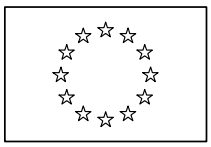

COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 21.12.2005
SEC(2005) 1745

COMMISSION STAFF WORKING DOCUMENT

Annex to the

Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on type approval of motor vehicles with respect to emissions and on access to vehicle repair information, amending Directive 72/306/EEC and Directive ../../EC

Impact Assessment

{COM(2005) 683 final}

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The impact assessment has demonstrated that further action to amend emission limits for light duty vehicles is necessary to retain a functioning internal market, while at the same time improving air quality.

Particulate pollution is of increasing scientific concern and has resulted in a number of Member States providing fiscal incentives to encourage vehicles with low particulate emissions onto the market. The development of these incentives demonstrates that harmonising emission limits at European Union level is now necessary to prevent barriers to the distribution and circulation of vehicles emerging and to achieve substantial reductions in particulate emissions from diesel vehicles across the EU. An 80% reduction in the limit value for particulate matter (PM) is proposed with an emission limit of 5 mg/km, which given current technology will require particulate filters to be fitted to all diesel vehicles.

Additional action on nitrogen oxide (NO_x) and hydrocarbon (HC)[1] emissions from diesel vehicles is also justified, given the fact that many Member States will otherwise be unable to fulfil the requirements of the National Emissions Ceilings Directive (2001/81/EC) and the proposal for revision of the air quality directives(COM(2005) 447)[2]. Diesel vehicles produce significantly higher emissions of NO_x than petrol vehicles. A 20% reduction in NO_x to an emission limit of 200 mg/km for diesel passenger cars is proposed. Given the current state of development of NO_x after-treatment technology and the need to provide for affordable vehicles to consumers, it would not be cost-effective at this stage to set emission limits at a level where widespread use of such a technology would be required.

With petrol cars, the main technology used to reduce emissions is the 3 way catalyst. This is a well developed, long established and effective technology. Emissions can be reduced through specification of better optimised catalysts. Data collected for the impact assessment showed that the cost of reducing emission limits was relatively small. Furthermore, for emissions of HC it was shown that lower NO_x emission limits also resulted in lower HC emissions at no additional cost. Therefore emission reductions in both NO_x and HC are proposed. A 25% reduction in limit values for each pollutant is put forward. This level reflects the situation that at present many petrol vehicles have emissions well within the proposed limit values, to some extent reflecting the more stringent emissions requirements on petrol vehicles in other parts of the world.

A series of other amendments to the existing legislation are discussed in this impact assessment. The general effect of these additional elements of the proposal is to further tighten emission limits from vehicles, in that they reduce the risk of vehicles producing unnecessary levels of pollution by providing more robust and comprehensive regulatory

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[1] Hydrocarbons (HC) and Volatile Organic Compounds (VOC) are used in this document interchangeably.

[2] This proposal for an Ambient Air Quality Directive would amend existing air quality legislation, i.e. Directives 96/62/EC ("Framework Directive"), OJ L 296, 21.11.1996, p. 55, and three "daughter directives" 1999/30/EC, 2000/69/EC, 2002/3/EC and Council Decision 97/101/EC.

requirements without imposing excessive costs. In addition, they ensure standardised access to vehicle repair information.

2. PROBLEM DEFINITION

2.1. Nature of the issue or problem that requires action

The proper functioning of the single market in the European Union requires common standards limiting the emission of atmospheric pollutants from motor vehicles. Action at Community level prevents varying product standards emerging across Member States which results in fragmentation of the internal market and imposition of unnecessary barriers to intra-Community trade. Also through harmonised standards it is possible to reap the economies of scale as production series can be made for the whole European market.

Harmonized vehicle emission standards have long been a feature of EU policy. Given developments in automotive technology, increased demand for road transport and continuing air quality problems, there has been a need to keep standards under review.

2.2. Underlying drivers of the problem

All Member States and their citizens are concerned about the significant risk to human health and environment that results from air pollution. Although air quality has improved over the past decade, there are still significant air quality problems throughout the European Union, especially in urban areas and in densely populated regions. The Commission's Clean Air for Europe (CAFE) Programme[3] has identified that the pollutants from road transport of most concern for human health are airborne particulates and ozone. Ozone is formed by reaction between HC and NO_X, both of which are emitted by road transport. The road transport sector is a significant source of pollution; it was responsible for 43% of total NO_X emission and 27% of total volatile organic compounds (VOCs) emissions in 2002.[4] The transport sector (including road transport, shipping, aviation and rail) accounted for 29% of total $PM_{2.5}$ emissions in the year 2000.[5] Road transport contributed 15 % to the total emissions (i.e. from all sectors) of acidifying substances in 2001 for EEA-31 (25 EU Members States, Bulgaria, Romania, Turkey, Iceland, Lichtenstein and Norway). Road transport is the dominant source of ozone precursors and contributed 36 % of total ozone precursor emissions in 2001 in EEA-31[6]. These pollutants are associated with damage to health and have detrimental impacts on ecosystems through: ozone formation; particulate matter formation; acidification and eutrophication. Since the emissions of these pollutants from motor vehicles are

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3 Thematic Strategy on Air Pollution, COM(2005) 446, 21.9.2005.

4 Source: Eurostat – Environment and energy statistical data: http://epp.eurostat.cec.eu.int/portal/page?_pageid=0,1136239,0_45571447&_dad=portal&_schema=PORTAL.

