Title: Restricting the use of tyres 10 years and older on heavy vehicles **IA No:** DfT00411 **RPC Reference No:** **Lead department or agency:** Department for Transport **Other departments or agencies:**	**Impact Assessment (IA)** **Date:** 25/05/2019 **Stage:** Consultation **Source of intervention:** Domestic **Type of measure:** Secondary legislation **Contact for enquiries:** **IVS.Consult@dft.gov.uk**

Summary: Intervention and Options

RPC Opinion: RPC Opinion Status

Cost of Preferred (or more likely) Option (in 2016 prices)			
Total Net Present Social Value	**Business Net Present Value**	**Net cost to business per year**	**Business Impact Target Status** Qualifying provision
£3.3m	-£4.2m	£0.5m	

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

There have been two collisions, resulting in eight fatalities, in the last 10 years where old tyres on heavy vehicles had been deemed as a contributory factor at the Coroners inquests. As such, there are potential safety concerns arising from old tyres being fitted to heavy vehicles.

Heavy goods vehicle (HGV), bus, coach and minibus operators understand the private costs involved in replacing tyres, but may not be aware of the dangers associated with older tyre use, or the increased social benefits (through road safety) which may materialise from replacing older tyres. Data suggests a minority of these heavy vehicle operators use old tyres even in the presence of roadworthiness guidance and online information advising that tyres over 10 years old should be replaced. Government intervention is the best way to address this information gap and negative externality.

What are the policy objectives and the intended effects?

The policy looks to ensure that every HGV, bus, coachand minibus on the road has tyres younger than 10 years old by expanding on the existing Construction and Use regulations to set a maximum tyre age. The intended effect of this policy is to improve road safety by reducing the possibility that collisions involving HGVs, bus, coach and minibuses occur due to old tyres.

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

- **Option 0:** Do minimum
- **Option 1**: To ban the use of tyres which are 10 years or older, and re-treads of all ages on all axles for all HGVs, buses, coaches and minibuses (including trailers).
- **Option 2** (preferred, subject to consultation): To ban the use of tyres which are (a) aged 10 years or older, and re-treads of any age,on the steering axles for all HGVs, buses, coaches and minibuses and (b) 10 years or older, or have a re-tread date 10 years or older, on all other axles (including trailers).
- **Option 3**: As Option 2, but excluding heavy trailers.
- **Option 4**: To ban the use of tyres aged 10 years or older, and re-treads of any age, only on the steering axles for all HGVs, buses, coaches and minibuses.

Will the policy be reviewed? It will/will not be reviewed. **If applicable, set review date:** Month/Year

Does implementation go beyond minimum EU requirements?		Yes / No / N/A		
Is this measure likely to impact on trade and investment?		Yes / No / N/A		
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 SELECT SIGNATORY: ..... Date: .....

Summary: Analysis & Evidence

Policy Option 1

Description: To amend The Road Vehicles (Construction and Use) Regulations to **ban** the use of tyres aged 10 years or older, and re-treads of any age, on **all axles** for all HGVs, buses, coaches and minibuses (including heavy trailers over 3.5 tonnes). This option will necessarily create an immediate ban on all re-tread tyres since we cannot guarantee the age of the original first-life tyre as there is no legal requirement to record this.

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2019	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low:-691.6	**High:**-243.6	**Best Estimate:**-467.7

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	259.0		0.2	**260.7**
High	687.2		0.5	**691.6**
Best Estimate	473.2		0.4	**476.2**

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

The cost of replacing tyres aged 10 years or older is estimated to affect around 0.1% of HGVs, buses, coaches, and minibuses, as this is the estimated level of non-compliance with tyres on all axles under the age of 10 years. These vehicles are primarily owned by businesses. Costs are derived from replacing older and re-tread tyres on the vehicles listed above, and bringing forward tyre purchases compared to the baseline. Costs in replacing re-tread tyres on these vehicles represent the majority of the costs presented in this option, as this represents around 30% of the tyres fitted to these vehicles.

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

Businesses or individuals selling tyres which are 10 years or older may sell fewer units. As a result, this lost revenue may be made up by passing cost onto consumers, through the prices of newer tyres. The re-tread industry will be heavily impacted by this option, as it rules out the re-treading of tyres for heavy vehicles. The tyre waste and recycling industry will also incur costs due to the potentially significant increase in tyres that will become obsolete and need to be disposed, as re-treading heavy vehicle tyres would no longer be allowed.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0		0.0	**0**
High	17.0		0.0	**17.0**
Best Estimate	8.5		0.0	**8.5**

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

The key monetised benefit of this option is the estimated reduction in fatal collisions due to old tyres being removed from use, however there is an inherently high level of uncertainty in the number of lives saved from this (and other) options. The benefit is experienced by all road users.

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

Monetised benefits relate to collisions which have resulted in fatalities; this measure is also likely to reduce more minor collisions, which will have safety benefits.

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

Benefits assume there will be two collisions of equal size and severity as those in 2012 and 2017. DVSA data suggest that the average age of a tyre over 10 years is around 13 years - this is assumed to be the age when tyres are scrapped in the counterfactual scenario. As the data considered tyres which are currently in use, this is likely to be an underestimate. DVSA data on tyres is for front steering axle only; tyres on other axles may have a different age distribution.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			**Score for Business Impact Target (qualifying provisions only) £m:**
Costs:	**Benefits:**	**Net:**	
55.3	**0.0**	**55.3**	243.5

Summary: Analysis & Evidence

Policy Option 2

Description: To amend The Road Vehicles (Construction and Use) Regulations to (a) **ban** the use of tyres aged 10 years or older, and re-treads of any age, on the **steering axles** for all HGVs, buses, coaches and minibuses and (b) **ban** the use of tyres aged 10 years or older, or having a re-tread date 10 years or older, on all other axles (including heavy trailers over 3.5 tonnes).

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2019	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low:-7.0	High:14.4	Best Estimate:3.7

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	1.0		0.2	**2.6**
High	2.6		0.5	**7.0**
Best Estimate	1.8		0.4	**4.8**

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

The cost of replacing tyres aged 10 years or older is estimated to affect around 0.1% of HGVs, buses, coaches, and minibuses. Vehicles are primarily owned by businesses . Costs are derived from replacing older tyres on the vehicles listed above and bringing forward tyre purchases compared to the counterfactual. This cost will be lower than in option 1, as a subset of re-tread tyres (those with re-tread date above 10 years) would be required to be replaced, rather than all re-tread tyres.

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

Businesses or individuals selling tyres which are 10 years or older may sell fewer units. This is because demand for 10+ year old tyres for HGVs, buses, coaches, minibuses and associated trailers would fall. Due to this, this lost revenue may be made up through passing cost onto consumers, through the prices of newer tyres.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0		0.0	**0**
High	17.0		0.0	**17.0**
Best Estimate	8.5		0.0	**8.5**

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

The key monetised benefit of this option is the estimated reduction in fatal collisions due to older tyres being removed from use, however there is an inherently high level of uncertainty in the number of lives saved from this (and other) options. The benefit is experienced by all road users.

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

Monetised benefits relate to collisions which have resulted in fatalities; this measure is also likely to reduce more minor collisions, which may have safety benefits. These may be equal to those under option 1. Re-tread tyres are subject to UNECE standards, such that it can be assumed a newly re-tread tyre is as safe as a new tyre. However, in terms of safety relating to tyre age, ensuring all re-tread tyres in use have been re-tread within the last 10 years is assumed to provide some additional safety benefits compared to allowing the continued use of older re-tread tyres.

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

Benefits assume there will be two collisions of equal size and severity as those in 2012 and 2017. DVSA data suggest that the average age of an older fitted tyre is around 13 years - this is assumed to be the age when tyres are scrapped, in the counterfactual scenario. As the data considered tyres which are currently in use, this is likely to be an underestimate. DVSA data on tyres is for front steering axle tyres only; tyres on other wheels may have a different age distribution.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 0.6	**Benefits: 0.0**	**Net: 0.6**	2.5

Summary: Analysis & Evidence

Policy Option 3

Description: To amend The Road Vehicles (Construction and Use) Regulations to (a) **ban** the use of tyres aged 10 years or older, and re-treads of any age, on the **steering axles** for all HGVs, buses, coaches and minibuses and (b) **ban** the use of tyresaged 10 years or older, or having a re-tread date 10 years or older, on all other axles (excluding heavy trailers).

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2019	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low:-4.3	High:15.4	Best Estimate:5.5

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.6		0.1	**1.6**
High	1.6		0.3	**4.3**
Best Estimate	1.1		0.2	**3.0**

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

The cost of replacing tyres aged 10 years or older is estimated to affect around 0.1% of HGVs, buses, coaches, and minibuses. Vehicles are primarily owned by businesses with some third party organisations. Costs are derived from replacing old age tyres on the vehicles mentioned above and bringing forward tyre purchases compared to the baseline. The associated cost to replace non-compliant fitted tyres is lower than costs represented in options 1 and 2, due to fewer tyres being within scope.

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

Businesses and individuals selling tyres which are 10 years or older may sell fewer units. This is because demand for 10+ year old tyres for HGVs, buses, coaches, minibuses and associated trailers would fall. Due to this, this lost revenue may be made up through passing cost onto consumers, through the prices of newer tyres.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0		0.0	**0**
High	17.0		0.0	**17.0**
Best Estimate	8.5		0.0	**8.5**

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

The key monetised benefit of this option is the estimated reduction in fatal collisions due to old tyres being removed from use, however there is an inherently high level of uncertainty in the number of lives saved from this (and other) options. The benefit is experienced by all road users.

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

Monetised benefits relate to collisions which have resulted in fatalities; this measure is also likely to reduce more minor collisions, which will have safety benefits. These are likely to be lower than those under option 2, as the scope of older tyres to be replaced is lower.

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

Benefits assume there will be two collisions of equal size and severity as those in 2012 and 2017. DVSA data suggest that the average age of an older fitted tyre is around 13 years - this is assumed to be the age when tyres are scrapped, in the counterfactual scenario. As the data considered tyres which are currently in use, this is likely to be an underestimate. DVSA data on tyres is for front steering axle tyres only; tyres on other wheels may have a different age distribution.

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	**Benefits:**	**Net:**	
0.3	**0.0**	**0.3**	1.5

Summary: Analysis & Evidence

Policy Option 4

Description: To amend The Road Vehicles (Construction and Use) Regulations to **ban** the use of tyres aged 10 years or older, and re-treads of any age, only on the **steering axles** for all HGVs, buses, coaches and minibuses. This option is the closest to a legislative extension to current DVSA Roadworthiness Guidance.

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2019	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -1.2	High: 16.6	Best Estimate: 7.7

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.2		0.0	**0.5**
High	0.4		0.1	**1.2**
Best Estimate	0.3		0.1	**0.8**

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

The cost of replacing tyres aged 10 years or older is estimated to affect around 0.1% of the HGVs, buses, coaches, and minibuses considered in this option. These vehicles are primarily owned by businesses with some third party organisations. The costs are those of disposing of tyres, which are in use, and bringing forward the purchase of new tyres. The costs under this option will be lower than the others, due to fewer tyres being within scope.

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

Businesses and individuals selling tyres which are 10 years or older may sell fewer units. This is because they lose the sales of these used for steering axles. Due to this, this lost revenue may be made up through passing cost onto consumers, through the prices of newer tyres

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0		0.0	**0**
High	17.0		0.0	**17.0**
Best Estimate	8.5		0.0	**8.5**

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

The key monetised benefit of this option is the estimated reduction in fatal collisions due to old tyres being removed from use, however there is an inherently high level of uncertainty in the number of lives saved from this (and other) options. The benefit is experienced by all road users.

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

Monitised benefits relate to collisions which have resulted in fatalities; this measure is also likely to reduce more minor collisions, which will have safety benefits. These are likely to be lower than those under option 3, as the scope of older tyres to be replaced is lower.

