Summary: Intervention & Options

Department /Agency:	Title:	
TTS Division	Impact Assessment of Retrofitting of Mirrors to Increase the Field of indirect Vision (Blind Spot) of Goods Vehicles	
Stage: Implementation	**Version: Draft v3.5**	**Date:** 3rd December 2008
Related Publications:		

Available to view or download at:

http://www.

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

Blind spots in the drivers' field of indirect vision can contribute to road accidents involving large goods vehicles. Measures to improve the minimum standards for mirror systems fitted to new goods vehicles have already been introduced to reduce the number of vulnerable road users killed and seriously injured by goods vehicles. However, until these measures become fully effective (after the entire goods vehicle fleet is replaced) casualties will continue to result from the limitations of the current vehicle mirror systems.

What are the policy objectives and the intended effects?

The aim is to reduce the number of casualties which result from the limitations of current large vehicle mirror systems. By requiring all large goods vehicles registered since 1st January 2000 to be equipped with improved mirror systems on the passenger side, the safety benefits that would be gradually achieved by Directives 2003/97/EC and 2005/27/EC can be realised much more quickly. It is estimated that doing so could save 57 more lives over the twelve years before the existing measures become fully effective; nearly 5 every year.

What policy options have been considered? Please justify any preferred option.

A retrospective Directive that would require improved mirrors to be fitted to the passenger side of all large goods vehicles registered from 1st January 2000 has been analysed. This proposal was considered in relation to an alternative option of taking no action beyond the existing requirements of Directives 2003/97/EC and 2005/27/EC. Other options were considered at an earlier stage but none of these was suited to solving the very specific problem identified by the Commission.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

A post implementation review will be conducted by the Commission. This will be completed by 2010.

Ministerial Sign-off For final proposal/implementation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:

.....Date:

Summary: Analysis & Evidence

Policy Option: 2	Description: **The retrospective fitting of mirrors to increase the field of indirect vision of goods vehicles**

COSTS

ANNUAL COSTS	
One-off (Transition)	**Yrs**
£63m	1
Average Annual Cost (excluding one-off)	
£600k	12

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

One-off costs of £63m, in present value (PV) terms, for installing mirrors fall upon vehicle operators, who also face maintenance costs of £5m, together with higher vehicle operating costs of £1.7m. The cost of extra CO_2 emissions for society totals approximately £367k (PV).

Total Cost (PV) **£70m**

Other **key non-monetised costs** by 'main affected groups' Changing the specification of mirrors may impose adjustment costs on manufacturers and suppliers.

BENEFITS

ANNUAL BENEFITS	
One-off	**Yrs**
£0	
Average Annual Benefit (excluding one-off)	
£9.9m	12

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

In present value terms, benefits from reductions in the number of road users killed and seriously injured total approximately £118m over a twelve year period.

Total Benefit (PV) **£118m**

Other **key non-monetised benefits** by 'main affected groups' Increasing the demand for mirrors is likely to benefit firms who manufacture them.

Key Assumptions/Sensitivities/Risks

- The benefits are sensitive to the uncertain forecast of casualty reductions to be achieved by the scheme;
- The estimated cost of the improvements assumes most vehicles will only require a replacement glass, where they already have the base mirrors fitted;
- Parts and labour costs could rise and affect future maintenance costs;
- There is a risk that enforcement costs could increase.

Price Base Year 2005	Time Period Years 12	**Net Benefit Range** (NPV) **£1m to 95m**	**NET BENEFIT** (NPV Best estimate) **£48m**

What is the geographic coverage of the policy/option?			Great Britain (GB)	
On what date will the policy be implemented?			2009	
Which organisation(s) will enforce the policy?			VOSA	
What is the total annual cost of enforcement for these organisations?			£0	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			£0	
What is the value of changes in greenhouse gas emissions?			£367k	
Will the proposal have a significant impact on competition?			No	
Annual cost (£-£) per organisation (excluding one-off)	Micro **£4**	Small **£10**	Medium **£90**	Large **£700**
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £0 Decrease £0 **Net Impact** £0

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Evidence Base (for summary sheets)

1. Purpose and Intended Effect

Objective: To improve the exterior field of indirect vision of existing Heavy Goods Vehicles (HGVs). A new Directive (2007/38/EC) will apply to all vehicles with a mass over 3.5 tonnes (categories N_2 and N_3), which meet the standards set out in Directive 71/127/EC and all subsequent amendments up to Directive 88/321/EC. To fall within the scope of the Directive, lorries must have cabs of sufficient height to enable close proximity (class V) mirrors to be fitted at least two metres from the ground and still be visible to the driver, and to have been first used on, or after, 1st January 2000. The Directive entered into force in August 2007. Full implementation is expected by 31 March 2009 and measures to ensure compliance are expected to commence in April 2009.

Background and Rationale for Government Intervention: Approximately 3,200 people have been killed and more than 30,000 seriously injured on British roads on an annual basis in recent years[1]. In order to reduce the number of road casualties, the European Council and Parliament produced Directive 2003/97/EC in 2003, setting standards for rear view mirrors fitted to vehicles. A later Directive (2005/27/EC) extended the requirement to certain goods vehicles in the 3.5 to 7.5 tonne mass range. Together these Directives require all new goods vehicles registered since 26th January 2007 to be equipped with compliant mirrors. Increasing the number of mirrors fitted and improving their field of view is intended to reduce blind spots and improve visibility of pedestrians, cyclists and other vehicles, particularly those in close proximity to high-sided vehicles where the drivers' view is often obstructed.