5 Impact Assessment of the Thematic Strategy on Air Pollution, SEC(2005) 1133, 21.9.2005, p. 9, 26, 31.

6 EEA factsheet of air pollutants from transport: http://themes.eea.eu.int/Sectors_and_activities/transport/indicators/consequences/TERM03%2C2003.09/TERM2003_03_EEA31_Transport_emissions_of_air_pollutants_by_mode_final.pdf

harmonised at EU level, the Community needs to address these issues, as it carries responsibilities for the internal market for vehicles, public health and the environment.

2.3. Stakeholders affected

A wide range of different groups are affected by the problem:

- The population of the European Union is affected by poor air quality through the impacts on health and welfare of society. In the year 2000, exposure to particulate matter was estimated to reduce average statistical life expectancy by approximately eight months in the EU-25. This equates to approximately 3.6 million life years lost or 348,000 premature mortalities per annum. In addition, it has been estimated that there were some 21,000 cases of hastened death due to ozone[7].

- Consumers of motor vehicles are affected by changes in the price of new vehicles, which may alter as a result of stricter vehicle emission limits.

- Stricter emission limits affect vehicle manufacturers all over the world by requiring improvements to new vehicles through the development and introduction of better technologies.

- Component suppliers will be affected by increasing demand for advanced engine and exhaust gas after-treatment technologies.

2.4. Consequences of no change in policy

With no change in the policy of reducing emission levels for motor vehicles, there is a high risk that the functioning of the internal market would be impaired. Poor air quality will remain an issue in the European Union as atmospheric pollution will continue to have a detrimental impact on human health.

With no additional action on motor vehicle pollution, it is likely that Member States would question whether EU legislation still provides a high level of environmental protection in the sense of Article 95 (3) of the Treaty. It is foreseeable that they would try to promote vehicles that fulfil stricter emission limit values. There is a risk that this would result in disruption to the single market if varying standards for vehicles emerge from different Member States. If air quality remains a problem, the use of other measures, such as bans on certain types of vehicle entering cities or creation of low emission zones would also become more widespread, restricting the free movement of goods and people.

The CAFE Programme has forecast the likely levels of air pollution given present policies for the period 2000-2020. Despite the improvements in pollutant emissions, health impacts from air pollution across the EU are still projected to be considerable in 2020[8].

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[7] Thematic Strategy on Air Pollution, COM(2005) 446, 21.9.2005, p. 3

[8] Impact Assessment of the Thematic Strategy on Air Pollution, SEC(2005) 1133, 21.9.2005, p. 11, 37, 39.

- For particulate matter, the average loss in statistical life expectancy will be five months in 2020. Correspondingly, in 2020 it is estimated that some 2.5 million life years will be lost in the EU-25. This is equivalent to about 272,000 premature deaths.

- No significant decrease is estimated in the health impacts of ozone with 20,000 cases of hastened death in the year 2020.

The total annual damage costs to human health associated with particulate matter and ozone pollution in 2020 are estimated at between €189 billion and €609 billion. This excludes an estimate of damage on ecosystems and cultural heritage which are difficult to value.

2.5. Treaty base and subsidiarity principle

Since the objective of the Euro 5 proposal is to lay down harmonised rules on the construction of motor vehicles with regard to their emissions with a view to ensuring the functioning of the internal market, the proposed Regulation is based on Article 95 of the EC Treaty.

The subsidiarity principle is respected, since the policy objectives cannot be sufficiently achieved by actions of the Member States and can be better achieved at Community level. European Union action is necessary because of the need to avoid the emergence of barriers to the single market and because of the transboundary implications of air pollution.

3. OBJECTIVES

3.1. Policy objectives

The proposal pursues the following general policy objectives:

- Ensuring proper functioning of the internal market; and
- Providing for a high level of environmental protection in the European Union.

The specific objectives cover:

- Setting harmonised rules on the construction of motor vehicles; and
- Improving air quality by reducing pollutants emitted by the road transport sector.

The operational objectives include:

- Setting the next stage of emission limit values for passenger cars and light-duty vehicles in a cost-effective way with specific focus on NO_X, PM and HC.

3.2. Consistency with horizontal objectives of the European Union

3.2.1. Lisbon strategy

The policy objectives of Euro 5 are in line with the aims of the European Union's Lisbon strategy, which has three pillars, namely:

- Making Europe a more attractive place to invest and work

The objectives of Euro 5 are supporting the integrity of the single market, providing for uniform standards for new vehicles sold throughout the European Union. It means that the automotive industry in Europe is required to meet uniform regulations throughout the Internal Market of the EU. This will ensure that the European car industry remains competitive and an attractive industry to invest in. The proposal will also contribute to enhancing its competitiveness on world export markets.

The CAFE Programme has shown that air pollution has significant effects on productivity.[9] For example, the CAFE Cost-Benefit Analysis[10] assessed the effects of air pollution on activities of the population, namely by estimating the Restricted Activity Days (RADs) and the Work Loss Days (WLDs) for each Member State that are attributable to air pollution. By seeking to reduce air pollution, the policy objectives of Euro 5 contribute to increasing productivity in the European Union.

- Knowledge and innovation for growth

New emission limits for vehicles encourage the development and implementation of new environmental technologies. The policy objectives therefore promote innovation and technological development, enabling the EU to keep pace with the technology development of the automotive industry in the United States and in Japan. Europe has world leading diesel engine technology. However, one of the barriers to diesel vehicles in other parts of the world is the perception that they are too polluting. Policies which support the development of cleaner diesel open up the potential for greater export of European technology to other parts of the world.