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

Benefits assume there will be two collisions of equal size and severity as those in 2012 and 2017. DVSA data suggest that the average age of an older fitted tyre is around 13 years - this is assumed to be the age when tyres are scrapped, in the counterfactual scenario. As the data considered tyres which are currently in use, this is likely to be an underestimate. DVSA data on tyres is for front steering axle tyres only; tyres on other wheels may have a different age distribution.

BUSINESS ASSESSMENT (Option 4)

Direct impact on business (Equivalent Annual) £m:	

Costs:	Benefits:	Net:	Score for Business Impact Target (qualifying
0.1	**0.0**	**0.1**	0.4

Evidence Base (for summary sheets)

Problem under consideration

1. In September 2012, a catastrophic failure of a tyre, fitted to the steering axle of a large coach, led to the loss of three lives. The Coroners Inquest concluded that the age of the tyre was the primary contributing factor to its failure.

2. In September 2017, a HGV travelling on the M5 suffered a tyre blow-out and crossed the central reservation and collided with oncoming traffic. Five lives were lost in the incident. The collision investigator concluded that the tyre failure was caused by its age. The Coroner's inquest (held in Feb 2019), concluded that this crash was due to a tyre blow-out and noted that the tyre had suffered structural deterioration due to its age.

3. In both collisions, the tyres on the steering axle of the vehicle at fault were older than 10 years of age (19 years and 18 years for the collisions in 2012 and 2017, respectively).

4. The Driver and Vehicle Standard Agency (DVSA) publish a guide to maintaining roadworthiness for commercial goods and passenger carrying vehicles. This was updated in 2013 to advise bus operators against fitting tyres older than 10 years to the steering axles of their vehicles. In November 2018[1] this guidance was extended to cover HGVs, so that tyres aged more than 10 years old should not be used except on a rear axle as part of a twin wheel arrangement.

5. In light of evidence from inquiries regarding the collisions and the current DVSA roadworthiness guidance, policy options to ban the use of tyres aged 10 years and older on certain vehicles are under consideration, to improve road safety for all users. Buses, coaches, heavy goods vehicles and minibuses are included within this analysis.

Rationale for intervention

6. This section introduces the market failures associated with older tyre use. Reasons why the market fails to deliver a higher level of safety in the absence of regulation are discussed, as well as why the proposed intervention is justified.

7. **There is asymmetric information influencing heavy vehicle operators' tyre replacement decisions.** A HGV, bus, coach or minibus operator is aware of, and fully exposed to, the private cost of replacing an older tyre. However, they may believe that their older tyres present no additional danger (in terms of road safety) compared to a newer tyre. Experts investigating the fatal collisions of 2012 and 2017 concluded that the age of the tyres was a contributory factor. Given that guidance on steering-axle use of older tyres already exists, these conclusions point to a key information gap.

8. **There is a negative externality in tyre replacement on heavy vehicles.** As mentioned, a heavy vehicle operator will bear the private cost in replacing an older tyre; however they may not factor into their decision-making that the social benefit in doing so is greater than the private benefit. This is because the operator may not take into account that replacing an old tyre

[1] The guide can be found online [last accessed 8th March 2019]

improves safety for all road users, not just the operator. Therefore, in a free market environment, these tyres will be replaced less frequently than the socially optimal level.

9. **Self-regulation is currently not working to the level desired.** Due to the above market failures, older tyres on heavy vehicles are likely to remain fitted at levels higher than that which is socially optimal. The DVSA roadworthiness guidance advises that tyres aged 10 years above should not be fitted to the steering axles of heavy vehicles. There has also been publically available information[2] advising users to replace tyres before the 10 year limit. Further, as the guidance and information online are published as recommendations, operators may not feel the compulsion to follow these. Given that there is still a minority of vehicles fitted with tyres aged 10 years or older and that there has been a fatal collision caused by an older tyre since the guidance was first published, further intervention is necessary.

10. **A ban on the use of older tyres on heavy vehicles (and minibuses) is the preferred option to address these failures.** Safety issues arising from the use of older tyres point to the need to remove them from being fitted to heavy vehicles. Due to the asymmetric information and negative externality concerns mentioned above, these tyres will be replaced less frequently than the socially optimal level. Publically available information has not brought replacement rates to this optimal level. As such, government intervention calling for a ban on these tyres will best address these failures. Consideration of other methods (such as for instance a tax on older tyres) may not deliver the same outcomes. Such methods are costly to implement and enforce and present a route for potentially dangerous tyres to remain on the market. Given the relatively small number of older tyres on the market, it is more proportionate to ban older tyres.

Policy Context and Objectives

11. The Government is determined to improve road safety and since 2013 has implemented a range of measures to address potential dangers posed by ageing tyres.

12. These include updating the roadworthiness guidance (as mentioned above), amending the requirements in relation to tyre cuts in the annual roadworthiness test (MoT) for all vehicles and commissioning pioneering research to establish the effect age has on the integrity of road vehicle tyres. As part of this research, the UK's Transport Research Laboratory has worked with a leading laboratory in the United States to carry out testing and analysis, with findings (based on a small sample size) suggesting older tyres are subject to higher levels of corrosion due to damage over time, which may compromise safety.

13. The DfT and its Agencies are working closely to ensure vehicle operators understand how to maintain the safety and roadworthiness of their vehicles, including their tyres, and to enforce any non-compliance.

14. The Government now intends to consult on options to ban older tyres on heavy vehicles, including legislation to make it illegal for buses, coaches, heavy goods vehicles, and minibuses to have tyres aged 10 years and older.

15. Re-treading tyres is a remanufacturing process that replace the tread on worn tyres. These tyres are required to meet precise UNECE standards, which stipulate that they are tested to the same loads and speed criteria as new tyres. In line with this, a newly re-tread tyre is considered to be as safe as a new tyre in this assessment, and is expected to deteriorate over time in the same way. As a result, re-tread tyres are also within scope of the policy.

[2] https://www.kwik-fit.com/tyres/information/tyre-age [last accessed 13/03/19], https://www.theaa.com/driving-advice/safety/tyre-life-and-age [last accessed 13/03/19], https://www.michelin.co.uk/tyres/learn-share/buying-guide/when-should-i-change-my-tyres [last accessed 13/03/19], https://www.blackcircles.com/helpcentre/tyres/age-of-a-tyre [last accessed 13/03/19]

16. The heavy vehicles at fault in the 2012 and 2017 collisions had steering axle tyres which were 19 years and 17 years respectively. The proportion of HGVs, buses, coaches and minibuses with tyres aged 10 years or older is very low; the 10 year age limit has been chosen as a precautionary principle and is in line with the DVSA roadworthiness guidance.

Description of options considered (including do minimum)

17. **Option 0 (Do minimum):** This is the counterfactual scenario, where regulations focussing on the use of older tyres are not introduced. Under this scenario, it is assumed that all else equal, within every 10 year interval there will be two collisions of equal size and severity as those in 2012 and 2017 where the main contributory factor is tyre age. These are the only two collisions where older tyres have been concluded to be the main contributory factor; therefore, it is not possible to establish a trend which may better inform this assumption. It is also assumed that an operator with tyres aged over 10 years would replace these tyres when the tyre is 13 years old. Details of this assumption are given in the costs section.

18. **Option 1**: To amend The Road Vehicles (Construction and Use) Regulations to **ban** the use of tyres which are 10 years or older, and re-treads of all ages, on **all axles** for all HGVs, buses, coaches and minibuses (including heavy trailers over 3.5 tonnes). For the purposes of this analysis, it is assumed that only HGVs tow trailers which exceed 3.5 tonnes.This option will necessarily create an immediate ban on all re-tread tyres since we cannot guarantee the age of the original first-life tyre as there is no legal requirement to record this.

19. **Option 2:** To amend The Road Vehicles (Construction and Use) Regulations to (a) **ban** the use of tyres which are aged 10 years or older, and re-treads of any age, on the **steering axles** for all HGVs, buses, coaches and minibuses and (b) **ban** the use of tyres aged 10 years or older, or having a re-tread date 10 years or older, on all other axles (including heavy trailers over 3.5 tonnes). For the purposes of this analysis, it is assumed that only HGVs tow trailers which exceed 3.5 tonnes.

20. **Option 3:** To amend The Road Vehicles (Construction and Use) Regulations to (a) **ban** the use of tyres aged 10 years or older, and re-treads of any age, on the **steering axles** for all HGVs, buses, coaches and minibuses and (b) **ban** the use of tyres aged 10 years or older, or which have a re-tread date 10 years or older, on all other axles (excluding heavy trailers).

21. **Option 4**: To amend The Road Vehicles (Construction and Use) Regulations to **ban** the use of tyres which are aged 10 years or older and re-treads of any age only on the **steering axles** for all HGVs, buses, coaches and minibuses. This option is the closest to a legislative extension to current DVSA Roadworthiness Guidance.

22. A summary of these options is provided in Annex A (Table 14).

Summary and preferred option with description of implementation plan

23. The Department proposes, subject to consultation to proceed with **Option 2**: to amend The Road Vehicles (Construction and Use) Regulations to (a) **ban** the use of tyres aged 10 years or older, and re-treads of any age, on the **steering axles** for all HGVs, buses, coaches and minibuses and (b) **ban** the use of tyres aged 10 years or older, or which have a re-tread date 10 years or older, on all other axles (including heavy trailers over 3.5 tonnes).

24. Whilst the monetised benefits are the same across all options, due to a limited evidence base, the potential additional benefits on road safety under Options 1 and 2 (which have not been monetised) could lead to better outcomes for all road users. This is because it can be argued that the higher the number of older tyres replaced with new tyres, the greater the safety benefits (as new tyres will be free from wear and tear, and other defects). This is further highlighted by research conducted on a limited sample by the UK's Transport Research Laboratory for the department, whose results indicated that of the tyres examined, all aged over 8 years old exhibited corrosion potentially caused by cuts and penetrations in the tread structure, which can compromise road safety. As such, safety outcomes may be higher under Options 1 and 2 than under Options 3 and 4. The difference between Options 1 and 2 centre around the cost in banning re-tread tyres (option 1 mandates a complete ban, whilst option 2 bans those which have a re-tread date 10 years and above). Re-tread tyres are subject to UNECE standards, such that it can be assumed a newly re-tread tyre is as safe as a new tyre. Therefore, replacing all re-tread tyres is assumed to provide no additional safety benefits (in terms of those derived from tyre age) compared to replacing only older re-tread tyres. As such, Option 2 is lower in cost compared to Option 1, but is expected to deliver the same monetised and non-monetised safety benefits (in terms of those derived from tyre age).

25. Option 1 may have higher non-monetised benefits accrued from sources other than tyre age compared to Option 2. However, unlike Option 1, Option 2 permits re-tread tyres away from the steering axle, thus mitigating the risk to the UK re-tread industry. This also allows operators to source high quality tyres at lower costs than first life tyres and contributes to Defra's recycling and waste strategy.

26. Our intention is to specify that tyres older than 10 years must not be used on particular types of vehicle (coach/bus/HGV/minibus), as an additional criterion, alongside all the current rules for the condition of tyres on motor vehicles. We may, subject to the outcome of the consultation, consider exemptions for particular vehicle types (e.g. historical vehicles).

27. We are working with DfT legal colleagues to develop this approach and plan to use the same provisions for non-compliance to those in place for contravention of the legal minimum tread depth requirement. In these cases, the driver and/or the vehicle owner/operator can be fined, or subject to Magistrate Court proceedings. For Court prosecution the sanctions available are fines, driving licence penalty points or, in severe cases, disqualification from driving. The maximum fine is Level 5 for offences for goods vehicle, minibuses or buses. This means in England and Wales the fines are unlimited whereas in Scotland and Northern Ireland the fine is a maximum £5000.

Monetised and non-monetised costs and benefits of each option (including administrative burden)

Costs

28. This section outlines the transition and annual costs which build the total cost of each option. The costs borne in replacing non-compliant tyres in the initial year are treated as transitional costs, as they are one-off. The recurring costs to replace tyres which turn 10 years of age annually are treated as annual costs. The costs in this section result from central estimate tyre costs being applied, for both first-life and re-tread tyres. Annex B presents the low and high tyre cost estimates, which when applied result in the high and low transitional, annual average and total cost estimates presented in the summary sheets of this impact assessment.