However, the existing fleet of around 5 million goods vehicles within the European Union will not be replaced for about 12 years (2020 at the earliest). Until then, the danger will continue to exist, even with existing legislation. In response to this, the European Commission put forward a proposal to reduce road accidents by extending the requirement to fit blind spot mirrors to existing goods vehicles.

This proposal resulted in a new Directive (2007/38/EC). The retrofitting Directive is designed to apply to goods vehicles above 3.5 tonnes and first used on, or after, 1 January 2000, which may already be equipped with class IV (wide angle) and class V (close proximity) mirrors and could therefore be upgraded at a reasonable cost, in many cases without changing the mirror housings. The road safety benefits of this policy are considered to be cost effective even when taking into account that operators of some vehicles would be required to fit additional mirrors because:

- class IV and class V mirrors are not obligatory on goods vehicles between 3.5 and 7.5 tonnes and may not be fitted to all vehicles; and
- class V mirrors are not obligatory on goods vehicles between 7.5 and 12 tonnes and may not be fitted to all vehicles.

2. Consultation

- We have consulted within government on the changes to the GB Construction and Use Regulations needed for the policy to be implemented.

- Public consultation has involved all major stakeholders in Commission Working Group discussions concerning this proposal. These stakeholders represent vehicle and component manufacturers, vehicle operators and consumer interests. Details of the public responses received can be found at: http://www.dft.gov.uk/consultations/closed/retrofittingmirrors/

Prior to preparing this proposal, the Commission conducted a web-based consultation exercise. Details of the public responses received, including the major stakeholders, can be found at: http://ec.europa.eu/transport/roadsafety/vehicles/blind_spot_mirrors_en.htm

[1] Transport Statistics Great Britain 2007 (November 2007), 33rd Edition, London, TSO

3. **Options**

Two options are examined:

- **Option 1:** assumes no action taken and is the baseline for all calculations.

Risk – Doing nothing is not regarded as a feasible course of action for Government to take. Vulnerable road users would continue to be killed at the same rate and a window of opportunity would have been missed to save lives as a result of this measure. There would also be cost implications if the UK were involved in infraction proceedings as a result of non-compliance with the requirements of the Directive. Consequently the option of doing nothing is not directly appraised in this impact assessment.

However, all impacts are measured relative to a baseline scenario under which no further action is taken by the government to reduce the number of road users killed or seriously injured by goods vehicles. This reference level entails fitting new vehicles with improved mirrors, as is required by existing Directives 2003/97/EC and 2005/27/EC. Thus it entails a gradual reduction in the number of road casualties over time as the proportion of vehicles equipped with upgraded mirrors rises.

- **Option 2:** the policy option assumes full adoption of the measures within the EC Directive.

These measures are:

- The mandatory upgrading of all existing close proximity (class V) mirrors on the passenger side of all goods vehicles over 3.5 tonnes, where these mirrors can be fitted at least 2m from the ground and still be visible to the driver and requiring vehicles that are not already equipped with these mirrors to have them installed; and

- The mandatory upgrading of all existing wide angle (class IV) mirrors on the passenger side of goods vehicles which fall into the above category and requiring vehicles that are not already equipped with these mirrors to have them installed.

Whilst the Directive requires that all vehicles be equipped, on the passenger side, with wide angle and close proximity mirrors that fulfil the requirements set by Directive 2003/97/EC, it also recognises that full compliance with these standards may be difficult to achieve. To make allowance for this, vehicles will be deemed to be compliant if they are equipped with mirrors whose combined field of vision covers not less than 95% of the total field of vision at ground level of a class IV mirror and not less than 85% of the field of vision at ground level of a class V mirror according to Directive 2003/97/EC.

Taking this into account, the Commission estimates that 75% of vehicles will be able to comply by installing replacement mirror glasses. The remaining 25% are likely to require new mirrors to be fitted.

Risk - The Directive will initially be implemented through changes to the GB Construction and Use Regulations and enforced by means of roadside and annual roadworthiness checks. There is a risk that these checks may prove impractical and expensive because there are no requirements for marking the replacement mirror glasses. If it was necessary to carry out a practical test to judge whether mirrors conform to the regulations in every inspection, this would cause enforcement costs to rise above the zero level assumed in this appraisal. Further, if monitoring and enforcement procedures are badly designed or implemented there is a possibility that significant administrative burdens will be placed on vehicle operators.

An additional risk is that existing vehicle door construction may not be designed to cope with the weight and wind loading created by fitting additional mirrors. This could lead to premature failure and liability claims.

4. **Costs and Benefits**

The overall costs and benefits indicated in this document apply only to GB and are calculated in 2005 Net Present Value prices (NPV). Northern Ireland will be making its own Regulations.

- **Sectors and Groups Affected**

    - Vehicle manufacturers;
    - Replacement mirror and glass manufacturers;
    - Vehicle owners and operators; and
    - End users and vulnerable road users.

This policy has been assessed for race relevance; a Race Impact Assessment is not required.