- Creating more and better jobs

In the Impact Assessment of the Thematic Strategy on Air Pollution (SEC(2005) 1133) it was demonstrated that reducing air pollution in the EU would have a negligible impact on employment. As Euro 5 would be one of the measures considered in the Thematic Strategy, the overall employment impact of this proposal is also negligible. One of the main employment impacts is likely to be created by the demand for new vehicle components. Given that new technology could be required, the employment impact will be a mixture between high value added research and development activities and also manufacturing opportunities.

3.2.2. Sustainable Development strategy

At the core of the European Union's Sustainable Development strategy, as communicated by the Commission to the European Council at Göteborg in 2001[11] and supported by the European Council, is that "*economic growth, social cohesion and environmental protection must go hand in hand*". The policy objectives of Euro 5 are in

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9 Methodology for the Cost-Benefit analysis for CAFE, Volume 2: Health Impact Assessment, AEA Technology Environment, February 2005, p. 85.

10 CAFE Cost Benefit Analysis: Baseline Analysis 2000 to 2020, AEA Technology Environment, April 2005, p. 18, 60.

11 COM(2001) 264 finl.

line with the strategy by ensuring that the automotive industry grows in a more sustainable way through production of more environmentally friendly vehicles. Such vehicles bring social benefits through reducing the impacts on human health.

4. POLICY OPTIONS

4.1. Options Identified

Four policy options have been identified as possible means of meeting the policy objectives identified in the previous section. These are:

(1) **Regulatory approach at the European level**: revising the existing Euro 4 legislation through setting new Euro 5 emission limit values at European Union level.

(2) **Regulation in Member States:** Member States develop their own emissions standards and/or impose other policy measures (e.g. temporary driving restrictions on vehicles not complying with more ambitious standards).

(3) **Fiscal incentives by Member States**: Member States introduce on a voluntary basis (or on the basis of a EU legislation) fiscal incentives for vehicles that fulfil stricter emission limit values than Euro 4.

(4) **Non-regulatory approach**: self-regulation through negotiated commitments with the automotive industry to reduce the emissions from new vehicles.

4.2. Options discarded at an early stage

Discussions with stakeholders have shown that there is little interest in a fundamental change in the regulatory system. Moreover, the 'softer' options such as self-regulation or voluntary fiscal incentives may not deliver on the environmental side or would not be workable. For example, the option may not be feasible due to the unanimity requirement in the Council with respect to a fiscal regime, or because it creates significant distortions in the working of the internal market. Therefore, three options were discarded at an early stage, these are:

(1) **Regulation in Member States:** Member States develop their own emissions standards and/or impose other policy measures (e.g. temporary driving restrictions on vehicles not complying with more ambitious standards).

This policy option was rejected because of its detrimental effects on the functioning of the internal market

(2) **Fiscal incentives by Member States**: Member States introduce on a voluntary basis (or on the basis of a EU legislation) fiscal incentives for vehicles that fulfil stricter emission limit values than Euro 4.

The policy option of using fiscal incentives as a mechanism to introduce lower emission limits was rejected for the following reasons:

- Due to the unanimity requirement at the Council it is likely that legislation on support schemes would be very difficult to ever finalise.
- At present only a small number of Member States have a history of introducing fiscal measures encouraging the introduction of cleaner vehicles in advance of new Euro standards, so uptake of the measure could be limited.

- With a purchase tax regime, a key issue is their sustainability over a period of time. They could involve significant financial commitment by Member States so there is no guarantee that they would be in place for the long term. Therefore the resultant policy could lead to considerable uncertainty for manufacturers as to the demand for cleaner vehicles. Fiscal incentives could be designed such that they are revenue neutral with charges on the sale of polluting cars subsidising the purchase of cleaner cars. Such a tax would only be revenue neutral as long as sales of polluting cars continue to take place. If the instrument becomes too successful and the market shifts to cleaner cars, the tax base will diminish. The incentive mechanism will then become a net cost to the Member State. If the incentive scheme were to finish, the market risks shifting back to cheaper, less clean vehicles.

- In order to make such an approach revenue neutral such an option could only work through differentiation of circulation taxes. For example, vehicles fulfilling a more ambitious but indicative new norm would benefit from reduced taxes (or a direct subsidy), whilst vehicles fulfilling the norms in place when the vehicles were registered for the first time would come with higher circulation taxes. The higher the penetration rate of new vehicles, the higher the tax 'penalty' for older cars would have become for revenue neutrality to continue. This could lead to undesired distortions of the market and unacceptable negative economic and social consequences for the owners of cars already on the market.

- If uncoordinated, different types of incentive regimes in neighbouring countries could result in unpredictable cross border effects, both in terms of vehicle purchasing patterns and air pollution impacts. The continued existence of the single market for vehicles could therefore be put in danger. A Commission Communication giving some guidance to Member States could perhaps help at an early stage. However, such a Communication would also have to develop indicative vehicle emission limit values so as to give some guidance on an adequate tax differentiation. Thus, if effective this would eventually come close to a regulatory approach without delivering the planning security for vehicle manufacturers and the greater environmental certainty that a regulation would bring about.

In conclusion, such a policy option does not ensure that the stated policy objectives are attained and could even have a negative impact on the functioning of the internal market through reducing the certainty as to the demand for specific types of vehicles. However, fiscal incentives could be used by Member States (preferably in a budget neutral way) as an accompanying measure to a European regulation so as to accelerate the penetration of new vehicles fulfilling more ambitious standards.

(3) **Non-regulatory approach**: self-regulation through negotiated commitments with the automotive industry to reduce the emissions from new vehicles.