Option 0: Baseline

29. There are no direct costs associated with option 0, as there are no changes to currently set requirements regarding tyre use. Option 0 is the baseline against which all other options are compared.

Option 1: To amend The Road Vehicles (Construction and Use) Regulations to ban the use of tyres which are 10 years or older, and re-treads of all ages, on all axles for all HGVs, buses, coaches and minibuses (including heavy trailers over 3.5 tonnes). This option will necessarily create an immediate ban on all re-tread tyres.

30. This option seeks to replace all tyres which are 10 years of ageand above on all axles for HGVs, buses, coaches and minibuses (including trailers). Given that the original first-life tyre age of a re-tread tyre cannot be seen, and therefore cannot be guaranteed to be compliant under this option, re-tread tyres are necessarily banned. The cost of replacing older tyres and the cost of replacing re-tread tyres are presented separately below, as well as a total cost summary.

Total cost in replacing old tyres early

Number of vehicles affected in initial year

31. DVSA provided 2018 data on annual and roadside inspections (first test and retests) of HGVs, buses, coaches and minibuses. Out of the nearly 2,700 HGVs, 81,000 buses and coaches, and 3,200 minibuses inspections, only a small minority had at least one tyre aged 10 years or above on the front steering axle (0.15%, 0.06% and 0.28% vehicles respectively). It is assumed that these samples are representative of all HGVs, buses, coaches and minibuses. A further key assumption is that all tyres on a vehicle are around the same age, and so if one is 10 years or older, the others are likely to be. This assumption is made due to data informing the age distribution of tyres only on the front steering axle being available; the department is currently procuring richer data to help better inform this assumption.

32. Table 1 provides a breakdown of the number of tyres assumed by axle configuration. It is assumed that the steering axles on the tractor units are fitted with single tyres, whilst the other axles and fitted with twin tyres. This only applies to 2 and 3 axle tractor units. 4 axle tractor units are assumed to have two steering axles (fitted with single tyres) and two rear axles (fitted with twin tyres). All trailer units are assumed to be fitted with single tyres. The number of axles on trailers for rigid HGVs have not been given, so it has been assumed these are equal to the tractor unit. As a simplifying assumption, trailers with 4 or more axles are assumed to have 4 axles.

Table 1: Number of tyres by axle configuration

Axle configuration	Number of tyres excl. trailers	Number of tyres incl. trailers
Rigid Vehicles		
2 Axle & 2 axle trailer	6	10
3 Axle & 3 axle trailer	10	16
4 Axle & 4 or more axle trailer	12	20
Articulated Vehicles		
2 Axle Tractor & 2 axle trailer	6	10
2 Axle Tractor & 3 axle trailer	6	12
2 Axle Tractor & 4 or more axle trailer	6	14
3 Axle Tractor & 2 axle trailer	10	14
3 Axle Tractor & 3 axle trailer	10	16
3 Axle Tractor & 4 or more axle trailer	10	18

33. In order to estimate the average number of tyres for Option 1, the number of tyres presented above has been weighted by the corresponding number of vehicles in the fleet (sourced from DfT vehicle licensing statistics, table VEH0524). This is shown in table 2.

Table 2: Weighted average number of tyres (incl. trailers)

Axle configuration	Weighting	Number of tyres
Rigid: 2 Axle	47%	10
Rigid: 3 Axle	12%	16
Rigid: 4 Axle	9%	20
Articulated: 2 Axle Tractor & 2 axle trailer	2%	10
Articulated: 2 Axle Tractor & 3 axle trailer	3%	12
Articulated: 2 Axle Tractor & 4 or more axle trailer	1%	14
Articulated: 3 Axle Tractor & 2 axle trailer	0%	14
Articulated: 3 Axle Tractor & 3 axle trailer	26%	16
Articulated: 3 Axle Tractor & 4 or more axle trailer	0%	18
Weighted average number of tyres (incl. trailers)	13	

34. From the above, it has been estimated that the weighted average number of tyres on a HGV including trailers is **13**[3]. It is assumed that buses, coaches and minibuses do not tow trailers. It is assumed that buses and coaches are 2 axle units, with the steering axle being fitted with single tyres, and the other axle being fitted with twin tyres, resulting in **6** tyres per vehicle. It is assumed that minibuses are 2 axle units fitted with single tyres, resulting in **4** tyres per vehicle.

35. Table 3 suggests that 44 buses and coaches (assumed to scrap and replace 6 tyres), 254 minibuses (assumed to replace 4 tyres) and 781 HGVs (assumed to scrap 13 tyres) are initially affected. This implies 11,656 tyres would be need to be scrapped and replaced.

Table 3: expected number of HGVs, buses, coaches and minibuses with tyres aged 10 years or older in initial year

	Total number of licensed vehicles (2018)[4]	Expected number with tyre(s) aged 10 years or older
Buses and coaches	73,832	44
Minibuses	89,080	254
HGVs	526,744	781
Total	689,656	1,078

Additional upfront cost to replace tyre early

36. The costs detailed in this subsection (i.e. the non-recurring costs) occur in the initial year only, and are therefore considered a one-off transaction cost.There are two additional costs imposed on an operator replacing their older tyre under this option: the additional cost in having to purchase a new tyre earlier than they would in the counterfactual and the value lost in having to scrap their tyre earlier. The DVSA data suggests that the average age of HGV, bus, coach and minibus older tyres is around 13 years (13, 12.9 and 13.3 years respectively). It is assumed that this is the average age at which individuals would replace older tyres. This is likely to be an

[3] The weighted average number is around 13.3 tyres

[4] Note: 2018 Q3 is the latest year in (unpublished) DfT statistics. Full annual 2018 statistics will be released in April; however, given the small proportion of vehicles affected, we believe these figures to be in line with the current year too.

underestimate, as the DVSA data only presents information on fitted tyres, rather than when tyres are scrapped. This assumption is made in lieu of better data, and will be covered within the consultation to help improve the evidence base.

37. In this analysis, it is assumed that if a tyre needs replacing, a brand new tyre is purchased, rather than rotating old tyres with newer tyres elsewhere on the vehicle. This is a necessary simplifying assumption as DVSA data obtained from 2018 only records the age of tyres on the front-steering axle and therefore provides no insight into the age of the other tyres on the vehicle. It is therefore assumed that all tyres on a vehicle will be of a similar age, reducing the incentive to rotate tyres. This assumption will also be covered within the consultation to help improve the evidence base. In addition, there is a high prevalence of re-tread tyres. The British Tyre Manufacturers' Association (BTMA) suggest 8 re-tread tyres are sold for every 10 new tyres[5], suggesting many tyres on heavy vehicles may be re-tread. As this option seeks to replace re-tread tyres as well, the assumption of purchasing a new replacement tyre is justified.

> **Question 1**: What is the average life expectancy of a tyre aged at least 10 years for a HGV, bus/coach and minibus respectively?

38. In the absence of this policy, it is assumed an operator with tyres aged over 10 years would replace these tyres when the tyre is around 13 years old. Under this option, the operator is replacing their tyres around 3 years earlier than they otherwise would have; that is, they are bringing their new tyre purchase decision ahead by around 3 years. These are simplifying assumptions. In the initial year, the DVSA data shows vehicles which have tyres aged over 10 years (including those aged over 13 years). This breaks the assumptions that (i) replacing after 13 years implies bringing the purchase forward by 3 years[6] and (ii) 13 years is when tyres reach the end of their lifetime[7]. However, of the vehicles with tyres aged at least 10 years (0.15% of HGVs; 0.06% of buses and coaches; and 0.28% of minibuses), most are aged between 10 and 12, with around 42% being either 10 or 11 years in age. Given the small proportion of vehicles affected, and the prevelance of older tyres being 10 years old, assuming all affected operators bring forward their purchase by 3 years (i.e. assuming all non-compliant tyres are 10 years) is justified.Table 4 shows the additional cost in having to bring forward the new tyre purchase decision by 3 years, assuming a 3.5% discount rate.

Table 4: Additional cost in bringing forward new tyre purchase

	Valued today	Valued if purchase in 3 years is valued today	Additional cost by bringing forward tyre purchase[8]
Average price of bus/coach tyre[9]	£ 537	£ 484	£ 53
Average price of a HGV tyre[10]	£ 537	£ 484	£ 53
Average price of a minibus[11] tyre	£ 107	£ 96	£ 10

[5] https://btmauk.com/wp-content/uploads/2014/12/tif-factbook-0712.pdf

[6] If a tyre is 12 years old, this means the purchase decision is brought for ward 1 year, not 3

[7] There are tyres aged over 13 in the data

[8] Note: additional cost column may not be exactly equal to difference between tyre value today and in 3 years due to rounding.

[9] It is assumed that the new tyre price for a bus/coach is equal to that of a HGV, in lieu of better data. We welcome any better data sets which can better inform this analysis.

[10] Tyre price data for HGVs have been found through an online search of all season HGV tyres (https://www.mytyres.co.uk/cgi-bin/rshop.pl?dsco=110&cart_id=SpHA6Nz26uTjzU6J.110.265488165&sowigan=GAN&Breite=385&Quer=65&Felge=22.5&Speed=&kategorie=&ranzahl=4&tyre_for=&x_tyre_for=&F_F=&m_s=2&suchen=Search for tyres&Ang_pro_Seite=10&sort_by=preis&rsmFahrzeugart=LKW&weiter=140). In order to determine the price, an average was taken between the cheapest and most expensive tyre (at the time of analysis, these were £292.90 and £780.40 respectively).

[11] The new tyre price for minibuses is assumed to be equal to that of vans, in lieu of better data. Tyre price data for vans have been averaged over a range of tyre sizes (195/70 R15, 235/65 R16 and 225/55 R17). The tyres used in the analysis were the Unirotal RainMax, Avon Avanza Av11 and Continental ContiVanContact 100. An online search from www.mytyres.co.uk showed the prices of these tyres (at the time of analysis) were £61, £107 and £152 respectively.

Opportunity cost of scrapping tyre earlier

39. The opportunity cost of scrapping tyres early is also considered in the total cost for this option. It is assumed that an operator, who would scrap an old tyre after around 13 years (after 13, 12.9 and 13.3 years for HGVs, buses/coaches and minibuses respectively) expects to get around 13 years' worth of value from the tyre. Scrapping the tyre after 10 years implies around 3 years' worth of value is now lost, which could have been alternatively spent.

40. It is assumed that the operator values each useable tyre year equally. Therefore, the price of the old tyre is spread equally across its lifetime (assumed to be around 13 years) to generate an annual value for the tyre. Table 5 shows the per year value of a tyre and the opportunity cost of scrapping it after 10 years instead of around 13.

Table 5: opportunity cost in replacing tyre early

	Price of tyre	Per year value	Lost value in replacing around 3 years early	Lost value in today's prices[12]
Bus/coach[13]	£ 537	£ 42	£ 121	£109
HGV[14]	£ 537	£ 41	£ 124	£112
Minibus[15]	£ 107	£ 8	£ 26	£24

Implication of the assumed lifetime of old aged tyres changing

41. It has been assumed that an operator with tyres aged over 10 years would replace these when the tyre is around 13 years old. As mentioned above, this is likely to be an underestimate. If this is the case, costs to business would increase for two reasons. Firstly, the opportunity cost in replacing a tyre increases (as there is now a greater number of years' worth of lost value). Secondly, the additional cost in bringing forward the tyre replacement increases. This is because, after discounting, the value of a tyre purchase in three years is higher than that further in the future. As a result, the difference between the costs in replacing the tyre now or in the future is higher in the case where the tyre is brought forward by more than 3 years.

