

721. We assume that this cost reoccurs annually following implementation. Over the 25-year appraisal period, future years costs are discounted at a rate of 3.5% in line with HMT's The Green Book, resulting in a total discounted cost of £2.2 million to the vending sector for the training of new staff.

[2] Office for National Statistics (2019). Analysis of job changers and stayers using Annual Survey of Hours and Earnings (ASHE) data.

*Maintenance of age verification hardware*

722. As set out in Paragraph 705, we assume that 13,751 soft drinks vending machines in public places in England will be adjusted to include age verification hardware. Based on stakeholder engagement we assume that each adjusted vending machine will require essential maintenance once per year across the 25-year appraisal period.

723. Based on the adjusted wage estimates in Annex D: ASHE wage estimates, the estimated hourly wage for electrical and electronic technicians is £22.50. We used this wage to inform the estimated wage for vending machine technicians. These figures represent average wage estimates, and actual wages may vary depending on the size of the establishment.

724. In the absence of specific data, we assume that the maintenance requires one vending machine technician working for 1.5 hours (half the time it takes for installation) per vending machine.

725. By multiplying the time required by the average uprated hourly wage of the vending machine technician, we estimated the average cost of vending machine maintenance as £34 per vending machine.

726. Multiplying the cost per vending machine by the number of adjusted vending machines results in an estimated total cost of £0.5 million per year, equating to a total of £7.5 million across the 25-year appraisal period.

**Lost sales**

727. A ban on the sale of high-caffeine energy drinks to children under 16 years through vending machines would reduce sales of these drinks. In Section 7.1.3, Lost sales, we assess the impact of lost sales on retailers across all sales channels, not just vending machines. This is because there is insufficient evidence to understand the proportion of sales to children under 16 years which occur through vending machines compared to other retail sectors.

728. For this policy option, we also consider an additional cost to vending machine businesses or clients, who will be charged per transaction that uses the age verification hardware fitted on adjusted machines. The total cost of these age verifications is estimated to be £10.7 million across the 25-year appraisal period.

729. The following section sets out our approach to calculating lost sales.

*Age verifications*

730. As set out in Paragraph 705, we assume that 13,751 soft drinks vending machines in public places in England will be adjusted to include age verification hardware. Based on stakeholder engagement we assume that each ongoing transaction that uses the age verification system costs the vending machine business or client £0.20 per transaction.

731. We assume that all high-caffeine energy drink transactions from vending machines in public places will continue to occur after the ban, but all of these are subject to age verification costs.

732. In Section 7.1.3, Lost Sales we estimate the total number of sales of high-caffeine energy drinks from vending machines per year. Since we assume that only vending machines located in public places are fitted with age verification hardware, we applied the figure of 18%, which represents the proportion of vending machines in public places, to the total number of energy drink vends per year. This provides us with an estimate that 3.3 million high-caffeine energy drink vends per year would be subject to the age verification charge.

733. By multiplying the number of high-caffeine energy drink vends per year that would be subject to the age verification charge by the price per age verification transaction, we estimate a total cost of £0.7 million per year.

734. As we do not know what proportion of high-caffeine energy drink sales would have been attempted by children under 16 years, we cannot estimate how many transactions will be avoided entirely because children are deterred by the age verification and do not attempt to make a purchase. Therefore, we did not apply the usual market growth assumptions for high-caffeine energy drinks. We assume that any growth in purchases among those aged over the age of 16 years is offset by the reduction in attempted purchases from children under 16 years, resulting in no net change in the overall number of transactions subject to age verification charges.