The policy option of self-regulation was discarded due to the following reasons:

- Self-regulation would imply a significant departure from an approach that is well established all over the world and has proven its effectiveness and proportionality in the past.
- A large number of other countries around the world base their emissions regulation on EU practice. A radical change in approach to a non-regulatory approach risks reducing the EU's leadership in this area. The use of EU regulation by other countries also offers competitiveness benefits to the EU automotive industry which could be affected by a change of approach.
- It is not clear that a self commitment provides an adequate guarantee that a specific emission level will be reached or that there will be appropriate sanctions available if the self-commitment were to be breached.
- As the issue of emission control has repercussions on the protection of the environment and public health, it is questionable whether a self-commitment can be justified.
- A self-regulation approach could take too much time to be negotiated and to deliver the hoped-for effects. Due to the problem of several Member States to meet existing air quality targets, there is a certain urgency to introduce action that has more immediate effects.

In addition, it is not apparent that the use of a voluntary approach would offer any additional benefits to the industry, governments or the general public. It is likely that a similar compliance process would be used as currently exists in the type approval system, however there would be additional transaction costs in establishing an appropriate monitoring and compliance mechanism. A regulatory approach instead would provide industry with a stable and predictable framework in which investment in better technology solutions would be stimulated.

5. ANALYSIS OF IMPACTS

5.1. Impacts of the policy options

This section analyses the impacts of policy option 1 (Regulatory approach) relative to the baseline (No policy change). The potential economic, environmental and social impacts have been examined.

5.1.1. Baseline - 'No policy change'

As discussed in Section 2.2 and 2.4 the option of no policy change is not considered a viable way forward due to the significance of the air pollution problems that the EU faces. However this option provides a baseline to consider the impact of the Regulatory approach. The impacts related to the baseline have been based on the forecasts made under the CAFE Programme. Any potential limitations with the forecasts have already been considered in the development of the CAFE Programme, so it is not necessary to consider these issues in the present impact assessment.

5.1.2. Option 1 - Regulatory approach

Considerable emphasis was given to gathering data from stakeholders to understand the costs of varying emission limits. There is substantial information asymmetry as those with the best information on these costs do not necessarily have clear incentives to make it public. Another key issue with cost data relates to understanding the effect of mass production on new technology. A more detailed explanation of this process is provided in section 6.

5.1.2.1. Economic impacts

The fulfilment of stricter emission limit values would require the development and introduction of technologies to reduce emissions of pollutants. There are a number of economic impacts that result from the further regulation of vehicle emissions:

- Single market

Harmonised emission limit values throughout the European Union would have a positive impact on the competition in the internal market by sustaining a 'level playing field' for all automotive businesses.

- Competitiveness

This policy option may have neutral direct impacts overall on the competitiveness of the automotive industry within the European Union. The option may increase the operating costs of businesses in the automotive industry through the additional cost of additional components and also research and development expenditure. But these costs will be incurred for all the car manufacturers that sell vehicles on the European market, so for the competitors of the European automotive companies as well. Depending on the vehicle mix and export of vehicles, EU car manufacturers are affected differently. However, the competitive position of the manufacturers of the EU would not be influenced by the policy option. Moreover, costs and economic impacts could be expected to diminish over time, once a new technology becomes established and production costs fall.

The policy option would have some indirect impacts as well in terms of competitiveness. The automotive industry could become more competitive in markets outside the EU with strict environmental regulation in force, through being able to produce vehicles equipped with advanced environmental technologies. Moreover, it should be noted that at present, the EU is the world leader in diesel technology for light duty vehicles, whilst sales of diesels in Japan and in the US are minimal. A key reason for the limited sales in other markets relates to the higher pollutant emissions from diesel vehicles. They are unpopular even though their CO_2 emissions are considerably lower than equivalent petrol vehicles. Cleaner diesel vehicles are therefore a necessary requirement for making diesel technology viable in the parts of the world that use US or Japanese emissions standards. Encouraging the development of cleaner diesel vehicle technology will have a positive impact on the international competitiveness of EU industry through expanding the size of the global diesel market and making European technology exportable to the rest of the world.

Further development of EU emissions standards ensures their continued use in other markets around the world. At present there are three main systems used around the world for setting vehicle emission limits, these are those from the EU, the United States and Japan. Currently there is widespread use of EU standards in OECD countries such as Australia and emerging markets around the world, including in China and India. As many of these markets have significant air quality problems and are experiencing high growth in the use of cars, there is continued demand for better standards. Current high levels of oil prices and concerns over security of supply, is increasing the level of interest in diesel technology in a number of markets. So driving forward the development of cleaner diesel technology is an important need which could provide competitiveness benefits. Therefore further evolution of EU policy in this area, will sustain the use of the Euro system so be in the interests of both EU based manufacturers and equipment suppliers.

Finally, a policy that makes it necessary to develop and introduce new environmental technologies would benefit indirectly the component suppliers in the automotive industry, who would benefit from increasing revenues.

- Affordability of cars

The necessary technological developments will result in an increase in consumer prices of new vehicles, which would negatively affect consumers in the European Union. However, consumers would also benefit from the proper functioning of the internal market indirectly through greater competition between manufacturers and the reduction in barriers to cross-border vehicle purchases.

5.1.2.2. Environmental impacts

- Air quality

The policy option would result in improvement in air quality through reducing the levels of pollution produced by road transport. A decrease in the areas under threat of ozone and eutrophication would be a result of reduced air pollution from vehicles. Furthermore, cleaner air in cities would also reduce damage to buildings and cultural heritage.

- Biodiversity

The regulatory option would have reduced impact on biodiversity compared to the baseline scenario through reducing the emission of pollutants from vehicles. The threats of ozone and eutrophication on biodiversity would be reduced.