Recurring costs

42. Each year, a new set of tyres which reach 10 years in age will need to be replaced. Data on the distribution of tyre ages by vehicle type has not been readily available. In lieu of this, it is assumed that the proportion of vehicles which have tyres aged exactly 10 years old in the DVSA dataset (0.04% of HGVs, 0.01% of buses and coaches and 0.06% of minibuses) is the proportion of vehicles with tyres turning 10 years old each year (and thus need to be scrapped). Applying these rates to the total licensed fleet numbers (526,744 HGVs, 73,832 buses and coaches and 89,080 minibuses) results in 8 buses and coaches, 195 HGVs and 56 minibuses

[12] These are discounted, as the value is realised 3 years in the future

[13] It is assumed that the new tyre price for a bus/coach is equal to that of a HGV, in lieu of better data. We welcome any better data sets which can better inform this analysis.

[14] Tyre price data for HGVs have been found through an online search of all season HGV tyres (https://www.mytyres.co.uk/cgi-bin/rshop.pl?dsco=110&cart_id=SpHA6Nz26uTjzU6J.110.265488165&sowigan=GAN&Breite=385&Quer=65&Felge=22.5&Speed=&kategorie=&ranzahl=4&tyre_for=&x_tyre_for=&F_F=&m_s=2&suchen=Search for tyres&Ang_pro_Seite=10&sort_by=preis&rsmFahrzeugart=LKW&weiter=140). In order to determine the price, an average was taken between the cheapest and most expensive tyre (at the time of analysis, these were £292.90 and £780.40 respectively).

[15] The new tyre price for minibuses is assumed to be equal to that of vans, in lieu of better data. Tyre price data for vans have been averaged over a range of tyre sizes (195/70 R15, 235/65 R16 and 225/55 R17). The tyres used in the analysis were the Unirotal RainMax, Avon Avanza Av11 and Continental ContiVanContact 100. An online search from www.mytyres.co.uk showed the prices of these tyres (at the time of analysis) were £61, £107 and £152 respectively.

having 6, 13 and 4 tyres (respectively) which need to be scrapped each year. The associated costs (bringing forward the purchase decision and the opportunity cost of scrapping a tyre early) are the same as those detailed above.

Question 2: What proportion of fitted tyres turn 10 years of age annually for HGVs, buses, coaches and minibuses?

Total cost in replacing re-tread tyres

43. Given that the original first-life age of a re-tread tyre cannot be seen, and therefore cannot be guaranteed to be compliant under this option, re-tread tyres are necessarily banned. The cost of replacing re-tread tyres are presented below.

44. Re-tread tyres are required to meet precise UNECE standards, which stipulates that such tyres are tested to the same loads and speed criteria as new tyres. In line with this, a newly re-tread tyre is considered to be as safe as a new tyre in this assessment, and is expected to deteriorate over time in the same way. Under this Option, all re-tread tyres are banned.

Number of tyres affected

45. Data from the British Tyre Manufacturers' Association commissioned by the department show that in 2017, around 2,552,375 replacement HGV tyres were sold in the UK (758,698 being re-tread). Table 1 shows there are 526,744 HGVs in the UK, each having 13 tyres on average (including trailers; this results in 7,001,226[16] tyres in total).

46. Given the number of number of tyres replaced and the total number of tyres fitted to HGVs, this suggests HGV tyres on average have a lifetime of 2.7 years (note that this is the average age of all HGV tyres, rather than of old age tyres- which are estimated have a lifetime of around 13 years).

47. In lieu of better data, it is assumed a re-tread HGV tyre has the same estimated lifetime of a first-life tyre; views at consultation to help better inform this assumption are welcomed. Given that 758,698 re-tread replacement tyres are sold in the UK annually, which have an estimated lifetime of 2.7 years, it is estimated that there are 2,081,127 re-tread tyres on HGVs in the UK. This is around 30% of all HGV tyres. It is assumed this proportion also applies to buses, coaches and minibuses in lieu of better data. Information will be sought at the consultation stage to inform this assumption.

Question 3: What are the average life expectancies of a first life tyre and a re-tread tyre?

Question 4: What proportion of total bus/coach and minibus tyres are re-tread?

48. Using the total number of vehicles in table 3, and assuming 13, 6 and 4 tyres per HGV, bus/coach and minibus respectively, we estimate 2,081,127[17] re-tread tyres are fitted to HGVs; 131,680 are fitted to buses and coaches; and 105,917 are fitted to minibuses[18].

Additional upfront cost to replace re-tread tyre early

[16] The number of HGVs and number of tyres per vehicle do not multiply to 7,001,226 exactly, due to the rounding in the weighted average number of tyres.

[17] As mentioned above, due to rounding in the weighted average number of tyres for a HGV, numbers may not be exact

[18] Table 1 shows there are 73,832 buses and coaches, and 89,080 minibuses in the UK. Assuming 6 and 4 tyres on each bus/coach and minibus respectively results in 442,992 tyres on buses and coaches, and 356,320 on minibuses. Around 30% of these are assumed to be re-tread tyres, resulting in 131,680 fitted to buses and coaches; and 105,917 fitted to minibuses.

49. As with older tyres, there are two additional costs imposed on an operator replacing their re-tread tyre under this option: the additional cost in having to purchase a new tyre earlier than they would in the baseline and the associated cost in having to scrap their tyre earlier. As suggested above, an average tyre has a life expectancy of 2.7 years. In lieu of data around the age distribution of re-tread tyres, for simplicity it is assumed the average age of a re-tread tyre will be at the midpoint of the total lifetime: around 1.4 years. The department is currently procuring data on the age distribution of re-tread tyres and. views to better inform this assumption are welcomed at consultation.

Question 5: What is the age distribution for re-tread tyres for HGVs, buses, coaches and minibuses? How does this compare to that for first-life tyres?

50. In the absence of this policy, we have assumed an operator with re-tread tyres would replace these tyres when the tyre is around 3 years old, as mentioned above. Given it has been assumed the average age of a re-tread tyre is just over 1 year old, under this option, the operator is replacing their tyre with a new tyre 2 years earlier than they otherwise would have. Table 6 shows the additional cost in having to bring forward the new tyre purchase decision by 2 years, assuming a 3.5% discount rate.

Table 6: Additional cost in bringing forward tyre purchase

	Valued today	Valued if purchase in 2 years is valued today	Additional cost by bringing forward tyre purchase[19]
Average price of bus/coach tyre[20]	£ 537	£ 501	£ 36
Average price of a HGV tyre	£ 537	£ 501	£ 36
Average price of a minibus tyre	£ 107	£ 100	£ 7

Opportunity cost of scrapping re-tread tyre earlier

51. The opportunity cost of scrapping re-tread tyres early is also considered in the total cost for this option. It is assumed that an operator, who would scrap a re-tread tyre after 2.7 years expects to get 2.7 years' worth of value from the tyre. Given it has been assumed the average age of a re-tread tyre is around 1.4 years old, scrapping the tyre after 2.7 years implies around 1.4[21] years' worth of now lost value, which could have been alternatively spent.

52. It is assumed that the operator values each useable tyre year equally. Therefore, the price of the old tyre is spread equally across its lifetime (assumed to be 2.7 years) to generate an annual value for the tyre. Table 7 shows the per year value of a tyre and the opportunity cost of scrapping it after 1.4 years instead of 2.7.

Table 7: opportunity cost in replacing tyre early

[19] Note: additional cost column may not be exactly equal to difference between tyre value today and in a year due to rounding.

[20] New tyre prices are the same as those outlined in table 2

[21] The midpoint of the full life expectancy is 1.35 years, so 1.35 years' worth of value is lost. This rounds to 1.4 years.

	Price of re-tread tyre[22]	Per year value	Lost value in replacing 1.4 years early	Lost value in today's prices[23]
Bus/coach	£ 376	£ 137	£ 188	£175
HGV	£ 376	£ 137	£ 188	£175
Minibus	£ 75	£ 27	£ 37	£35

Recurring costs

53. There are no recurring costs associated with replacing re-tread tyres. This is because under this option, re-tread tyres are banned from being fitted to HGVs, buses, coaches and minibuses. As such, once those tyres initially fitted to these vehicles are scrapped, there are no longer any re-tread tyres remaining.

Ongoing familiarisation and monitoring costs

54. The policy will be introduced following a suggested 12 month implementation period (the length of which is subject to change) from the date of any legislation. In line with the proposed implementation period, no familiarisation costs have been included in this analysis. All familiarisation will occur during the implementation period.

55. It is expected that the vehicle driver and owners/operators will take the first steps to enforce the obligation to ensure they only drive/operate safe vehicles. Awareness of the planned change will be raised among professional vehicle operating sector, the maintenance and tyre management community. DVSA will continue checking tyre age as part of their routine roadside enforcement activities for HGVs and buses. This will be extended to cover minibuses covered by the O-licence regime. Similarly DVSA will monitor tyre age at the annual test for all vehicles subject to O-licencing. We will include tyre age assessment to the annual roadworthiness scheme (MOT test) for minibuses outside the O-licence framework.

56. Whilst the dates on tyres on the steering axle are easily visible, this is not the case with the other tyres fitted in a twin wheel configuration: two wheels fitted at each end of the axle. With this arrangement only one side of each tyre can be inspected without undertaking some dismantling. The requirement for tyres to be marked with their date of manufacture (in order to determine its age) is fulfilled by marking only one side of the tyre. It is therefore possible that a number of date codes will be located in the void between the two wheels and therefore not able to be viewed. To ensure the age of tyres can be determined, the department proposes to consult on mandating that the date markings on tyres are visible in all formations. This new requirement will require the tyres to be fitted in such a way to allow the date mark to be easily viewed by enforcement inspector/officers. As such, costs regarding monitoring for these particular vehicles are expected to be low.

57. The Traffic Commissioners will also be notified of repeated non-compliances by a haulier or bus/coach operator and this could be considered in any review of their Operator Licence. Any

[22] Bridgestone (https://www.bridgestone.co.uk/HGV-and-bus/retread/?referrer=https%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3D%26esrc%3Ds%26source%3Dweb%26cd%3D14%26ved%3D2ahUKEwie6P_w5tHhAhUirXEKHWvIAiAQFjANegQICRAB%26url%3Dhttps%3A%252F%252Fwww.bridgestone.) suggests re-tread tyres are 30% cheaper than new tyres. As such, the price of re-tread tyres has been calculated to be 30% than the prices detailed in table 4.

[23] These are discounted, as the value is realised 2 years in the future

costs on business as a result of non-compliance with a regulation are excluded from this assessment and the Business Impact Target as they are non-qualifying regulatory provisions.

Total cost of replacing tyres early

58. The option is valued over a 10-year appraisal period with a 2019 base year and a 3.5% discount rate. The total cost is estimated to be **£476,201,518**. The equivalent annual direct cost to business is estimated to be equal to **£55,322,823** discounted to 2019 in 2019 prices. For the purposes of the Business Impact Target, to compare policies equally across this Government 2019 prices discounted to 2016 prices, it is **£48,699,121.**

59. These costs are likely to be an overestimate. Assessing the costs to scrap tyres aged 10 years and above will necessarily capture those re-tread tyres which have a re-tread date above 10 years. These are double-counted when the cost in scrapping all re-tread tyres is then assessed. More information will be sought at the consultation stage to help refine these costs.

Option 2: To amend The Road Vehicles (Construction and Use) Regulations to (a) ban the use of tyres aged 10 years or older, and re-treads of any age, on the steering axles for all HGVs, buses, coaches and minibuses and (b) ban the use of tyres aged 10 years or older, or having a re-tread date 10 years or older, on all other axles (including heavy trailers over 3.5 tonnes).

60. This option is similar to Option 1, with less restrictive allowances for re-tread tyres on axles other than on the steering axles. Option 1 assesses the replacement of all tyres aged 10 years and over on HGVs, buses, coaches and minibuses (including trailers), as well all re-tread tyres, since the original age of the tyre cannot be assessed. Option 2 requires the replacement of tyres which have a year of manufacture, or a re-tread date, 10 years or older[24].

61. As such, all cost assumptions involved in replacing older tyres early detailed under Option 1 apply to this option. The only difference in the total cost relates to the portion of re-tread tyres replaced under Option 1. Due to Option 2 allowing for re-tread tyres on non-steering axles, the overall costs of this option are lower.