- **Benefits**

The main benefits of the retrofitting policy will be reductions in the number of people killed and seriously injured by accidents involving goods vehicles. However, determining precisely how many casualties are caused by collisions with goods vehicles as a direct result of the limitations of current mirror systems is a challenging task and involves considerable uncertainty. There are a number of stages involved in calculating the likely benefits of a policy to retrofit improved mirrors to existing goods vehicles.

The benefits are dependent upon:

- how many accidents may be partly attributable to the limitations of current mirror systems;
- the extent to which improved mirrors would be effective at reducing the casualties that occur as a result of collisions involving domestic lorries;
- the percentage of the domestic goods vehicle fleet that will have improved mirrors installed as a result of the proposal; and
- the proportion of accidents involving domestic goods vehicles.

Whilst the Directive will encompass goods vehicles registered throughout the European Union, this Impact assessment is concerned only with the domestic GB fleet. Foreign registered vehicles are therefore excluded from the analysis.

Step 1 - Because only limited information on the cause of road accidents is collected, it is not possible to determine how many casualties may be attributable partly to the limitations of current mirror systems fitted to goods vehicles. The Department has attempted to circumvent this problem by using the STATS19 database for 2005 to investigate specific accident scenarios that are likely to be related to driver visibility. These are indicative of the scale of road casualties that could potentially be prevented by improving the drivers' field of vision:

- 38 Vulnerable Road Users (VRU) were killed in GB as a result of collisions with the sides of heavy goods vehicles; and
- 4 car occupants were killed in side swipe incidents involving heavy goods vehicles on multi-lane roads.

These figures (42 fatalities) are believed to provide the best available indication of the scale of road casualties. However, the reliability of inferences made from this limited information remains uncertain. Further details of these casualties are provided in Table 1, below.

Table 1 – Fatalities in Accidents with the Sides of HGV's during 2005

Accidents with Vulnerable Road Users			Side Swipe Accidents	**Total**
Pedestrian	Pedal Cycle	Motor Cycle		
13	10	15	4	**42**

Step 2 - Determining how effective measures to reduce blind spots in the drivers' field of vision may be at reducing road casualties is problematic because many different factors play a causal role in traffic accidents. On the basis of all available information on the causes of accidents, this appraisal makes the assumption that improving mirrors has the potential to prevent one quarter of accidents involving the sides of goods vehicles. On the basis of the data from the STATS19

database, this assumption leads to the estimate that 10 lives per annum could be saved by implementing the proposal across the entire fleet (see table 2 below). Given the limited information available and complexity of road accident causes, this forms a reasonable prediction of the benefits that improving mirrors will bring, but there is necessarily a degree of uncertainty.

Table 2 - Estimated Number of Lives Saved per Annum				
Accident	Vehicle Manoeuvre	Fatalities	Effectiveness of Measure	Lives Saved (Rounded)
VRU Struck by Side of HGV	All	38	25%	9
Side Swipe	Changing Lane and Overtaking	4	25%	1
Total		42		**10**

Step 3 - As noted above, the benefits are calculated relative to the baseline scenario. If no further government action is taken in this area, the proportion of goods vehicles equipped with compliant mirrors (in accordance with the requirements of previous Directive 2003/97) is forecast to rise steadily over time. This will occur as new vehicles, which existing regulations require to be fitted with such mirrors, replace those reaching the end of their life. Consequently the baseline for comparison is expected to be a gradual reduction in the annual casualty figures.

Step 4 - Whilst foreign registered goods vehicles are included within the scope of the retrofitting requirement being considered, this appraisal is only concerned with the domestic GB fleet. Foreign registered vehicles are therefore excluded from the analysis and, for this reason; they are not included in the data presented in Table 1 (above).

It should be noted that, as corresponding requirements are being introduced across the European Union, this is expected to result in most of the foreign registered goods vehicles operating within Britain having improved mirror systems, thereby producing greater overall reductions in this type of accident than are measured by this appraisal. In the same way, British vehicles driving abroad will be less likely to be involved in accidents.

Installing improved mirrors on existing vehicles will cause a steeper reduction in year on year casualties to occur. The exact scale of casualty reductions achieved by the retrofitting proposal will be determined by the rates of depletion of the existing vehicle fleet and growth of new vehicles. The proportion of vehicles manufactured after 2000 is also an important consideration, since it is these that the proposal will apply to. The policy is appraised over a period of twelve years, by which time most goods vehicles will have been replaced by new vehicles that meet the standards set by existing Directives 2003/97/EC and 2005/27/EC. Data from Transport Statistics 2005 were used to make projections on new vehicle registrations for the period up to 2020 and calculate the annual depletion of the existing fleet, along with the number of lives saved by the retro fit measures (see Table 3 below).

Table 3 - Calculation of Annual Vehicle Fleet Changes and Average Numbers of Lives Saved			
Year	**% of Fleet Equipped with Improved Mirrors**	**% of Fleet Equipped with Existing Mirrors**	**Lives Saved (Max 10)**
1	11.3%	88.7%	9
2	22.4%	77.6%	8
3	31.9%	68.1%	7

4	41.3%	58.7%	6
5	49.9%	50.1%	5
6	57.0%	43.0%	4
7	63.5%	36.5%	4
8	68.6%	31.4%	3
9	73.0%	27.0%	3
10	76.9%	23.1%	2
11	79.7%	20.3%	2
12	81.5%	18.5%	2
Average Number of Lives Saved per Annum			**5**

The policy is expected to lead to a reduction in the numbers of pedestrian, cyclist and car occupant casualties due to collisions with goods vehicles. This is estimated to deliver an average of 5 fewer fatalities and 25 fewer serious injuries per year. However, the estimated number of lives saved per year can be seen to decline over time as fewer of the accidents prevented are attributable to retrofitting existing vehicles with improved mirrors.