- Climate

Tighter emission limits could have both direct and indirect effects on fuel consumption and greenhouse gas emissions. The direct impact is due to some forms of engine management and after-treatment resulting in slightly higher CO_2 emissions, therefore, the policy option might cause the emission of greenhouse gases to increase. Given the nature of emission limits being considered, and the likely technologies used to reach these limits a small direct negative impact on CO_2 could be expected.

However, there might be some positive impacts indirectly. Greenhouse gas emissions may be decreased if the slightly higher price of vehicles results in reduction of vehicle fleets and suppresses demand for road transport.

5.1.2.3. Social impacts

- Public health

Better air quality would improve public health by decreasing morbidity rates and increasing life expectancy of the population, which in turn results in lower mortality. The impacts will grow in proportion to the penetration of newer low emission vehicles onto the market while older more polluting vehicles are retired. Employment

The proposal has no perceptive impact on employment (see Section 3.2.1).

5.2. Conclusion

In conclusion, in comparison with the no policy change scenario, the regulatory option will have the clear benefits of ensuring the proper functioning of the internal market and improving air quality. This, in turn, will improve public health and, thus, will enable Governments to generate savings.

As far as the competitiveness of industry is concerned, the indirect impacts of the regulatory option might be positive as the international competitiveness of EU industry, especially in markets with strict environmental regulation in force, might be improved.

On the other hand, the introduction of new technologies will bring additional costs and result in an increase in consumer prices of new vehicles.

It is therefore essential to ensure a right balance between higher environmental standards and continued affordability of cars for the consumers, both in the diesel and the petrol markets. To this effect, in the next section different scenarios under the regulatory option are compared.

6. IDENTIFICATION OF THE BEST SCENARIO UNDER THE REGULATORY OPTION

In this section, different scenarios under the regulatory option are compared, where possible, based on a quantification of their impacts. When comparing the scenarios, the following elements should be taken into account:

- recent scientific research has provided evidence that PM has a significantly greater negative impact on health and environment than NOx;

- different levels of increase in the price of diesel and petrol cars might imply a shift in consumer demand from one fuel type vehicle to another.

6.1. Data Collection and Modelling of the Impacts

The Euro 5 proposal was developed at the same time as the Commission's thematic strategy for air pollution (CAFE Programme). Stakeholders were actively engaged in the discussion of this programme.

In the preparation for a new set of limit values for light-duty vehicles, the Commission services sent out a questionnaire to stakeholders that requested information on the technologies needed and the associated costs for meeting a number of different scenarios for possible Euro 5 limit values. The responses received from the stakeholders were then provided to a panel of three independent experts for validation. Some further discussion was held between the panel and the stakeholders in order to clarify outstanding issues and to generate additional information. The panel subsequently reported on its interpretation of the stakeholder responses in terms of the technologies required and the costs involved. The data summarised by the panel was used as input for the modelling of the impacts of different scenarios.

6.2. Scenarios of the Regulatory approach

A number of scenarios, combining different levels of PM, NOx and HC emissions have been developed for policy option 2 (Regulatory approach).

6.2.1. Evaluation of Scenarios for Diesel Vehicles

The cost implications for the various scenarios examined as part of this proposal are set out in Table 1. This summarises the average cost per vehicle for each diesel scenario, weighted according to the projected composition of the new vehicle fleet in 2010. These figures have been deflated by a 4% discount rate so that they are provided as 2005 costs. In addition, a deflation was made to the costs of the diesel scenarios, as the expert panel was of the opinion that the costs provided by stakeholders had failed to account for the economies of scale that would result through the mass production of new technologies that would be used in diesel cars in the foreseeable future.

These figures demonstrate that all the scenarios entail higher costs for diesel vehicles. With diesel vehicles it is projected by the expert panel who reviewed the cost data that a large proportion of the cost relates to the increased specification of particulate filters. The other key variable is the need to specify additional internal engine measures or after-treatment to reduce NO_x emissions. The highest cost scenarios relate to those with the most significant PM and NO_x reduction. In these cases, two additional after treatment devices are forecast to be required, one for NO_x and one for PM.

Table 1: Sales weighted average cost per diesel vehicle (2005 prices)

	Scenario A	**Scenario B**	**Scenario C**	**Scenario D**	**Scenario E**	**Scenario F**	**Scenario G**	**Euro 4**
PM	*2.5/5 mg/km*	*8.5mg/km*	*12.5mg/km*	*2.5/5 mg/km*	*8.5 mg/km*	*12.5mg/km*	*2.5/5 mg/km*	*25mg/km*
NOx	*75mg/km*	*75mg/km*	*75mg/km*	*150mg/km*	*150mg/km*	*150mg/km*	*200mg/km*	*250mg/km*

€	**590**	**570**	**497**	**499**	**467**	**383**	**377**	**0**

Source: Euro 5 technologies and costs for light duty vehicles – The expert panel's summary of stakeholder responses. 33% reduction in costs made to take account of mass production economies of scale.

6.2.1.1. Particulate Emission Limits for Diesel Cars

The current emission limit value for PM is 25mg/km. In view of the high concentrations of particulate matter in many European cities and the willingness of some Member States to introduce tax incentives for diesel cars with emissions below the Euro 4 limit values, the Commission services published a Staff Working Paper in January 2005[12]. This paper referred to a value of 5mg/km as the recommended parameter to use for such incentives. It is likely that in order to achieve this parameter diesel particulate filters (DPFs) will be installed on all vehicles. DPFs are a well established technology that is effective at significantly reducing emissions. The scenarios setting particulate emission limits above this level (8.5 and 12.5 mg/km) were rejected from further consideration. The key reason is that these limit values are insufficiently stringent to ensure a significant improvement of air quality.