Ongoing familiarisation and monitoring costs

62. As with Option 1, familiarisation costs are not included in this analysis for the same reasons.

63. As with Option 1, it is expected that there will be some degree of monitoring costs, due to the time cost in dismantling tyre fittings to examine the year of manufacture. Costs under this option are expected to be higher than those in Option 1, as it is expected that the time cost in assessing re-tread dates is higher than that involved in outright rejection of re-tread tyres. This will be covered within the consultation to help improve the evidence base.

Total cost in replacing old tyres early

64. The option is valued over a 10-year appraisal period with a 2019 base year and a 3.5% discount rate. The total cost is estimated to be **£4,811,492**. The equivalent annual direct cost to business is estimated to be equal to **£558,976** discounted to 2019 in 2019 prices. For the purposes of the Business Impact Target, to compare policies equally across this Government 2019 prices discounted to 2016 prices are **£492,051.**

[24] The option also details that all tyres which have an original date of 10 years or more will be banned from the steering axle. It is best practice to not fit re-tread tyres on the front steering axle (https://trucks.michelin.co.uk/Advice/Legislation); as such, it is assumed in this analysis that re-tread tyres are only fitted on other axles.

Option 3: To amend The Road Vehicles (Construction and Use) Regulations to (a) ban the use of tyres aged 10 years or older, and re-treads of any age, on the steering axles for all HGVs, buses, coaches and minibuses and (b) ban the use tyres aged 10 years or older, or having a re-tread date 10 years or older, on all other axles (excluding heavy trailers).

Total cost in replacing old tyres early

Number of vehicles affected in initial year

65. This option differs to Option 2 by contracting the scope of the policy to ban all tyres with a manufacture date or re-tread date 10 years and older on HGVs, buses, coaches and minibuses, **excluding** trailers. As such, the same number of vehicles are under scope, and so table 3 is applicable.

66. Table 1 presents the estimated number of tyres by axle configuration, excluding trailers. In order to estimate the average number of tyres for Option 3, the number of tyres presented in table 1 has been weighted by the corresponding number of vehicles in the fleet (sourced from DfT vehicle licensing statistics, table VEH0524[25]). This is shown in table 8.

Table 8: Weighted average number of tyres (excl. trailers)

Axle configuration	Weighting	Number of tyres
Rigid: 2 Axle	48%	6
Rigid: 3 Axle	11%	10
Rigid: 4 Axle	9%	12
Articulated: 2 Axle Tractor & 2 axle trailer	2%	6
Articulated: 2 Axle Tractor & 3 axle trailer	3%	6
Articulated: 2 Axle Tractor & 4 or more axle trailer	1%	6
Articulated: 3 Axle Tractor & 2 axle trailer	0%	10
Articulated: 3 Axle Tractor & 3 axle trailer	27%	10
Articulated: 3 Axle Tractor & 4 or more axle trailer	0%	10
Weighted average number of tyres	8	

67. From the above, it is estimated each HGV replaces around 8 tyres. The number of tyres assumed to be scrapped and replaced for buses, coaches and minibuses is the same as under Options 1 and 2, as it has been assumed these vehicles do not tow trailers. As such, it is assumed that minibuses have 4 tyres and buses and coaches have 6. Table 3 suggests that 44 buses and coaches, 254 minibuses and 781 HGVs are initially affected. This implies 7,559[26] tyres would be need to be scrapped and replaced.

Additional upfront cost to replace tyre early and opportunity cost of scrapping early

68. As with Option 2, this option also imposes the cost to bring the tyre purchase forward by around 3 years, as well as the opportunity cost in scrapping an old tyre around three years earlier than in the baseline. The total cost per tyre by vehicle type is the same as in Option 2. These costs are presented in tables 4 and 5.

[25] Note these weightings differ to those presented in table 2, as the number of trailer units for rigid HGVs are now being considered

[26] 44 buses and coaches scrap and replace 4 tyres each (261 tyres in total); 254 minibuses scrap and replace 6 tyres each (1,015 tyres in total); and 781 HGVs scrap and replace 8 tyres each (6,282 tyres in total). These sum to 7,559 tyres, accounting for rounding.

Recurring costs

69. As the only difference between this option and Option 2 is the number of tyres per vehicle which are in scope, the number of vehicles with at least one tyre turning 10 years old each year (and will need to be replaced) is the same as under Option 2. This results in 8 buses and coaches, 195 HGVs and 56 minibuses having 6, 8 and 4 tyres which need to be scrapped (respectively) each year. The associated costs per tyre are the same as those detailed above.

Ongoing familiarisation and monitoring costs

70. As explained in Option 2, we do not expect any familiarisation costs to be borne from this policy.

71. We expect monitoring and enforcement to follow the same procedure as laid out in Option 2. However, we expect the cost to be lower than under Option 2, as tyres on HGV trailers need not be assessed.

Total cost of replacing tyres early

72. The option is valued over a 10-year appraisal period with a 2019 base year and a 3.5% discount rate. The total cost is estimated to be **£2,984,681**. The equivalent annual direct cost to business is estimated to be equal to **£346,746** discounted to 2019 in 2019 prices. For the purposes of the Business Impact Target, to compare policies equally across this Government 2019 prices discounted to 2016 prices are **£305,231.**

Option 4: To amend The Road Vehicles (Construction and Use) Regulations to ban the use of tyres aged 10 years or older and re-treads of any age only on the steering axles for all HGVs, buses, coaches and minibuses. This option is the closest to a legislative extension to current DVSA Roadworthiness Guidance.

Total cost in replacing old tyres early

Number of vehicles affected in initial year

73. This option differs to Option 3 by contracting the scope of the policy further to ban all tyres with a manufacture date of 10 years and older on HGVs, buses, coaches and minibuses on the steering axle only. As such, the same number of vehicles are under scope, as per Table 3.

74. Table 3 presents the number of on-road vehicles under this option which are expected to have tyres aged 10 years or older. The option only seeks the replacement of older steering axle tyres. It is assumed that each bus, coach, minibus and HGV (with under 4 axles) replaces 2 tyres (as these vehicle types are assumed to have one steering axle). HGVs with 4 axles (table 2 suggests this represents 9% of HGVs) are assumed to replace 4 tyres, as these vehicles are assumed to have two steering axles. Using tables 2 and 3 suggests 44 buses/coaches, 254 minibuses and around 681 HGVs replace 2 tyres (1958 tyres in total) and around 70 HGVs replace 4 tyres (280 in total). This implies from the 1,078 vehicles initially affected, 2,238 tyres would be scrapped.

Additional upfront cost to replace tyre early and opportunity cost of scrapping early

75. As with Option 3, this option also imposes the cost to bring the tyre purchase forward by around 3 years, as well as the opportunity cost in scrapping an old tyre around three years earlier than in the baseline. The total cost per tyre by vehicle type is the same as in Option 3. These costs are presented in tables 4 and 5.

Recurring costs

76. As the only difference between this option and Option 3 is the number of tyres per vehicle which are in scope; the number of vehicles with at least one tyre turning 10 years old each year (and will need to be replaced) is the same as under Option 3. This results in 8 buses and coaches, 177 HGVs and 56 minibuses having 2 tyres which need to be scrapped each year, and 18 HGVs with 4 tyres which need to be scrapped each year. The associated costs per tyre are the same as those detailed above.

Ongoing familiarisation and monitoring costs

77. As explained in Option 3, we do not expect any familiarisation costs to be borneborne from this policy.

78. We expect monitoring and enforcement to follow the same procedure as laid out in Option 3. It is expected these additional costs may be lower than under Option 3, due to fewer tyres being in scope and the DVSA already conducting annual checks on the ages of tyres on the front steering axle.

Total cost of replacing tyres early

79. The option is valued over a 10-year appraisal period with a 2019 base year and a 3.5% discount rate. The total cost is estimated to be **£836,198**. The equivalent annual direct cost to business is estimated to be equal to **£97,146** discounted to 2019 in 2019 prices. For the purposes of the Business Impact Target, to compare policies equally across this Government 2019 prices discounted to 2016 prices, it is **£85,514.**

Benefits

Option 0

80. There are no benefits associated with Option 0 as this is the baseline against which all other options are compared. Over the past 10 years, there have been two collisions for which tyre age was concluded as a contributory factor (the vehicles at fault in the 2012 and 2017 collisions had tyres aged 19 and 17 years respectively). In total, there were 8 fatalities. Evidence suggests these are the only two collisions where the main contributory factor has been concluded to be old age tyres. As such, it is assumed that every 10 years, there will be collisions of equal severity as those in 2012 and 2017 in the baseline.

Option 1: To amend The Road Vehicles (Construction and Use) Regulations to ban the use of tyres which are 10 years or older, and re-treads of any age, on all axles for all HGVs, buses, coaches and minibuses (including heavy trailers over 3.5 tonnes). This option will necessarily create an immediate ban on all re-tread tyres.

81. The average value of prevention per fatality per road collision is valued at £2,215,705 in 2019 prices[27]. It is assumed that the only reason for the collisions assumed to occur in the baseline is tyre age on HGVs, buses, coaches and minibuses , following inquest evidence which highlighted the main contributing factor of the collisions were due to old age tyres As a result, when all tyres which are 10 years or older (and all re-tread tyres) are removed from these vehicles, the probability of these collisions reduces to 0. Upon implementation of the policy, there will be no HGVs, buses, coaches or minibuses with tyres fitted aged 10 years or older. As such, the probability of collisions associated with old tyre age on heavy vehicles falls to 0. The benefits are assumed as being realised in the year of implementation, by way of a simplifying assumption. Therefore, the total maximum benefit of this option lies in the value of collisions avoided, which is equal to £17,047,376.This analysis also estimates a scenario under which no further collisions occur in the baseline. Under this scenario, the policy results in no additional benefits, and as such the benefits under this low-case scenario is valued at £0. As such, the best estimate for benefits is valued as the average between these values at **£8,523,688.**

82. There are potential benefits that have not been monetised. There may be other collisions caused in full or in part by older tyres on HGVs, buses, coaches and minibuses causing monetary damage and injury that have not resulted in high profile inquests and as such are not factored in here.

83. Additionally, there has been no quantification of the benefits associated with a reduction in other costs of a collision. These would include: the cost of replacement vehicles, road repairs, time costs due to closed carriageways and emergency and hospital services.

84. There are further potential non-monetised benefits that should be recognised in this option. The coroner's report identifies that older tyres were a causal factor in tyres failing on the steering axle. Option 1 bans the use of older tyres on all axles, implying there may be fewer tyre failures on these axles, compared to the counterfactual. Tyre failures are likely to cause issues in steering vehicles, and can contribute to collisions. Therefore, it is expected that banning tyres from all axles may reduce the number of collisions. As we do not have evidence or examples of cases where the failure of a rear axle tyre led to an collision, it is not possible to monetise these impacts. This option take a precautionary approach to tyre failure to avoid the risk of these future collisions taking place.

Option 2: To amend The Road Vehicles (Construction and Use) Regulations to (a) ban the use of tyres aged 10 years or older, and re-treads of any age, on the steering axles for all HGVs, buses, coaches and minibuses and (b) ban the use of tyres aged 10 years or older, or having a re-tread date 10 years or older, on all other axles (including heavy trailers over 3.5 tonnes).

85. The only collisions identified as having older tyres as a contributory factor are those valued above and in both these cases the tyres that failed were fitted on the steering axles. There is no further information regarding the relationship between tyre age and road collisions. Therefore, even

[27] This cost is valued as £2,130,922 in 2017 prices, as in the following source (see table RAS60001, page 342/376): https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/755698/rrcgb-2017.pdf. GDP deflators have been applied to calculate the 2019 value.

though the scope of this option is less restrictive than in Option 1, the monetised benefits are estimated to be the same (**£8,523,688)**, as the benefits arise from removing old aged tyres from the steering axle.