Departmental estimates of the value of the prevention of road casualties, published in Highways Economic Note No.1: 2005 (HEN1), put the statistical value of avoiding a single fatality at £1,428,180 and for preventing a serious injury at £160,480. Applying these estimates to the forecast casualty reductions indicates that **approximately £118m in social benefits is likely to result from the proposal** to retrofit mirrors over the twelve year appraisal period. This present value benefit is in 2005 prices. It has been calculated by uplifting the HEN1 values in line with expected income growth, applying these to the forecast of casualty reductions and discounting the resulting benefits by 3.5% per annum. This benefit equates to average annual societal benefits of £9.9m. Further details can be found in **Annex 1**.

- **Costs**

The baseline for calculating the costs of the proposal is taking no action beyond the existing requirements of Directives 2003/97/EC and 2005/27/EC, which would not impose any costs on society.

4.1 **Business Sectors Affected**

The Directive entails a retrofit requirement. Goods vehicle manufacturers are not expected to be affected by the provisions other than as suppliers of replacement mirrors and glasses. However, mirror manufacturers and suppliers are likely to obtain a net benefit which will cause an increase in the number of mirrors required. The size of existing stocks of mirrors and glasses that conform to earlier requirements (laid down by Directive 71/127/EEC) is not known but it is assumed they will be utilised for vehicles not covered by this requirement (i.e. pre 2000 vehicles) and will not represent a loss to manufacturers or stockists.

Ultimately, the costs resulting from the increased requirements will fall to the end user, either the vehicle operators or private owners. Since all organisations use vehicles to some extent, the cost will be spread across all business sectors, charities and voluntary organisations.

4.2 **Compliance Costs for Mirror Manufacturers**

The Directive changes the specifications of the mirror glasses and requires either, upgrading or replacement of the existing mirrors or, where mirrors are not already fitted, the installation of

additional mirrors. Any development costs incurred by the manufacturers should be recovered quickly from the high initial demand for the products caused by the need to modify the vehicles before the deadline.

4.3 **Compliance Costs for Vehicle Users**

It is anticipated that the cost of mirrors and their installation, as well as any increase in operating or administrative costs will be met by the vehicle users.

4.4 **Installation Cost for Each Measure**

Costs of installing the equipment required for vehicles to meet the standards proposed will depend on two main factors:

- the number of vehicles in the existing fleet that will accept replacement mirror glasses against the numbers that need replacement mirrors; and
- the number of vehicles in the existing fleet that do not have the mirrors required by the proposal and must have additional mirrors installed.

The total installation cost estimates are based on the Commission assertion that 75% of the existing fleet of goods vehicles will only need to have the mirror glass replaced, while the remaining 25% of vehicles are expected to require replacement mirrors, where those mirrors are already likely to be fitted.

According to the latest figures available[2], approximately 419,000 goods vehicles are registered in GB. Of these, 237,543 were registered since 2000 and fall within the scope of the proposal. Separating these into different categories by Gross Vehicle Weight (GVW), around 100,200 are between 3.5 and 7.5 tonnes and the Department estimates that 20% of these vehicles (20,044) a have the type of cab that falls within the scope of the proposal and will require additional class IV and V mirrors to be fitted. 9,699 are between 7.5 and 12 tonnes, which will also probably need additional mirrors to be fitted. The remaining 127,622 are over 12 tonnes and are usually fitted with class IV and V mirrors as standard, so are unlikely to require any additional mirrors to be fitted.

In calculating the installation costs, the average cost of each mirror glass is taken to be £110 and each replacement mirror is assumed to cost £225. The additional mirrors that will have to be installed because they are not provided as original equipment on vehicles are also assumed to have an average cost of approximately £225 per unit. An installation cost of around £48 is assumed for every mirror and glass fitted.

The costs calculated from this information are presented in Table 4, below. In present value terms, the total one off cost of retrofitting to all appropriate existing goods vehicles is predicted to be around £63m in 2005 prices.

Table 4 - Installation Costs for Each Vehicle Type and Requirement

Vehicle Type	3.5 to 7.5 Tonnes	7.5 to 12 Tonnes	Over 12 Tonnes	All Vehicles
Number of Vehicles Affected	20,044	9,699	127,622	157,365
Class IV Mirror Glass or Mirror Replaced	No	Yes	Yes	N/A
Class V Mirror Glass or Mirror Replaced	No	No	Yes	N/A
Additional Class IV Mirror Fitted	Yes	No	No	N/A

[2] Vehicle Licensing Statistics 2006 (June 2007)

Additional Class V Mirror Fitted	Yes	Yes	No	N/A
Average Cost per Vehicle	£546	£460	£373	£401
Total Installation Cost	£10,944,024	£4,459,144	£47,666,932	**£63,070,100**

More detailed calculations underlying this table are provided in **Annex 2**

4.5 **Vehicle Operating Costs**

The vehicle operating costs are expected to rise very slightly, caused by increased fuel consumption. Other things remaining constant, fuel efficiency is predicted to fall by a small amount due to minor increases in weight and aerodynamic drag caused by installing additional mirrors to goods vehicles.