735. Therefore, the estimated cost for age verifications across the 25-year appraisal period is £10.7 million.

# Annex H: High-caffeine energy drinks and carbonated soft drink sugar content analysis

## Results

*Table 97: Sales weighted average sugar content of high-caffeine energy drinks and other carbonated soft drinks, by drink type*

| Drink category | Drink type | Sales weighted average sugar content (g/100ml) | Sales (000's litres) | Number of products |
|---|---|---|---|---|
| Energy drink | Sugar free | 0.04 | 53,303 | 127 |
| Energy drink | Sweetened | 7.90 | 71,452 | 185 |
| Other carbonated soft drink | Sugar free | 0.01 | 2,006,644 | 604 |
| Other carbonated soft drink | Sweetened | 5.77 | 1,098,056 | 1,120 |
| Energy drink | All together | 4.54 | 124,755 | 312 |
| Other carbonated soft drink | All together | 2.01 | 3,104,700 | 1,724 |

*Notes: Sugar-free denotes if a drinks sugar content is below 0.5g/100ml. Sweetened denotes if a drinks sugar content is higher than 0.5g/100ml. The table present results for all products, using real, cloned and imputed information.*

*Table 98: Sales weighted average size of an energy drinks*

| Drink category | Drink type | Sales weighted average size (ml) |
|---|---|---|
| Energy drink | All together | 472 |

## Methodology

736. The analysis calculated the sale weighted average (SWA) of sugar content per 100ml of high-caffeine energy drinks (a drink is classified as a high-caffeine energy drink if its caffeine content is greater than 150mg per litre and it is not a coffee drink) and carbonated drinks.

737. Drinks were identified as high-caffeine energy drinks by through a two-step process. Firstly, a series of search terms were used to identify potential products in the dataset (such as names of well-known energy drink brands and words potentially associated with energy drinks such as "Energy", "Alert" and "Caffeine") and these were used on the product description and brand name fields. Products were then filtered out if they could not be high-caffeine energy drinks (for example if they were milk-based drinks) and the products were then manually scrutinised to assess whether they could be classed as high-caffeine energy

drinks or not. Drinks were identified as carbonated drinks using the “carbonated drinks” identifier within the Kantar dataset.

738. The average (mean) sugar content of each high-caffeine energy drink product is weighted by its total sales volume in volume (litres) to give more influence on products with higher sales. The SWA for size of product was calculated using the same methodology as the SWA sugar content. It simply used product size instead of sugar content.

739. For this analysis the nutrition information of all products has been used i.e. “real” nutritional information (where the product has been found instore and the nutritional information recorded), “cloned” nutritional information (where the product of a different size has been identified and recorded and the nutritional information copied across) and “imputed” nutritional information (where the product was not identified instore but instead the average of all products in that Kantar sub-category was used).

740. All analysis was undertaken using data from the Kantar take-home panel for the 52 weeks to September 2023.

## Annex I: The DHSC Calorie Model

741. This annex outlines the Department of Health & Social Care (DHSC) Calorie Model, explaining its purpose, function, and role in supporting policy development. It also provides an illustrative example and a brief overview of the model's historical developments.

### What is the Calorie Model?

742. The Calorie Model is a simulation model, written in R, developed by analysts at the Office for Health Improvement and Disparities (OHID) within DHSC. It draws on earlier modelling work developed by Public Health England (PHE).

743. The purpose of the model is to simulate the long-term impacts of policies that affect calorie intake at a population level. By estimating changes in calorie intake, alongside other key assumptions, the model estimates effects on health outcomes, NHS treatment costs, social care costs and economic output.

744. Typically, the model is used to quantify the benefits of reduced calorie intake, but it can also assess the impact of calorie increases.

745. The model is calibrated for the population in England,[1] using 2019 data as the baseline.[2]

### How does the model work (summary)?

746. The Calorie Model is a cohort-based Markov model.[3] It divides the population into annual cohorts by year of birth, and the health of each cohort is modelled over time, based on expected body mass index (BMI) and the associated probability of acquiring obesity-related diseases. A change in calorie intake influences BMI, which in turn affects the likelihood of ill health.

747. Each cohort is divided into health states: healthy, diagnosed with an obesity-related disease, or deceased. Transitional probabilities are used to estimate how many individuals move between states each year, with new births added to the population. This allows the model to estimate the expected prevalence of obesity-related diseases and their associated impacts.

748. Policy interventions are modelled using a control and treatment approach. The control scenario assumes no policy change, while the treatment scenario applies a reduction or increase in calorie intake. The effects of the policy are measured by comparing the two scenarios over time.