86. As with Option 1, there are expected to be further benefits, which are not monetised. The difference between Options 1 and 2 centre around banning re-tread tyres (option 1 mandates a complete ban, whilst option 2 bans those which have a re-tread date 10 years and above). Re-tread tyres are subject to UNECE standards, such that it can be assumed a newly re-tread tyre is as safe as a new tyre. Therefore, replacing all re-tread tyres are assumed to provide no additional safety benefits (in terms of those derived from tyre age) compared to replacing only older re-tread tyres. As such, Option 2 is expected to deliver the same monetised and non-monetised safety benefits (in terms of those derived from tyre age) as Option 1. Non-monetised benefits accrued from sources other than tyre age may be lower under Option 2, however the wider benefits of allowing the existence of the re-tread industry for heavy vehicles (also not monetised) needs to be noted.

Option 3: To amend The Road Vehicles (Construction and Use) Regulations to (a) ban the use of tyres aged 10 years or older, and re-treads of any age, on the steering axles for all HGVs, buses, coaches and minibuses and (b) ban the use tyres aged 10 years or older, or having a re-tread date 10 years or older, on all other axles (excluding heavy trailers).

87. As with Option 2, the benefits estimated under this option are the same as that in Option 1 (**£8,523,688)**, as old tyres from the steering axle are replaced.

88. This option excludes the ban of older tyres to trailers; as a result it is expected that this Option will present fewer non-monetised benefits than Options 1 and 2, as fewer tyres are replaced. TEvidence where failures of trailer tyres led to collisions has not been identified, therefore it has not been possible to monetise the extent to which the benefits under this option are lower than those under Options 1 and 2.

Option 4: To amend The Road Vehicles (Construction and Use) Regulations to ban the use of tyres aged 10 years or older, and re-treads of any age, only on the steering axles for all HGVs, buses, coaches and minibuses. This option is the closest to a legislative extension to current DVSA Roadworthiness Guidance.

89. As with the other options, since Option 4 advocates the replacement of old age tyres on the steering axle, the monetised benefits are estimated to be **£8,523,688.**

90. As with the other options, while there are benefits which have not been possible to monetise; it is assumed these will be lower under Option 4 than in the other options, due to fewer tyres being replaced.

Rationale and evidence that justify the level of analysis used in the IA (proportionality approach)

91. This policy aims to remove tyres aged 10 years and above on all HGVs, buses, coaches and minibuses in use in the UK. Using latest figures, this is around 690,000 vehicles. However as only a small minority of these vehicles are estimated to have older tyres fitted, a proprotionate level of analysis has been conducted in this impact assessment.

92. Evidence from the two fatal collisions of 2012 and 2017 concluded that the age of the tyre, which were over 10 years old in both cases, contributed to tyre failure. There has been publicly

available information online[28] advising operators to replace tyres by the 10 year point, as well as the DVSA roadworthiness guidance[29] for buses, coaches and HGVs. Given that a minority of vehicles are still fitted with tyres aged 10 years or older, evidence suggests that operators of these vehicles are not self-regulating tyre use to the socially optimal level. As such, government intervention is necessary, justifying the use of an impact assessment to outline the impacts of such intervention.

93. Potential unintended consequences centre on unexpected impacts from the increased number of tyres being scrapped due to the policy. One consequence may be that there are not enough new tyres to cope with the additional demand resulting from the policy. Table 9 below shows the estimated number of tyres scrapped by over a 10-year appraisal period, by option. It is expected that insights into these impacts will be gained through consultation, and as such it has not been proportionate to undertake such analysis at this stage.

Table 9: Number of tyres scrapped over a 10-year appraisal period

	Year 1	Total next 9 years	Total over 10-year appraisal period
Option 1: Total tyres on all axles (incl. trailer) and retread replaced	2,330,380	25,826	2,356,206
Option 2: Total tyres on all axles (incl. trailer) replaced	11,656	25,826	37,483
Option 3: Total tyres on all axles (excl. trailer) replaced	7,559	16,607	24,166
Option 4: Total tyres on steering axles replaced	2,297	4,993	7,290

94. A potential consequence is that the waste services cannot deal with the additional scrappage of tyres. An understanding into the feasibility of this issue is hoped to be gained through consultation. If the figures in table 9 imply a significant cost burden will be placed on waste and recycling services, these would need to be factored in to the cost estimates of the policy options. Such information is not readily available and as such is not proportionate to investigate at this initial stage. Views at consultation are welcome.

95. This policy is sensitive and has a lot of public interest. The Tyred campaign, led by Frances Molloy, gained support from Labour MP Maria Eagle and the National Highway Traffic Safety Administration[30]. In order to remain transparent towards the public, conducting an impact assessment is a proportionate approach.

Question 6: How many tyre disposals can be handled by the existing waste service infrastructure? What is the cost of disposal per tyre?

[28] https://www.kwik-fit.com/tyres/information/tyre-age [last accessed 13/03/19], https://www.theaa.com/driving-advice/safety/tyre-life-and-age [last accessed 13/03/19], https://www.michelin.co.uk/tyres/learn-share/buying-guide/when-should-i-change-my-tyres [last accessed 13/03/19], https://www.blackcircles.com/helpcentre/tyres/age-of-a-tyre [last accessed 13/03/19]

[29] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785463/guide-to-maintaining-roadworthiness-commercial-goods-and-passenger-carrying-vehicles.pdf, Section 5.2. [last accessed 13/03/19]

[30] https://www.factsmagazine.co.uk/news/tyred-campaign-government-consultation-old-tyres/ [last accessed 13/03/19]

Risks and assumptions

Risks

96. The main intended objective of the policy is to improve road safety. The policy is based on conclusions reached by expert collision investigators who conclude that a contributory factor for past collisions was the age of the tyres fitted to the vehicle involved. If new evidence becomes available which changes these conclusions, then the policy will not directly be improving road safety. As such, this risk could stop the policy from meeting its objective. This is unlikely to occur, as based on the evidence provided , the Coroner's verdict identified a link between the age of tyre and the collisions that occured. In addition, research conducted by the UK's Transport Research Laboratory has suggested that of the tyres sampled, all those over the age of 8 exhibited corrosion from cuts and penetrations accumulated over time, which may compromise the tyre's integrity and therefore road safety. However, this conclusion is based on a very small sample, and definitive conclusions cannot be reached without further investigation.

97. Another risk is that each of the policy options do not represent the true associated benefit. This is because while the relationship between tyre age and safety has been established through the Coroner's verdict, this link is not quantified. As such, it is not possible to quantify the additional safety benefits gained from increasing the number of tyres replaced outside of the front steering axle. It has been assumed in this impact assessment that the greater the number of potentially dangerous tyres removed, the greater the safety benefits gained, the extent to which cannot be assessed. This applies to both first-life and re-tread tyres. As such, these benefits are not monetised in this study. This does not prevent the policy from meeting its objective of improved road safety, but may not best reflect the extent to which each policy option does so.

98. There is a risk that the IA underestimates the number of tyres impacted. The IA is based on tyre checks undertaken by the DVSA on the front steering axle only. As there is existing guidance to move older tyres away from the steering axles, it is possible that there is an older distribution of tyres on rear axle or trailer tyres. Sensitivity analysis has been run on this assumption in this impact assessment.Views and data will be sought at the consultation stage to improve the evidence base of the overall age distribution of tyres in use on all axles.

99. There may be a risk that operators of vehicles considered under the policy options may have an incentive not to replace their older tyres. If the penalty for not doing so is lower than their total individual cost, they may retain their non-compliant tyres. The extent to which this endangers the policy from meeting its objective depends on the proportion of affected individuals for whom these incentives apply. The likelihood of this risk is low, as there will be additional measures within the enforcement regime which penalises continued non-compliance, of which drivers will be aware.

100. There is also a risk that drivers may replace their tyres for the period of the monitoring process, but revert back to their older tyres after this. This would result in the policy objective not being met, as essentially no change is made compared to the baseline scenario. The likelihood of this is expected to be very low: there is little incentive for operators to do this, and due to the existence of roadside checks simply acts to increase the probability of being penalised.

101. Given the DVSA roadworthiness guidance has been updated in November 2018, the impact this may have had on the number of heavy vehicles with older tyres has not been factored into this analysis, due to such data not being available yet. As such, the total costs may be overestimated, as the DVSA guidance may deter these vehicles being fitted with older tyres.

102. There is a risk that the waste and disposal services are unable to handle the additional tyre disposals borne from the policy. This is especially a concern under option 1, where the re-treading of tyres for heavy vehicles is not allowed. As such, there may be significant environmental costs. This does not prevent the policy from meeting its objective of improved road safety, but may increase the costs and worsen health outcomes. Views will be sought at the consultation stage to better understand the likelihood and costs of this risk.

103. A further risk exists around the definition of the age of the original, first-life tyre for re-tread tyres. If it is assumed that the age of re-tread tyres is reset during the re-tread process, but the consultation provides evidence that this assumption is invalid on grounds of safety then the benefits detailed in this assessment will be overestimated. Given that it is best practice to not fit re-tread tyres on the steering axle[31], this risk is negated for option 4. This is also negated under option 1, as this option bans all re-tread tyres on the vehicles in scope. However, this is present in options 2 and 3, and thus may prevent the policy from meetings its objective. The likelihood of this risk materialiseing is expected to be very low, since re-tread tyres are required to meet precise UNECE standards. Further exploration on the implications on the re-tread industry will be conducted as part of the consultation.

Key assumptions

104. Current costs assume that each vehicle, which has at least one tyre aged 10 years or older replaces: 13, 6 and 4 tyres (for HGV, bus/coach and minibus respectively) under Options 1 and 2; 8, 6 and 4 (for HGV, bus/coach and minibus respectively) under Option 3; and 2 for buses, coaches, minibuses and most HGVs, and 4 for a small proportion (9%) of HGVs under Option 4. The key assumption driving this is that all tyres on a vehicle are around the same age, and so if one is 10 years or older, the others are likely to be.

105. In order to calculate the average number of tyres on a HGV, it has been assumed that steering axles are fitted with single tyres and rear axles are fitted with twin. It has been assumed that all trailer axles are fitted with single tyres. It has been assumed that all minibuses have 4 tyres and all buses and coaches have 6 tyres. These assumptions have been made in lieu of robust appropriate data detailing the average number of tyres by vehicle type. Advice at consultation to help better inform this assumption is welcomed.

Question 7: What is the number of tyres per HGV, bus/coach and minibus by axle configuration?
Question 8: What is the number of tyres per HGV trailer, by axle configuration?

106. It has been assumed that the total number of HGVs, buses, coaches and minibuses does not change over time. This is because credible forecasts as to how these sizes may evolve over time are not available at this time. Historic vehicle growth rates have not been applied to forecast future figures, as with the rise of electrification and potential automation, such growth rates may not apply in the future. Changes in this assumption are unlikely to change costs to a significant degree. This is because the proportion of vehicles estimated to have tyres aged 10 years and older is so low, that significant changes in the total number of vehicles corresponds to few additional vehicles with non-compliant tyres.

107. It has been assumed that bus and coach tyre prices are the same as HGVs, and that for minibuses is the same as for vans. This is because bus and HGV tyre prices tend to be listed

[31] https://HGVs.michelin.co.uk/Advice/Legislation

together[32], as do minibus and van tyre prices. These are sensible assumptions, but are open to further consideration. This does not change the policy objective of improving road safety, but may significantly change total costs depending on the extent to which prices change.

108. The analysis assumes that real tyre prices do not change over time. This has been assumed, due to a lack of information regarding tyre price forecasts. Constructing a tyre price forecast at this stage may be disproportionate given the proportion of old tyres explored in this assessment. Data to challenge the assumption that real tyre prices do not vary significantly over time is welcomed. This does not change the policy objective of improving road safety, but may change total costs depending on the extent to which prices change; it is expected that this extent is not large enough to significantly change the scale of total costs.

Question 9: How are tyre prices expected to evolve over the next 10 years?