The proportional increase in weight will depend on the size of each vehicle. Utilising figures from previous research[3], the additional mirrors appear likely to increase the weight of the vehicle by 0.025% (3kg on a 12 tonne vehicle), which in turn will probably increase fuel consumption by 0.015%. Aerodynamic drag is influenced by various factors including the average speed of vehicles, the size and nature of the load being carried and other aerodynamic features of the vehicle but is expected to have a similar effect on fuel consumption as the increase in mass. Therefore, the combined effect of weight and drag on fuel consumption is predicted to be a 0.025% increase.

The annual fuel consumption of all heavy goods vehicles is estimated as 118 billion litres and this would increase by 0.025% if the entire fleet were equipped with the maximum number of additional mirrors required in order to comply with the Directive. The increase in fuel consumption is likely to affect around 7% of the total vehicle fleet and, when the number of additional mirrors and depletion of the fleet is taken into account, this suggests consumption will increase by approximately 526,575 litres. The average cost of fuel is taken to be £0.35 per litre after stripping out duty and VAT and from this Table 5, below, shows that the increased fuel costs are estimated to cost operators £184,301 per annum. In 2005 Net Present Value terms, the total cost of the additional fuel consumed over the life of the vehicles is expected to be about £1.7m.

Table 5 - Vehicle Operating Costs				
Vehicle Type	**3.5 to 7.5T**	**7.5 to 12T**	**Over 12T**	**All Vehicles**
Additional Fuel Consumed per Annum - Litres	424,800	101,775	N/A	526,575
Cost of Additional Fuel Consumed per Annum	£148,680	£35,621	N/A	£184,301
2005 NPV Total Extra Operating Cost Over 12 Years	£1,369,084	£328,015	N/A	**£1,697,099**

4.6 **Carbon Assessment**

This section analyses the specific carbon impact of the policy. Burning 1 litre of diesel fuel produces 2.64kg of CO_2 so, as a result of requiring additional mirrors to be fitted, an extra 526,575 litres of diesel will potentially be consumed causing an additional 1,390 tonnes of CO_2 per annum to be emitted into the atmosphere. Table 6, below, breaks this down by type of vehicle and details the monetary cost of the carbon dioxide emissions, which are calculated using the shadow price of carbon published by Defra[4]. The estimated carbon cost is relatively small, totalling approximately £367,031 in 2005 Net Present Value terms over the appraisal period.

[3] S0227/VF Potential Casualty Savings From Fitting Blind Spot Mirrors to Heavy Goods Vehicles – PPRO13 Final Report. TRL Limited.
[4] http://www.defra.gov.uk/environment/climatechange/research/carboncost/pdf/HowtouseSPC.pdf

Table 6 - Carbon Assessment Costs				
Vehicle Type	**3.5 to 7.5T**	**7.5 to 12T**	**Over 12T**	**All Vehicles**
Additional CO_2 Emitted per Annum - Tonnes	1,121	269	N/A	1,390
Cost of Additional CO_2 Emitted per Annum	£30,895	£7,414	N/A	£38,309
2005 NPV Total Cost of Carbon Emitted Over 12 Years	£296,011	£71,020	N/A	**£367,031**

4.7 **Maintenance Costs**

Although mirrors require very little maintenance they are sometimes subjected to damage. It is envisaged that 25% of the **additional** mirrors installed as a result of the Directive will need to be replaced once during the lifetime of the vehicle. This means that for every £1.00 of additional mirror cost, an additional £0.25 will be set aside for the cost of a replacement mirror, with an additional £24 per mirror allocated for the labour cost. These costs will fall to the end users.

Table 7, below, presents a detailed analysis of maintenance costs by class of goods vehicle. It shows that the costs of maintaining the additional mirrors mandated by the Directive will fall upon operators of goods vehicles weighing less than 12 tonnes. The present value of maintenance costs over the 12 year appraisal period is predicted to total about £5m in 2005 prices.

Table 7 - Maintenance Cost for Each Vehicle Type				
Vehicle Type	**3.5 to 7.5 tonnes**	**7.5 to 12 tonnes**	**Over 12 tonnes**	**All Vehicles**
Number of Additional Mirrors	2	1	None	
Total Number of Vehicles	20,044	9,699	None	29,743
Total Number of Additional Mirrors	40,088	9,699	None	49,787
Cost of Replacement Mirrors	£4,509,900	£1,091,138	£0	£5,601,038
Cost of Labour @ £24.00 for Each Mirror	£481,056	£116,388	£0	£597,444
Annual Maintenance Cost	£415,913	£100,627	£0	£516,540
2005 NPV of Total Maintenance Cost over 12 Years	£4,019,106	£972,394	£0	**£4,991,500**

4.8 **Total Costs**

Adding together the costs detailed earlier in this impact assessment provides a detailed profile of the total costs expected to be incurred by implementing this proposal. The costs are broken down into different categories and across different classes of goods vehicle in Table 8, below.