At current levels of technology, achieving an emission limit of 2.5 mg/km would require the application of the same particulate filter technology as achieving the 5 mg/km emission limit. Therefore the environmental benefit will be equal with both a 2.5 and 5 mg/km emission limit. However, since the existing particulate measurement technique is not considered reliable at very low emission limits[13], a low emission limit of 2.5 mg/km would put an unnecessary burden on both type approval authorities and manufacturers.

In conclusion, the 5 mg/km figure has been chosen as being the most appropriate option for a limit value. This limit value is consistent with the type approval values of those vehicles on the market that are already fitted with diesel particulate filters. In addition it is similar to the limit values in Japan and slightly lower than that in the US (though these limits are measured over different test cycles).

6.2.1.2. NO_x Emission Limits for Diesel Cars

The current emission limit value for NOx is 250 mg/km. The stakeholder questionnaire included scenarios with significant NOx reductions requiring NO_X after-treatment in the exhaust gas by means of selective catalytic reduction (SCR) technology (e.g. 75 mg/km), or by means of lean NOx traps (LNT) at least on some types of vehicles (e.g. 150 mg/km). The responses to the questionnaire highlighted that there are uncertainties at present on the technical availability of NO_X after-treatment for diesel cars. Furthermore, fitting a NOx after-treatment device in addition to a particulate filter would considerably increase costs (see scenarios A to F in Table 1) and thus prices for the consumers. This will have a negative impact on the affordability of cars and would thus risk reducing demand for diesel cars. The improvement in CO_2 emissions that Europe has seen in

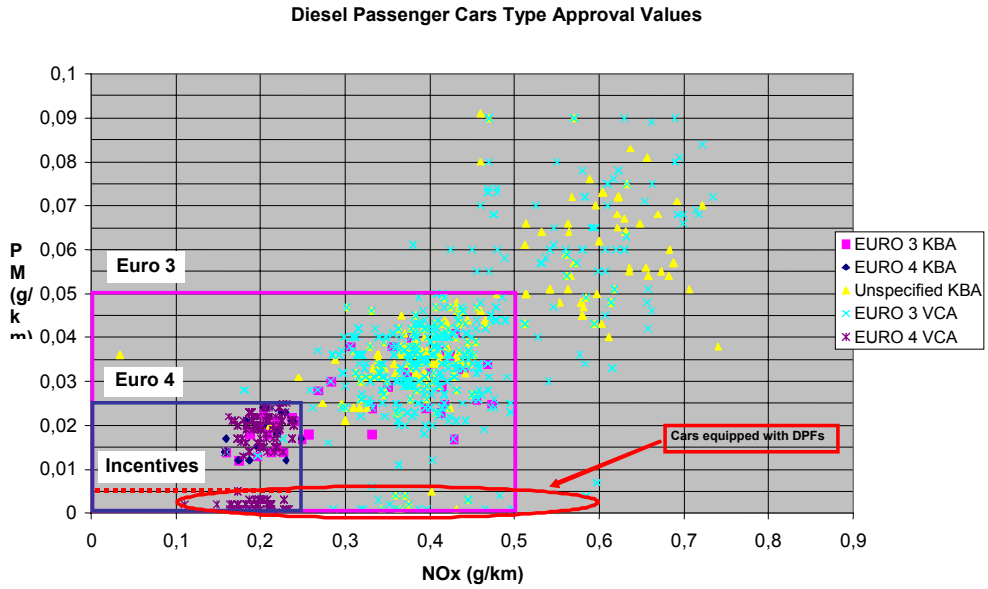
[12] Commission Staff Working Paper: Fiscal incentives for motor vehicles in advance of Euro 5, SEC(2005) 43, 12.1.2005

[13] The Commission plans to upgrade the particulate measurement procedure once work of the Particulate Measurement Programme at the UN-ECE has been completed.

recent years and which was to a large degree due to an increasing market share of diesel vehicles would then be at risk.

Figure 1 shows type approval values of diesel passenger cars in early 2005 and it can be seen that most Euro 4 compliant vehicles are clustered towards the upper right hand corner of the allowable emission limits. It shows that virtually no cars have been type-approved with a NOx value of less than 150 mg/km. Compared to the distribution of type-approval values of petrol vehicles seen in Figure 2, the figures for diesel cars suggest a completely different situation whereby regulated emission limits are technology forcing, and there is a point where further reductions in emissions require fitting the vehicles with NOx after-treatment technology. Given the current distribution of type approval values for Euro 4 diesel vehicles and the feedback information received from stakeholders, a 200 mg/km NOx limit should be achievable without the need for after-treatment

Figure 1: Type approval values for diesel passenger cars in early 2005



The Commission services therefore decided to chose scenario G as it reduces the current emission limit value of 250 mg/km to 200 mg/km without requiring NO_x after-treatment, while at the same time ensuring a very significant reduction in the limit value for PM.

The cost of € 377 per diesel vehicle in scenario G is relatively high compared to Euro 4, but considerably lower than that of scenarios A and D which reduce NO_x further, but raise the cost to € 590 and € 499 per vehicle respectively. The additional costs associated with scenarios A and D would have an impact on the affordability of cars and risk reducing the demand for new diesel vehicles. A reduced affordability of such vehicles would result in vehicle owners keeping their existing vehicles longer. Thus the new vehicles risk not penetrating the market sufficiently fast, thus not reducing air pollution to the extent desirable. The choice of scenario G therefore seemed appropriate.