[1] Model results can be applied to the rest of the UK by applying a pro-rata adjustment based on population size. This may not take full account of demographic and health-related differences but should suffice on an indicative basis.
[2] We use Health Survey for England (HSE) and Office for National Statistics (ONS) population data and projections.
[3] Further background information about this type of model can be found at Cornell University (2014) Markov Models for Health Economic Evaluations: The R Package heemod. Available at: https://arxiv.org/abs/1702.03252.

**What outputs does the model produce?**

749. The model produces several key outcomes for each scenario:

- Total benefit or cost in present value terms resulting from a calorie change, which includes:
    - Monetised health changes (measured in QALYs)[4]
    - Change in NHS treatment costs
    - Change in social care costs
    - Economic productivity impacts
- A timeline showing when these effects are expected to occur.
- The number of premature (aged under 75 years) deaths expected in the scenario compared with the control.
- The number of disease years expected in the scenario compared with the control.

750. The model also allows for detailed interrogation of different age group and BMI changes, as well as sensitivity analysis for input parameters.

**How does the model work (detailed) and what assumptions are used?**

751. The main input parameter is the expected change in calorie intake per person per day.[5] This value (or range) must be generated externally, using available research, analysis or estimation techniques. The model can explore the effect of various calorie changes and perform sensitivity analysis around, but it does not generate the correct calorie change to use.

752. The calorie change can be adjusted depending on the age, gender and BMI category of the population being affected. This allows for modelling of policies targeting specific groups, such as children.

753. Changes in weight and BMI resulting from the calorie reduction are calculated and provide a starting point for further analysis in the model.

754. The model then considers how changes in BMI affect 10 obesity-related diseases: type 2 diabetes, coronary heart disease (CHD), stroke, colorectal cancer, breast cancer, liver disease, uterine cancer, upper gastrointestinal cancer, kidney cancer and osteoarthritis. It

[4] Quality-adjusted life years (QALYs) are the standard currency used in health evaluations to measure the duration and quality of life combined. A value of 1.00 represents a year of life in perfect health. Someone living with an obesity-related disease is assumed on average to have a lower quality of life and/or a lower life expectancy than someone of similar age without that disease. The social value of QALYs (i.e. the value placed on them by the public) is £70,000 each. Further detail on how and why QALYs are used is provided in HMT's Treasury Green Book - page 72.
[5] Equivalent inputs (such as an expected change in weight or BMI status) can also be used with appropriate conversion upfront.

calculates the changes in disease prevalence, resulting in the number of diseases and deaths avoided under the treatment scenario. These diseases were chosen based on their relationship with excess BMI, prevalence and mortality rates, and impact on quality of life.

755. The model partly accounts for comorbidities. In previous versions, individuals in a disease state could only transition to the dead state or remain in that state. In this version, disease-to-disease transitions are modelled, but the model does not track a person's history of diseases. Therefore, when an individual transitions from one disease to another, the costs associated with the first disease are no longer counted. To minimise bias, disease transitions are allowed only from less severe to more severe diseases. The severity ranking is based on mortality rates, as shown in Table 99.

*Table 99: Diseases in the Calorie Model, ranked by severity*

| | |
|---|---|
| Upper GI Cancer | Highest – Most Severe |
| CHD | |
| Stroke | |
| Colorectal Cancer | |
| Kidney Cancer | |
| Uterine Cancer | |
| Breast Cancer | |
| Liver Disease | |
| Type 2 Diabetes | |
| Osteoarthritis | Lowest – Least Severe |

**BMI analysis**

756. Individual weights are modelled using the differential equations developed by Hall et al.[6] These equations assume an individual's weight to consist of fat and fat-free mass. Weight changes are modelled based on the imbalance between energy intake and expenditure, with the assumption that an individual remains at the same BMI percentile throughout life.

757. These equations were implemented using the deSolve[7] package in R. The original model predicted the same weight loss per calorie reduction regardless of starting body weight, but this simplification has been removed. The new model predicts greater weight loss per calorie reduction for individuals with higher initial BMI.