Table 8 - Total Cost by Vehicle Type				
Vehicle Type	**3.5 to 7.5T**	**7.5 to 12T**	**Over 12T**	**All Vehicles**

Installation Cost	£10,944,024	£4,459,144	£47,666,932	£63,070,100
Operating Cost	£1,369,084	£328,015	£0	£1,697,099
Carbon Cost	£296,011	£71,020	£0	£367,031
Maintenance Cost	£4,019,106	£972,394	£0	£4,991,500
2005 NPV of Total Costs Over 12 Years	£16,628,225	£5,830,573	£47,666,932	**£70,125,730**

Apart from the cost of carbon dioxide emissions, which will fall upon society, all costs will be met by the end users. Most costs are predicted to take the form of upfront expenditure required to install the improved mirrors, although operators of goods vehicles weighing less than 12 tonnes also face some operating and maintenance costs as a result of installing additional mirrors to these classes of vehicle. The present value of all costs imposed by the requirements of the policy is forecast to be around **£70m**.

5. Small Firms Impact Test

The total fleet of goods vehicles is 419,000[2]. The proposal will affect the operators of around 157,365 of these goods vehicles, which have been registered since 2000.

In total there are 100,000 operators of goods vehicles in GB[5]. Micro operators with use of only one vehicle make up 57,900 of the total number. There are 36,100 small operators who have between 2 and 10 vehicles, and 5,600 medium sized vehicle operators with between 11 and 100 goods vehicles. The number of large operators, with fleets over 100 vehicles, is just 275. These proportions have been used to estimate the relative cost of the proposals per organisation type. These calculations therefore assume that this split is constant across goods vehicles registered before and after 2000. However, due to lack of data it has not been possible to determine whether this assumption is valid.

It is expected that smaller operators will face lower costs from the proposal than the figures below suggest because of the tendency for smaller businesses to operate vehicles that are older and, therefore, on average are more likely to be beyond the scope of the requirements than those of operators of large fleets. Therefore the Directive could have a proportionately lower impact on small firms, although small operators may be less able to pass on the costs of the proposal than companies running large vehicle fleets.

By determining the average number of goods vehicles operated by different sized businesses and multiplying by the average annual cost per vehicle, excluding all one-off installation costs, an average annual cost per operator was obtained for different sizes of firm. The cost for micro-size operators is forecast to be around £4 a year, while small operators will incur costs of about £10 per year. Medium sized businesses are expected to face costs of approximately £90 per year whilst the burden on the largest few vehicle operators will be around £700 annually.

6. Competition Assessment

A competition assessment has been carried out and has indicated that the policy is unlikely to have any significant competition implications. Details are contained in **Annex 3.**

7. Enforcement, Sanctions and Monitoring

The new Directive will be implemented through changes to regulation 33 of the GB Construction and Use Regulations, which will require that the additional mirrors are fitted to and maintained on all affected goods vehicles to which regulation 33 applies in use on the road. Enforcement of the

[2] Vehicle Licensing Statistics 2006 (June 2007)
4 Road Freight Statistics 2006, DfT publication, September 2007
http://www.dft.gov.uk/162259/162469/221412/221522/222944/285840/01_Road_Freight_Stats_2006_1.pdf

Construction and Use requirements is by means of roadside enforcement and annual roadworthiness checks.

8. **Implementation and Delivery Plan**

The Directive will be implemented in accordance with the normal procedures as described in paragraph 7 above.

9. **Post Implementation Review**

Article 3 of the Directive requires the Commission to carry out a detailed study to assess whether the measures are having a positive effect on road safety. This review should be completed by 2010.

10. **Key Assumptions**

Although it is expected that VOSA will be responsible for monitoring and enforcing the requirements imposed by this policy, the details of this regime have not yet been determined. It is possible that the process will be incorporated within existing inspection regimes at no extra cost, which is assumed in the estimated costs used in this impact assessment. However, there is a risk that the enforcement activities and their costs could escalate.

The benefits are sensitive to the level of casualty reductions achieved by the scheme. This forecast is very uncertain and depends on how effective the measures are. The benefit figures presented above are conditional on an assumption that 25% of accidents involving the side of British registered HGVs could be avoided by increasing the driver's field of indirect vision.

The estimated cost of the improvements assumes most vehicles will only require a replacement glass where they already have an original mirror fitted. It may rise significantly if more vehicles need entirely new mirrors to be fitted. However, alternative solutions may be utilised where vehicles cannot be made to fully comply with the requirements for technical and economic reasons.

Installation and maintenance costs could escalate if parts and labour become more expensive.

11. **Summary**

Taking no action to reduce road accidents involving goods vehicles will have no significant benefits, but there could be cost implications from infraction proceedings as a result of non-compliance with the Directive. Doing nothing is therefore not regarded as a feasible option.

Table 9, below, shows the sum of all benefits and all costs predicted. The benefits and costs have been combined to produce a Net Present Value (NPV), i.e. benefits less costs over the appraisal period, for each vehicle type and for the policy as a whole. In its current form the proposal will apply to all goods vehicles upon implementation so the NPV for all vehicles is the relevant figure for consideration.