109. The analysis assumes that old tyres reach the end of their lifetime when they are aged around 13 years. This is based on DVSA data; it is assumed this is around when the tyres will be scrapped, in lieu of available data. The data is focused on fitted tyres, rather than the age at which old tyres are scrapped. This age is therefore likely to be an underestimate. This does not influence the policy objective, but may alter the overall costs; sensitivities have been run to test this. Data which can help to refine this assumption is welcomed. The data gathered by DVSA on the tyre demographic was based on the front steering axles of vehicles and made no discinction between first life tyres and re-treads. The cost of replacement of re-treads is based on the overall percentage.

110. The costs presented are likely to be overestimates. In the analysis, it is assumed that an individual will buy a new tyre if they are required to replace an old-aged tyre. In reality, an individual may purchase a second-hand tyre instead. This does not affect the policy objective, but could result in the true cost being much lower than what is presented in this assessment.

111. Data to inform benefits is uncertain. It has been assumed that in the baseline, over the 10 year appraisal period, there will be two collisions equal in size and severity to those that occurred in 2012 and 2017. This is a sensible assumption; evidence suggests these are the only two collisions where the main contributory factor has been concluded to be old age tyres. Altering this assumption does not influence road safety, but affects the extent to which banning old ages tyres benefits society.

112. In the collisions assumed to occur over the next 10 years in the baseline, it is assumed that there are only fatalities and no serious or slight injuries. This has been assumed due to a lack of granular injury data for the collisions of 2012 and 2017. In reality, this is likely not the case. If this assumption were to be changed to reflect that there are likely further injuries to take into account, this would increase the benefit estimates.

Wider Impacts

Statutory Equality Duties

113. The policy does not target any group specifically. As such, this policy is not in violation of the department's statutory equality duties.

[32] https://www.bigtyres.co.uk/HGV-tyres-bus-tyres.html, https://www.maxxis.co.uk/tyres/heavy-HGV-and-bus, https://www.snapdeal.com/products/HGV-bus-tyres?sort=plrty, https://www.apollotyres.com/cv/tyre-finder/tyres/ [all last accessed 14/03/19]

Economic Impacts

Competition

114. The competitiveness of certain firms may be affected by this policy. Tyre sellers who in the absence of regulation would sell tyres aged 10 years and above (and re-tread tyres depending on the option) will not be able to. This may result in higher priced products in order to make up for the potential shortfall in revenue due to not being able to sell these tyres. With higher prices, these businesses could theoretically be less competitive. A similar issue may be present for businesses operating HGVs, buses, coaches and minibuses. The re-tread tyre industry will be affected under Option 1, and may be impacted under the other options, unless we consider that the age of a tyre is reset at the date of re-tread. The potential implications of this will be explored at consultation.

Small Firms Impact Test

115. This policy will apply to small and micro firms. The initial presumption is that costs are likely to fall more on small businesses. As the proportion of vehicles that have tyres over 10 years old is very small, we do not expect significant impacts on small firms overall. As the policy objective is to improve road safety, we do not consider alternative approaches in regards to regulation for these firms a viable option. Insights at consultation are welcomed to help inform how many small firms operate the vehicles under this option, of these how many have vehicles with old age tyres (and how many vehicles), as well as how many small firms are tyre sellers, and information regarding these sales to help us develop the policy at final stage.

Question 10: What proportion of small firms operate HGVs, buses, coaches or minibuses with tyres 10 years or older?

Question 11: What proportion of small firms are tyre sellers? What proportion of tyre sales are made by small firms?

Technical barriers to trade

116. There is a theoretical barrier to trade that could arise if HGVs from other countries are not allowed to use tyres with an age of 10 years. This would mean that foreign HGVs coming to the UK would have to ensure that they have tyres below the age limit. We believe the scale of this barrier will be small. This is because vehicles covering cross-continental distances likely have high mileage, and wear out tyres faster than every 10 years. We welcome data and information on the age of tyres on foreign HGVs entering the UK during consultation to better inform this view.

Question 12: What is the age distribution of tyres fitted to foreign-owned HGVs which conduct business in the UK?

Environmental Impacts

117. The policy required tyres aged 10 years old to not be fitted on HGVs, buses, coaches and minibuses. The Department has not explored how these tyres which have no use will be disposed. We welcome views from DEFRA and the industry to help inform our assessment of the potential impacts of the disposal of an increased number of tyres. This may also help inform if the policy has any impact on health.

Question 13: What are the environmental impacts from increasing the number of annually disposed tyres?

Sensitivity analysis

Sensitivites on tyre age

118. In order to test the robustness of the results, sensitivity tests have been run regarding the 10 year age limit proposed in the ban. The 10 year age limit has been used as a precautionary principle and is in line with the DVSA's roadworthiness guidance.

119. The aim of the policy is to prevent collisions similar to those which occurred in 2012 and 2017. As such, the sensitivity tests focus on banning tyres which are (i) 15 years and older and (ii) 17 years and older. The 15 year ban is tested as another precautionary measure, whilst the 17 year ban addresses the fact that the vehicle at fault in the 2017 collision had a tyre aged 17.

120. As mentioned in the benefits section above, there is no further information regarding the relationship between tyre age and road collisions. As such, the benefits under both these tests will be equal to those estimated under all other options (**£8,523,688)**.

Number of vehicles affected in initial year

121. From the DVSA provided data, only a small minority of vehicles had at least one tyre aged 15 years or above on the front steering axle (0.07% of HGVs, 0.01% of buses and coaches and 0.06% of minibuses). An event smaller minority had at least one tyre aged 17 years or above on the front steering axle (0.04%, just above 0.00% and 0.03% for HGVs, buses and coaches and minibuses respectively).

122. Table 10 presents the number of on-road vehicles expected to have tyres aged (i) 15 years or older (ii) 17 year or older. These figures have been calculated by multiplying the proportion of vehicles which are expected to have old aged tyres by the total number of vehicles under consideration.

Table 10: total number of vehicles with old aged tyres

	Total number (2018)	Expected number with tyres(s) aged 15 years or older	Expected number with tyres(s) aged 17 years or older
Buses and coaches	73,832	9	4
Minibuses	89,080	56	28
HGVs	526,744	390	195
Total	689,656	455	227

Additional upfront cost to replace tyre early

123. The DVSA data suggests that the average age of tyres aged 15 years and older is around 17 years for HGVs, buses and coaches[33], and around 18 years for minibuses. The data suggests the average age of tyres aged 17 years and older is around 18 years for HGVs and around 19 for buses, coaches and minibuses[34]. As with the policy options, it is assumed that in the baseline, these are the expected lifetimes of the old aged tyres.

124. Tables 11a and 11b show the additional cost in having to bring forward the new tyre purchase decision, assuming a 3.5% discount rate.

Table 11a: Additional cost in bringing forward tyre purchase for a 15 year age limit

	Valued today	Valued if purchase in future is valued today[35]	Additional cost by bringing forward tyre purchase[36]
Average price of bus/coach tyre	£ 537	£ 501	£ 36
Average price of a HGV tyre	£ 537	£ 501	£ 36
Average price of a minibus tyre	£ 107	£ 96	£ 10

Table 11b: Additional cost in bringing forward tyre purchase for a 17 year age limit

	Valued today	Valued if purchase in future is valued today[37]	Additional cost by bringing forward tyre purchase
Average price of bus/coach tyre	£ 537	£ 501	£ 36
Average price of a HGV tyre	£ 537	£ 519	£ 18
Average price of a minibus tyre	£ 107	£ 100	£ 7

Opportunity cost of scrapping tyre earlier

125. As with the policy options, the opportunity cost is the value lost from scrapping the tyres earlier than in the baseline.

126. Tables 12a and 12b show the per year value of a tyre and the opportunity cost of scrapping it after 15 years and 17 years respectively.

Table 12a: opportunity cost in replacing tyre after 15 years

[33] 16.7 years and 16.9 years for HGV and buses/coaches respectively.

[34] 17.5 years, 19.3 years and 19 years for HGVs, buses/coaches and minibuses respectively.

[35] HGV and bus and coach tyre purchases are brought forward 2 years, while that of minibuses is brought forward 3 years

[36] Note: additional cost column may not be exactly equal to difference between tyre value today and in 3 years due to rounding.

[37] HGV tyre purchases are brought forward a year, while that for buses, coaches and minibuses are brought forward 2 years.

	Price of tyre	Per year value	Lost value in replacing early	Lost value in today's prices[38]
Bus/coach	£ 537	£ 32	£ 61	£57
HGV	£ 537	£ 32	£ 54	£52
Minibus	£ 107	£ 6	£ 18	£17

Table 12b: opportunity cost in replacing tyre after 17 years

	Price of tyre	Per year value	Lost value in replacing early	Lost value in today's prices[39]
Bus/coach	£ 537	£ 28	£ 65	£60
HGV	£ 537	£ 31	£ 15	£15
Minibus	£ 107	£ 6	£ 11	£10

Recurring costs

127. In the DVSA dataset, 0.04% of HGVs, just over 0.00% of buses and coaches and 0.03% of minibuses have at least one tyre turning 15 years old each year (and thus need to be scrapped if the age limit is 15 years). If we are considering the 17 year age limit, these proportions are the same for HGVs and minibuses, but slightly lower for buses and coaches[40]. Applying these rates to the total fleet numbers (526,744 HGVs, 73,832 buses and coaches and 89,080 minibuses) results in 4 buses and coaches, 195 HGVs and 28 minibuses having tyres which need to be scrapped each year, if the 15 year age limit is used. If the 17 year age limit is used, this results in 1 buses and coaches, 195 HGVs and 28 minibuses having tyres which need to be scrapped each year The associated costs (bringing forward the purchase decision and the opportunity cost of scrapping a tyre early) are the same as those detailed above.

Total cost of replacing tyres early

128. Table 13 presents the total costs under these sensitivity tests, valued over a 10-year appraisal period with a 2019 base year and a 3.5% discount rate.

Table 13: total costs under different sensitivity tests, across all policy options

	Total cost (2019 £) if 15 year age limit	Total cost (2019 £) if 17 year age limit
Option 1: Total cost to replace tyres on all axles (incl. trailer) and retread	£473,443,351	£ 472,081,936
Option 2: Total cost to replace tyres on all axles (incl. trailer)	£2,053,325	£691,909
Option 3: Total cost to replace tyres on all axles (excl. trailer)	£1,259,535	£426,756
Option 4: Total cost of replacing tyres on steering axle	£348,469	£119,500

129. While the costs are lower under the sensitivity tests, the government is ambitious and seeks to adopt the 10 year age limit as a precautionary principle. Given the small proportion of

[38] Bus, coach and HGV tyres are discounted by 2 years, as 2 years worth of value is lost. Minibus tyres are discounted 1 year, as 1 years worth of value is lost

[39] Bus, coach and minibus tyres are discounted by 2 years, as 2 years worth of value is lost. HGV tyres are discounted 1 year, as 1 years worth of value is lost

[40] 0..0012% instead of 0.0049% under the 15 year age limit

vehicles affected, this is not expected to be much more burdensome than the age limits proposed in the sensitivity tests, but may present more unintended benefits through additional road safety improvement.

Sensitivities on the distribution of older tyres on rear axles

130. One of the key assumptions made in lieu of data is that the distribution of older tyres on the rear axles matches that on the front steering axle. As detailed in this impact assessment DVSA data suggests only a small minority of vehicles had at least one tyre aged 10 years or above on the front steering axle (0.15%, 0.06% and 0.28% vehicles respectively). It has been assumed in options 1, 2 and 3 that the same proportion of vehicles have tyres aged 10 years and above on the rear axles. This is likely to be a significant underestimate, given the allowance for rotation of old tyres from the front steering axle to other axles.

131. In order to address this, sensitivity analysis has been conducted in the absence of stronger data. Two sensitivities are run in the initial year: (i) 5% of HGVs, buses, coaches and minibuses have tyres aged 10 years and above and (ii) 10% of HGVs, buses, coaches and minibuses have tyres aged 10 years and above. As the above proportions represent those tyres which are 10 years and older, it is assumed a lower proportion of vehicles turn exactly 10 each year. These sensitivity tests assume 1% of vehicles have tyres which turn 10 each year. All other assumptions made in this impact assessment hold in these sensitivity tests.