6.2.2. Development of Scenarios for Petrol Vehicles

Table 2 summarises the average cost per vehicle of all the petrol scenarios examined, weighted according to the projected composition of the new vehicle fleet in 2010. These figures have been deflated so that they are provided as 2005 costs.

Table 2: Sales weighted average cost per petrol vehicle (2005 prices)

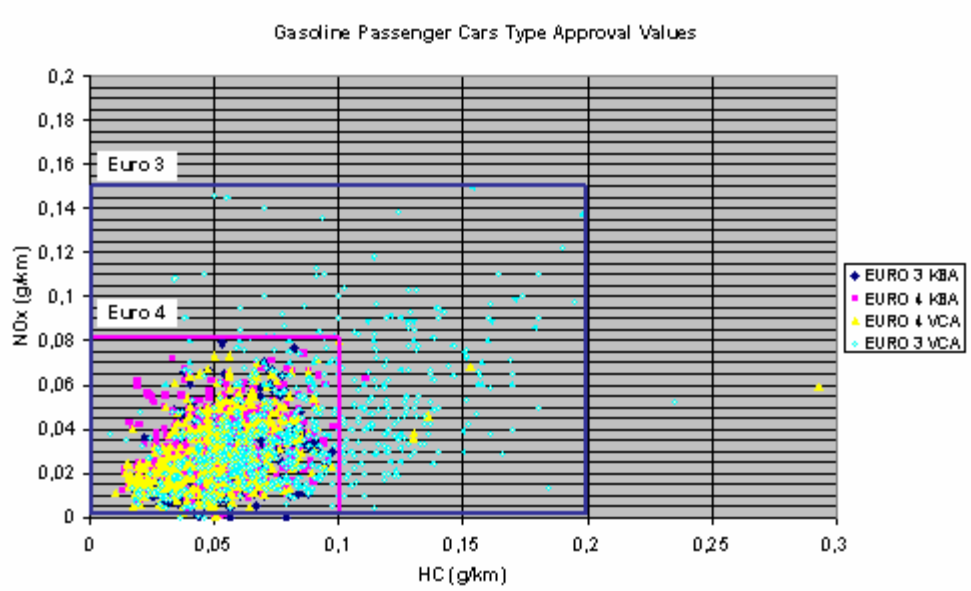
	Scenario H	**Scenario I**	**Scenario J**	**Scenario K**	**Scenario L**	**Scenario M**	**Euro 4**
HC	*50 mg/km*	*100 mg/km*	*75 mg/km*	*100 mg/km*	*100 mg/km*	*75 mg/km*	*100 mg/km*
NOx	*24 mg/km*	*24 mg/km*	*48 mg/km*	*48 mg/km*	*40 mg/km*	*60 mg/km*	*80 mg/km*
€	**105**	**105**	**82**	**82**	**82**	**51**	**0**

Source: Euro 5 technologies and costs for light duty vehicles – The expert panel's summary of stakeholder responses

These figures demonstrate that the costs projected for petrol cars are significantly lower than for diesel vehicles. The lower cost reflects the fact that the techniques used to reduce emissions from petrol vehicles are well established and that the necessary aftertreatment devices are already installed. With petrol vehicles some of the costs relate to upgrading the performance of the catalytic converter, though on some vehicles there may also be a need for improvements to the engine. The average costs take into consideration the situation with lean burn petrol engines which are forecast to have different abatement costs from standard petrol vehicles since the proposal introduces PM emission limit value for this type of vehicles. However, since these vehicles are anticipated to have a small market share, it is considered that such difference in abatement costs do not have a significant impact on the overall results.

Figure 2 shows the type approval values for Euro 3 and Euro 4 vehicles from the type approval authorities in two Member States. This chart highlights that many existing vehicles already comply with the scenarios set out for petrol vehicles. In part this is due to some vehicles being engineered to meet the stringent Californian regulations. However, the view of the panel was that over time, the cluster of type approval values are likely to shift up towards the limit values. This is due to manufacturers understanding more about the behaviour of their vehicles, so being able to ensure compliance at a lower cost by changing the specification of the emission control system and thus raising the emissions of their vehicles to areas close to the limit values.

Figure 2: Type approval values for petrol passenger cars, status early 2005



6.2.2.1. HC Emission Limits for Petrol Cars

The expert panel who analysed the responses concluded that for most petrol cars, it was unable to distinguish any noticeable difference in costs between scenarios J and K with HC emission limits staying the same (100 mg/km) or being reduced by 25% (75 mg/km). Similarly, the cost estimates for scenarios H and I were identical irrespective of whether HC emission limits stayed the same or were halved to 50 mg/km. Therefore for the scenarios reviewed, reductions in HC limits can be achieved at zero additional cost for

any given NO_x reduction. This result suggests that tightening of the HC limit should be considered when NO_x reductions are also under consideration.

6.2.2.2. NO_X Emission Limits for Petrol Cars

The Commission services decided to consider reductions of NO_x from petrol cars beyond the current Euro 4 standard because - as Table 2 shows - NOx can be reduced in petrol cars at relatively low cost.

In addition to issues associated with air pollution, Member States also have objectives to reduce emissions of greenhouse gases. A further rationale to seek NO_x reductions from petrol cars is to ensure that the price differential between more fuel efficient diesel, emitting less CO_2, and less efficient petrol vehicles does not widen excessively.