Table 9 - Summary of Costs and Benefits by Vehicle Type (2005 NPV)

Vehicle Type	PV of Total Benefit	PV of Total Cost	Net Present Value	Ratio Benefits to Social Costs
3.5 to 7.5 tonnes	£10,643,776	£16,628,225	-£5,984,449	0.6:1
7.5 to 12 tonnes	£3,547,925	£5,830,573	-£2,282,648	0.6:1
Over 12 tonnes	£104,072,473	£47,666,932	£56,405,541	2.2:1
All Vehicles	**£118,264,174**	**£70,125,730**	**£48,138,444**	**1.7:1**

Although parts of the policy appear to represent poor value for money, overall it is expected to produce a positive net present value of £48m over the appraisal period. Therefore the policy is

predicted to deliver net benefits to GB without cost to government. An indicative social benefit cost ratio (benefits to society divided by social costs) is given as a means of showing that the expected benefits are 1.7 times as great as its estimated costs.

The requirement to improve mirrors fitted to existing vehicles classed between 3.5 and 12 tonnes is likely to produce slight negative net present values. It also reflects the need to fit additional mirrors to these classes of goods vehicle, which then imposes extra maintenance and operating costs on operators, as well as causing additional carbon dioxide to be emitted into the atmosphere at a cost to society.

12. **Risks and Uncertainties**

The analysis of costs and benefits throughout this impact assessment is based upon what are judged to be the most likely impacts of requiring improved mirrors to be fitted, but many of the effects remain uncertain to varying degrees. The impact that deviations from the central case would have on costs and benefits is considered below.

A key factor for the analysis is estimating how many fatalities and casualties will be avoided by retrofitting improved mirrors. The outcome predicted to result from improving mirrors on the entire vehicle fleet is that one quarter of approximately 40 fatalities per year which involve the sides of goods vehicles will be prevented. Other things remaining constant, the proposal to improve mirrors would have to be very ineffective at preventing side swipe accidents (reducing casualties by less than 15%) before it was no longer worthwhile undertaking because it imposed a net cost on GB.

Similarly, the total costs of requiring improved mirrors to be fitted to goods vehicles would have to increase by around 70% before they outweighed the estimated benefits in terms of casualty reductions. This suggests that even some underestimation of the cost this measure entails for vehicle operators would not have altered the case for improved mirrors.

There is always a possibility that optimism bias may affect the estimation of impacts, so a sensitivity test has been carried out to examine what impact this might have. If the number of fatalities and casualties likely to be avoided by the proposal is actually 25% lower than the forecast above then the benefits of retrofitting mirrors would reduce to approximately £89m. Making an additional allowance for unanticipated rises of up to 25% in the costs of installing and maintaining mirrors that meet the new standard, as well as in the cost of operating vehicles with the new mirrors (including the associated carbon costs), raises the total cost of the proposal to about £88m. Under these circumstances the policy would yield a much lower, but still positive net present benefit to GB of around £1m. This forms the basis of the lower bound of a range of likely net benefits from implementing the retrofit proposal. The upper end of the range of likely net benefits that this proposal will yield is approximately £95m. This was determined by considering the possibility that actual costs could be up to 25% lower and than those estimated above, whilst benefits might be up to 25% greater.

Value for Money Assessment

Our best judgement is that implementing Directive 2007/38/EC, by requiring goods vehicles used on or after 1st January 2000 to be fitted with mirrors that increase drivers' field of indirect vision, will deliver **net benefits** to GB with a small increase to government revenues.

Owners and operators of goods vehicles are expected to incur a one-off cost totalling around £63m when installing improved mirrors. Over the twelve year appraisal period this proposal is also likely to increase maintenance costs by approximately £5m, raise operating costs by £1.7m and impose a cost of £370,000 on society through additional carbon emissions. These **costs** are forecast to total **£70m**.

We have estimated that retrofitting mirrors delivers **benefits** to society totalling around **£118m** over the appraisal period by reducing the number of road users killed and seriously injured in accidents involving goods vehicles.

However, the estimated benefits are uncertain, since they are based on an assumption that increasing drivers' field of indirect vision will prevent 1 in 4 'side-swipe' accidents involving HGVs. In addition, costs to hauliers could be higher or lower than estimated depending on how straightforward it is to replace mirrors, and how fast maintenance costs rise. There is also a risk that enforcement will entail additional unforeseen costs for VOSA. The impact of these uncertainties is that net benefits to GB could feasibly range from £1m to £95m, assuming that costs and benefits might vary by up to 25% around the central estimates above.

The proposal is expected to yield **net benefits** of between **£1m** and **£95m** over twelve years, based on the range of monetised impacts identified above. Available evidence suggests that the net effect of non-monetised impacts will be broadly neutral, and that **this scheme offers net benefits to GB with a small increase in government revenues**.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	*Results in Evidence Base?*	*Results annexed?*
Competition Assessment	Yes	Yes
Small Firms Impact Test	Yes	Yes
Legal Aid	No	No
Sustainable Development	No	No
Carbon Assessment	Yes	No
Other Environment	No	No
Health Impact Assessment	Yes	Yes
Race Equality	Yes	Yes
Disability Equality	No	No
Gender Equality	No	No
Human Rights	No	No
Rural Proofing	No	No