Question 14: How does the age distribution of tyres differ between the front steering axle and other axles?

132. Table 14a below presents the number of vehicles expected to have at least one older tyre under the sensitivity tests in the initial year. Table 14b details the expected number of vehicles expected to have at least one tyre which reaches 10 years of age each year.

Table 14a: Expected number of vehicles with older tyres

	Total number of licensed vehicles (2018)	Sensitivity 1: Assuming 5% of vehicles have older tyres	Sensitivity 2: Assuming 10% of vehicles have older tyres
Buses and coaches	73,832	3,692	7,383
Minibuses	526,744	26,337	52,674
HGVs	89,080	4,454	8,908
Total	689,656	34,483	68,966

Table 14b: Expected number of vehicles with at least one tyre reaching 10 years of age

	Total number of licensed vehicles (2018)	Assuming 1% of vehicles have tyres which turn 10
Buses and coaches	73,832	3,692
Minibuses	526,744	26,337
HGVs	89,080	4,454
Total	689,656	34,483

133. The only varying factor between these sensitivity tests and the analysis detailed throughout this impact assessment are the proportions of vehicles which are fitted with older tyres. Therefore, the cost in bringing forward the tyre purchase decision and the opportunity cost in scrapping an older tyre earlier than in the counterfactual remain the same.

134. The number of tyres which need to be scrapped and replaced annually are detailed in table 15a. The total number of tyres to be replaced over a 10 year appraisal period are detailed in table 15b.

Table 15a: Expected number of tyres scrapped annually

	Sensitivity 1: Assuming 5% of vehicles have older tyres initially		Sensitivity 2: Assuming 10% of vehicles have older tyres initially	
	Initially	**After initial year**	**Initially**	**After initial year**
Option 1: Total tyres on all axles (incl. trailer) and re-tread replaced	2,708,751	78,005	3,098,777	78,005
Option 2: Total tyres on all axles (incl. trailer) replaced	390,027	78,005	780,054	78,005
Option 3: Total tyres on all axles (excl. trailer) replaced	251,840	50,368	503,680	50,368
Option 4: Total tyres on steering axles replaced	73,706	14,741	147,413	14,701

Table 15b: Expected total number of tyres scrapped

	Sensitivity 1: Total number of tyres to be replaced assuming 5% of vehicles have older tyres initially	Sensitivity 2: Total number of tyres to be replaced assuming 10% of vehicles have older tyres initially
Option 1: Total tyres on all axles (incl. trailer) and re-tread replaced	3,410,799	3,800,826
Option 2: Total tyres on all axles (incl. trailer) replaced	1,092,075	1,482,102
Option 3: Total tyres on all axles (excl. trailer) replaced	705,152	956,992
Option 4: Total tyres on steering axles replaced	206,378	280,084

135. Table 16 presents the total costs under these sensitivity tests, valued over a 10-year appraisal period with a 2019 base year and a 3.5% discount rate.

Table 16. Total costs under both sensitivity tests, across all options

	Total cost (2019 £) if initially 5% of vehicles have older tyres	Total cost (2019 £) if initially 10% of vehicles have older tyres
Option 1: Total cost to replace tyres on all axles (incl. trailer) and re-tread	£ 617,682,296	£ 679,393,965
Option 2: Total cost to replace tyres on all axles (incl. trailer)	£ 146,292,270	£ 208,003,939
Option 3: Total cost to replace tyres on all axles (excl. trailer)	£ 92,463,501	£ 131,468,139
Option 4: Total cost of replacing tyres on steering axles	£ 25,915,253	£ 36,847,297

136. It is not possible to assess the level of benefits under these sensitivity tests without further understanding the relationship between collision rate and tyre age. As a result, monetised benefits are assumed to be equal under these sensitivity tests as those detailed throughout this impact assessment. However, as the scope of vehicles are greater under these sensitivities, it may be that the benefits that have not been possible to monetise are higher.

137. Whilst sensitivity analysis has been conducted, a greater insight into the age distribution of older tyres on the rear axles of vehicles is welcomed at consultation. The department is currently seeking data to help inform this.

Question 15: What is they age distribution of tyres fitted the rear axles of HGVs, buses, coaches and minibuses?

Conclusion

138. As mentioned earlier in this impact assessment, the Department proposes, subject to consultation to proceed with **Option 2**: to amend The Road Vehicles (Construction and Use) Regulations to (a) **ban** the use of tyres aged 10 years or older, and re-treads of any age, on the **steering axles** for all HGVs, buses, coaches and minibuses and (b) **ban** the use of tyres aged 10 years or older, or having a re-tread date 10 years or older, on all other axles (including heavy trailers over 3.5 tonnes).

139. This option proposes to remove as many potentially unsafe older age tyres as under option 1, but mitigates the risk to the UK re-tread industry, which contributes to Defra's recycling and waste strategy.

140. The Department is currently seeking views at consultation and procuring richer data to help better inform the assumptions made in the analysis detailed in this assessment. The results will be shared in later stage impact assessments.

Summary of Costs, Benefits and Net Present Value of Options

141. A summary of the total benefits (present value benefits- PVB), total costs (present value costs- PVC), and the overall impact (net present value- NPV) of options is provided below.

Table 17: Net Present Value of Options (£m)

	PVB	PVC	NPV
Option 1	8.5	476.2	- 467.7
Option 2	8.5	4.8	3.7
Option 3	8.5	3.0	5.5
Option 4	8.5	0.8	7.7

Annex A: Summary of Options

Table A1: Summary of options

	Option 0				Option 1				Option 2				Option 3				Option 4			
	First life		**Re-tread**		**First life**		**Re-tread**		**First life**		**Re-tread**		**First life**		**Re-tread**		**First life**		**Re-tread**	
Age (years)	<10	>10	<10	>10	<10	>10	<10	>10	<10	>10	<10	>10	<10	>10	<10	>10	<10	>10	<10	>10
Steering axles	✓	✓	✓	✓	✓	×	×	×	✓	×	×	×	✓	×	×	×	✓	×	×	×
All axles	✓	✓	✓	✓	✓	×	×	×	✓	×	✓	×	✓	×	✓	×	✓	✓	✓	✓
Trailers	✓	✓	✓	✓	✓	×	×	×	✓	×	✓	×	✓	✓	✓	✓	✓	✓	✓	✓

Annex B: Tyre Cost Estimates

142. The total costs presented in this impact assessment are the result of applying central estimate tyre costs (split by vehicle type). This annex presents the full range of costs examined as part of this impact assessment. When the low tyre costs estimates are applied, the transition, annual average and total cost estimates are reflected by the low scenario costs in the summary sheets for each option. The high scenario costs in the summary sheets are the result of applying the high tyre cost estimates.

143. Table B1 presents the range of HGV tyre costs. As noted earlier in this assessment, it is assumed that bus and coach tyres are equivalent in cost to HGV tyres in lieu of better data; views are welcomed at consultation. The prices are sourced from an online search[1] for 385/65 R22.5 all-season tyres. The cheapest of these represent the low cost scenario, and the most expensive represents the high cost scenario. At the time of analysis, these were £293 and £780 respectively. As mentioned in the main body of this assessment, re-tread tyres are assumed to be 30% cheaper than their first-life counterparts[2]. This is applied on the low and high tyre costs to obtain the low and high re-tread tyre costs.

Question 16: Do the tyre prices of buses/coaches vary significantly to those of HGVs? If so, how?

Table B1: HGV, bus and coach tyre costs

Cost	385/65 R22.5
Low	£293
High	£780
Central (average)	£537
Price of retread tyre low	£205
Price of retread tyre high	£546
Price of retread tyre central (average)	£376

144. Table B2 presents the range of minibus tyre prices. The new tyre cost for minibuses is assumed to be equal to that of vans, in lieu of better data. In the main body of this impact assessment, a central estimate cost is obtained by averaging over a range of tyre sizes (195/70 R15, 235/65 R16 and 225/55 R17). The tyres used in the analysis were the Unirotal RainMax, Avon Avanza Av11 and Continental ContiVanContact 100. An online search from www.mytyres.co.uk showed the prices of these tyres (at the time of analysis) were £61, £107 and £152 respectively. As noted above, re-tread tyres are assumed to be 30% cheaper than their first-life counterparts. Average tyre costs are obtained by averaging across the different tyre sizes (this is done for the low, central and high scenarios). The low and high cost estimates presented in the option summary sheets are the result of applying the low and high tyre costs in table B2 to the analysis.

Question 17: Do the tyre prices of vans and minibuses differ significantly? If so, how?

Table B2: minibus tyre costs

[1] https://www.mytyres.co.uk/cgi-bin/rshop.pl?dsco=110&cart_id=fOrVqveNnTZdlkzY.110.975049324&Breite=385&Felge=22.5&m_s=2&Quer=65&ranzahl=4&rsmFahrzeugart=LKW&sowigan=GAN&suchen=Search+for+tyres&sort_by=preis&Ang_pro_Seite=10

[2] https://www.bridgestone.co.uk/truck-and-bus/retread/?referrer=https%3A%2F%2Fwww.google.com%2Furl%3Fsa%3Dt%26rct%3Dj%26q%3D%26esrc%3Ds%26source%3Dweb%26cd%3D14%26ved%3D2ahUKEwie6P_w5tHhAhUirXEKHWvIAiAQFjANegQICRAB%26url%3Dhttps%3A%252F%252Fwww.bridgestone.

	Tyre sizes			
Cost	195/70 R15	235/65 R16	225/55 R17	Average
Low	£ 47	£ 58	£ 125	£ 77
Central	£ 61	£ 107	£ 152	£ 107
High	£ 89	£ 160	£ 153	£ 134
Price of retread tyre Low	£ 33	£ 41	£ 88	£ 54
Price of retread tyre Central	£ 43	£ 75	£ 106	£ 75
Price of retread tyre High	£ 62	£ 112	£ 107	£ 94

Annex C: Analytical Questions to be Further Explored

145. This annex provides a summary of the analytical questions highlighted in this impact assessment which are to be explored through consultation and further research. These are summarised in table C1 below. The questions asked in this impact assessment will supplement those asked in the full consultation doscument. As mentioned in this assessment, the department is commissioning research to collect further evidence to support the consultation. The consultation document produced for this policy contains questions specific to this Impact Assessment. These questions are:

Do you have any views on the analysis of the costs and benefits outlined in the consultation stage impact assessment?
Do you have any views or evidence on the potential environmental impact of the proposals outlined?

Table C1: summary of analytical questions to be explored at consultation

ID	Question
1	What is the average life expectancy of a tyre aged at least 10 years for a HGV, bus/coach and minibus respectively?
2	What proportion of fitted tyres turn 10 years of age annually for HGVs, buses, coaches and minibuses?
3	What are the average life expectancies of a first life tyre and a re-tread tyre?
4	What proportion of total bus/coach and minibus tyres are re-tread?
5	What is the age distribution for re-tread tyres for HGVs, buses, coaches and minibuses? How does this compare to that for first-life tyres?
6	How many tyre disposals can be handled by the existing waste service infrastructure?
7	What is the number of tyres per HGV, bus/coach and minibus by axle configuration?
8	What is the number of tyres per HGV trailer, by axle configuration?
9	How are tyre prices expected to evolve over the next 10 years?
10	What proportion of small firms operate HGVs, buses, coaches or minibuses with tyres 10 years or older?
11	What proportion of small firms are tyre sellers? What proportion of tyre sales are made by small firms?
12	What is they age distribution of tyres fitted to foreign-owned HGVs which conduct business in the UK?
13	What are the environmental impacts from increasing the number of annually disposed tyres?
14	How does the age distribution of tyres differ between the front steering axle and other axles?
15	What is the age distribution of tyres fitted the rear axles of HGVs, buses, coaches and minibuses?
16	Do the tyre prices of buses/coaches vary significantly to those of HGVs? If so, how?
17	Do the tyre prices of vans and minibuses differ significantly? If so, how?