758. These updates allow the model to account for weight changes during childhood. The equations include a growth term that reduces at age 18 years, meaning the model naturally transitions from childhood into adulthood.

759. Currently, there is limited evidence linking excess weight to diseases in childhood, so the model does not account for health benefits during this period. If future data reveals strong

[6] Hall KD, Butte NF, Swinburn BA, and Chow CC. Dynamics of childhood growth and obesity: development and validation of a quantitative mathematical model. The lancet Diabetes & endocrinology. 2013 Oct 1;1(2):97-105.
[7] Soetaert K, et al. (2023) deSolve: Solvers for Initial Value Problems of Differential Equations. Available: deSolve-package function - RDocumentation

associations between excess BMI and childhood diseases, the model may be updated to capture this.

**Groups of people considered within the model**

760. The model divides the population by age, sex, and five BMI categories: underweight, healthy weight, overweight, obese, and very obese. Age can be modelled in individual years or grouped categories, with age-specific parameters (e.g. mortality rate and disease incidence) applied as necessary.

761. The model also accounts for health benefits in adults with a BMI above 22 kg/m$^2$, even if they are not categorised as overweight. The risk of the diseases included in the model increases with BMI, so including this group allows the extra benefits of weight reduction to be captured. Underweight is modelled as a separate group and has no health consequences associated with it.

762. The starting population can be defined by the user, allowing for evaluation of policies that target specific groups (e.g., only children or only adults).

763. The model uses Markov modelling to simulate transitions between health states (healthy, diseased, or deceased). The heemod[8] package in R is used for this modelling, with transition probabilities being entered as an input. The whole population starts in the healthy state, and the package then simulates state transitions over time.

764. Each year (one cycle of the Markov model), the model calculates the proportion of the population in each state, producing a trajectory over time.

**Calculating results**

765. NHS savings are calculated based on reduced treatment requirements for each disease.

766. Economic productivity effects are assessed in two categories:

- Mortality effects: Reduced mortality increases the size of the workforce, with economic output being modelled based on median wages by age and gender.

- Morbidity effects: Changes in productivity due to illness are modelled using employment rates that vary by diseases.

767. Social care savings are estimated by calculating the reduced need for social care due to fewer overweight and obese individuals requiring care.

[8] Filipović-Pierucci A, Zarca K and Durand-Zaleski I (2017). "Markov Models for Health Economic Evaluation: The R Package heemod." *ArXiv e-prints*. R package version 0.8.0, 1702.03252

768. QALY changes are based on reduced deaths and fewer people living with obesity-related diseases. The model calculates the QALY value for individuals in disease states, adjusted for age and sex, and then converts these into QALYs.[4]

769. The model assumes that individuals' QALY values are affected by age and sex, even if they are healthy, to account for other age-related health issues not modelled explicitly.

770. Premature deaths (aged under 75 years, according to OHID definition) are calculated based on reductions in obesity-related diseases.

771. Disease mortality rates are constant for a given disease, regardless of BMI, but vary with age and sex.

772. Discount rates are applied to account for the time value of costs and benefits, following principles of the HMT The Green Book.[9]

773. The model can be run over user-defined timeframes. Long time periods (typically 20-50 years) are often used to capture long-term health benefits.

774. The model can accommodate policies that extend over multiple years, incorporating new children born during the policy period based on Office for National Statistics population projections.

775. Once a policy period ends, the model stops adding new children but continues to model the benefits for the existing population over the evaluation period selected. This ensures that benefits that do not occur until later in life are modelled.

**How robust and reliable is the model?**

776. The model has evolved over several years, incorporating new evidence and modelling improvements. It has been independently assured and the results have regularly been used to support published Impact Assessments.

777. However, the model has limitations:

- It predicts the effect of calorie intake changes on health and economic outcomes but cannot predict the impact of a policy on calorie changes. It relies on external analysis for these estimates.

- It simplifies real-world conditions and does not account for every possible disease, individual circumstance, or economic impact.