Annexes

ANNEX 1 – BENEFITS

Calculation of Benefit of Retrofitting Mirrors							
Year	**Estimated Reduction in Fatalities**	**Estimated Reduction in Serious Injuries**	**Value of Prevention of Fatality**	**Value of Prevention of Serious Injury**	**Value of Benefit of Retrofitting Mirrors**	**Discount Factor**	**Present Value of Benefit from Retrofitting Mirrors**
1	9	44	£1,524,529	£171,306	£21,120,010	0.97	£20,405,806
2	8	39	£1,558,068	£175,075	£18,883,527	0.93	£17,627,974
3	7	34	£1,588,295	£178,472	£16,893,247	0.90	£15,236,741
4	6	29	£1,619,108	£181,934	£14,843,925	0.87	£12,935,623
5	5	25	£1,650,519	£185,463	£12,914,958	0.84	£10,874,048
6	4	22	£1,682,539	£189,061	£11,299,738	0.81	£9,192,344
7	4	18	£1,715,180	£192,729	£9,777,716	0.79	£7,685,196
8	3	16	£1,748,454	£196,468	£8,574,698	0.76	£6,511,724
9	3	14	£1,782,374	£200,280	£7,516,187	0.73	£5,514,859
10	2	12	£1,816,952	£204,165	£6,555,267	0.71	£4,647,152
11	2	10	£1,852,201	£208,126	£5,872,447	0.68	£4,022,307
12	2	9	£1,888,134	£212,164	£5,455,561	0.66	£3,610,399
						Total	**£118,264,174**

Estimated Casualty Reduction Benefits by Vehicle Type (2005 Present Value Prices)		
3.5 - 7.5 tonnes Vehicles	**Percentage of Casualties Prevented**	**Annual Benefit**
Killed	9%	£6,814,921
Seriously Injured	9%	£3,828,854
Total		**£10,643,776**
7.5 - 12 tonnes Vehicles	**Percentage of Casualties Prevented**	**Annual Benefit**
Killed	3%	£2,271,640
Seriously Injured	3%	£1,276,285
Total		**£3,547,925**
Over 12 tonnes Vehicles	**Percentage of Casualties Prevented**	**Annual Benefit**
Killed	88%	£66,634,788
Seriously Injured	88%	£37,437,686
Total		**£104,072,473**
	All Vehicles	**£118,264,174**

ANNEX 2 – COSTS FOR INSTALLATION

Calculation for Replacement of Mirror Glasses to 75% of the Fleet				
Vehicle Type	**Replacement Mirror Glass Requirement**	**Cost per Vehicle Including Installation**	**Number of Vehicles**	**Total Cost**
3.5 to 7.5 tonnes	None	£0	None	£0
7.5 to 12 tonnes	1 x Class IV	£158	7,274	£1,149,292
Over 12 tonnes	1 x Class IV 1 x Class V	£316	95,716	£30,246,256
All Vehicles			102,990	£31,395,548

Calculation for Replacement of Mirrors to 25% of the Fleet				
Vehicle Type	**Replacement Mirror Requirement**	**Cost per Vehicle Including Installation**	**Number of Vehicles**	**Total Cost**
3.5 to 7.5 tonnes	None	£0	None	£0
7.5 to 12 tonnes	1 x Class IV	£273	2,425	£662,025
Over 12 tonnes	1 x Class IV 1 x Class V	£546	31,906	£17,420,676
All Vehicles			34,331	£18,082,701

Calculation for Installation of Additional Mirrors Where They Are Not Original Equipment				
Vehicle Type	**Additional Mirror Requirement**	**Cost per Vehicle Including Installation**	**Number of Vehicles**	**Adoption Cost**
3.5 to 7.5 tonnes	1 x Class IV 1 x Class V	£546	20,044	£10,944,024
7.5 to 12 tonnes	1 x Class V	£273	9,699	£2,647,827
Over 12 tonnes	None	£0	None	£0
All Vehicles			29,743	£13,591,851

Installation Costs for Each Vehicle Type				
Vehicle Type	**Additional Mirror Requirement**	**Cost per Vehicle Including Installation**	**Number of Vehicles**	**Adoption Cost**
3.5 to 7.5 tonnes	1 x Class IV 1 x Class V	£546	20,044	£10,944,024
7.5 to 12 tonnes	1 x Class IV 1 x Class V	£158.00 / £273.00	9,699	£4,459,144
Over 12 tonnes	1 x Class IV 1 x Class V	£316.00 / £546.00	127,622	£47,666,932
All Vehicles			157,365	£63,070,100

ANNEX 3 - COMPETITION ASSESSMENT

The competition filter below provides an indication of whether the proposal would risk a negative effect on competition.

Q1. In the market(s) affected by the new regulation, does any firm have more than a 10% market share?	YES
Q2 In the market(s) affected by the new regulation, does any firm have more than a 20% market share?	NO
Q3. In the market(s) affected by the new regulation, do the largest three firms together have at least a 50% market share?	NO
Q4. Would the costs of the regulation affect some firms substantially more than others?	NO
Q5. Is the regulation likely to affect the market structure, changing the number or size of firms?	NO
Q6. Would the regulation lead to higher set up costs, for new or potential firms, that existing firms do not have to meet?	NO
Q7. Would the regulation lead to higher ongoing costs, for new or potential firms, that existing firms do not have to meet?	NO
Q8. Is the market characterised by rapid technological change?	NO
Q9. Would the regulation restrict the ability of firms to choose the price, quality, range or location of their products?	YES. But only insofar as mirrors, which are currently supplied as an option, would need to be supplied on a mandatory basis.

It is concluded from the above that there is unlikely to be a negative competitive impact from the regulation.