- It assumes that past data (in terms of treatment costs, transition probabilities, population profiles and many other parameters) is a reasonable for future predictions.

[9] HM Treasury (2022). The Green Book: Central Government Guidance on Appraisal and Evaluation. Page 116

- Results vary depending on the chosen evaluation period.

778. Ongoing work aims to refine and improve the model and address its limitations. Sensitivity analysis and optimism bias are regularly used to ensure model results are appropriately interpreted and used.

**Illustrative Analysis**

*Table 100: Illustrative analysis, Calorie Model version 4.1*

| 25 years | | | | | |
|---|---|---|---|---|---|
| **Calorie reduction (per person per day)** | **Economic Output** | **NHS Costs** | **QALYs** | **Social Care Costs** | **Total** |
| 5 kcal | 2,708 | 466 | 11,679 | 426 | 15,279 |
| 10 kcal | 5,416 | 933 | 23,363 | 848 | 30,560 |
| 20 kcal | 10,831 | 1,869 | 46,739 | 1,684 | 61,123 |
| **10 years** | | | | | |
| **Calorie reduction (per person per day)** | **Economic Output** | **NHS Costs** | **QALYs** | **Social Care Costs** | **Total** |
| 5 kcal | 920 | 177 | 2,776 | 211 | 4,084 |
| 10 kcal | 1,841 | 354 | 5,553 | 420 | 8,168 |
| 20 kcal | 3,679 | 709 | 11,100 | 833 | 16,321 |

Benefit figures are for England, in £million and rounded to the nearest million. Figures are discounted to give present values

**Developmental history of the model**

779. PHE developed the Weight Management Economic Assessment Tool in 2014.[10] This tool was used to support analysis for reduction, and later calorie reduction. Through a series of developments, it became Version 1 of the Calorie Model, developed in collaboration with DHSC.

780. The model and its assumptions were the subject of a Technical Consultation Document,[11] published by DHSC in 2018.

781. The original model was built in Microsoft Excel. After the consultation, DHSC analysts developed a more advanced version using R programming language. This Version 2 of the model offered improved flexibility, more accurate modelling of weight gain and loss, the ability to extend the evaluation period, and enhanced functionality to model adult and children separately.

[10] Public Health England (2014) Weight Management Economic Assessment Tool
[11] Department of Health and Social Care (2018). Technical Consultation Document: DHSC Calorie Model.

782. These Version 2 changes were published in ‘Further advertising restrictions for products high in fat, salt and sugar: impact assessment’: Annex D.[12]

783. Version 3 of the model was developed by DHSC analysts in late 2019. This version added liver disease to the list of obesity-related diseases, added limited modelling of comorbidities, expanded the economic productivity component, and improved the QALY calculations by incorporating age-related health deterioration.

784. These Version 3 updates were published in ‘Total restriction of online advertising for products high in fat, sugar and salt (HFSS): Evidence Note’ Annex A.[13] These Version 3 updates were published in ‘Total restriction of online advertising for products high in fat, sugar and salt (HFSS): Evidence Note’ Annex A.[14]

785. The current model is Version 4.1, developed by DHSC analysts in mid-2022. It added several additional conditions to the disease list, including osteoarthritis, kidney cancer, upper gastrointestinal cancer, uterine cancer, and kidney cancer. This version also included a full update of the underlying data and cost assumptions to reflect 2019 or the latest available data.

786. Quality assurance was carried out in line with the principles of Government’s Aqua Book, and through engagement with internal and external experts for independent assurance.

787. Further details on the history and development of the model can be found in the published documents referred to.

[12] DHSC/DCMS, March 2019 [Online]: Impact assessment
[13] Department of Health and Social Care, and Department for Digital, Culture, Media and Sport (2021). Consultation outcome: Evidence note – total restriction of online advertising for products high in fat, sugar and salt (HFSS).
[14] Department of Health and Social Care, and Department for Digital, Culture, Media and Sport (2021). Consultation outcome: Evidence note – total restriction of online advertising for products high in fat, sugar and salt (HFSS).