Given current type approval values (see Figure 2), a NO_x emission standard of 60 mg/km was selected as being the appropriate limit value (Scenario M). This limit value provides for additional emission reductions at relatively low cost to consumers (€ 51 per car).

6.3. Impacts of the Core Scenario

On the basis of the analysis of the individual scenarios for diesel and petrol vehicles described above, a core scenario for Euro 5 was defined. This scenario was:

- Diesel: 5 mg/km PM and 200 mg/km NO_x (scenario G above)
- Petrol: 75 mg/km HC and 60 mg/km NO_x (scenario M above)

This section includes an assessment of the environmental impacts, performed with the model TREMOVE, a policy assessment model developed by the European Commission to study the effects of different transport and environment policies on the emissions of the transport sector.

6.3.1. Impact on emissions and fuel consumption

The impact on pollutant emissions is set out in Table 3. The modelling suggests that the core scenario will result in large drops in emissions of PM from diesel vehicles. With NO_X, there will also be substantial reductions in emissions from both petrol and diesel vehicles. Under the core scenario about a quarter of the NO_x reductions are from petrol vehicles and three quarters from diesel vehicles.

Table 3: Impact on pollutant emissions

Exhaust emissions - All countries – 2020	**NOx**		**PM**		**HC**	
Difference with baseline	*tonne*	*%*	*tonne*	*%*	*tonne*	*%*
Diesel car	-62,000	-16%	-20,000	-70%	-520	-1.0%
Light duty commercial diesel	-42,000	-16%	-5,900	-52%	-210	-1.5%
Total diesel	**-104,000**	**-16%**	**-26,000**	**-65%**	**-730**	**-1.1%**

Petrol car	-28,000	-16%	60	0.3%	-30,000	-13%
Light commercial vehicle petrol	-2,400	-16%	110	5.0%	-1,300	-11%
Total petrol	**-31,000**	**-16%**	**170**	**0.8%**	**-31,000**	**-13%**
LPG car	**30**	**0.5%**	**3**	**0.6%**	**140**	**0.8%**
TOTAL	**-135,000**	**-16%**	**-26,000**	**-43%**	**-32,000**	**-9.7%**

Source: TREMOVE – figures do not sum due to rounding

A slight increase in the fuel consumption of diesel vehicles has been assumed in the modelling on the basis that vehicles with particulate filters use slightly more fuel. The core scenario suggests that total fuel consumption would increase by 0.3%. This is due to the increasing share of diesel vehicles in the baseline, which creates a multiplier effect. The increase in fuel consumption and subsequent CO_2 emissions is more important for N_1 vehicles, with a 0.8% increase by 2020. This result primarily reflects the greater market share of diesel engines in N_1 vehicles.

6.3.2. Contribution to the objectives of the Thematic Strategy for Air Pollution

The Commission adopted the Thematic Strategy on Air Pollution in September 2005[14] that set out objectives for reducing the negative impact of air pollution on human health and ecosystems. These objectives will be delivered in stages. A summary of these objectives in terms of the specific emission reduction requirements for $PM_{2.5}$, NO_x and HC by the main business sectors is shown in Table 4. The table also shows the contribution of the Euro 5 core scenario to this emission reduction.

It can be seen that the Euro 5 proposal is an important factor in achieving not only the overall objectives of the thematic strategy, but also the contribution which has been forecast from transport. The overall emission reduction due to Euro 5 represents slightly over:

- 10% of the overall required reduction of $PM_{2.5}$;
- 11% of the overall required reduction of NOx; and
- 5% of the total reduction in HC emissions required in 2020.

As Table 4 shows, this is an adequate contribution to attaining the objectives of the Thematic Strategy.

Table 4: Emission reductions of Euro 5 relative to the requirements of the Thematic Strategy on Air Pollution in 2020

	Reduction of primary emissions of $PM_{2.5}$ (kt)	**Reduction of emissions of NOx (kt)**	**Reduction of emissions of HC (kt)**

[14] Document COM(2005) 446 of 21.9.2005.

Power generation	22	128	0
Industry	100	706	660
Other	103	9	4
Transport[15]	26	388	0[16]
Total Thematic Strategy	**250**	**1,231**	**664**
Euro 5 Contribution	***26***	***134***	***32***

Sources: RAINS for all sectors; TREMOVE for Euro 5.

In terms of health effects, the analysis of the impact on air quality of the Euro 5 contribution to emission reduction, undertaken with RAINS, shows a significant increase of the quality of life by reducing illness and reduce mortality (see Table 5). It is estimated that some 20,500 life years would be saved in 2020 due to the introduction of Euro 5. This would be equivalent to a prevention of around 2,300 premature deaths every year across the EU. European productivity is estimated to benefit through reducing by almost 2 million the number of activity days that are lost through ill health caused by air pollution.

Table 5: Changes in Health Impacts Associated with Euro 5 in 2020

	Reduction	**Unit**	**Pollutant**
Acute Mortality (All ages)	275	Premature deaths	O_3
Chronic Mortality (30yr +)	2,300	Premature deaths	PM
Chronic Mortality (All ages)	20,600	Life years lost	PM
Restricted Activity Days (RADs 15-64yr)	1,850,000	Days	PM

Source: RAINS, Environment DG

6.3.3. Cost effectiveness of Euro 5 relative to other sectors

As described in the impact assessment of the Thematic Strategy on Air Pollution (Section 5.5.3. Road Transport), it is important to examine to what extent Euro 5 would compare with measures in other sectors. For this purpose, a special scenario was analysed in the RAINS integrated assessment model. The interim objectives up to 2020 of the Thematic Strategy on Air Pollution were maintained and a specific model run was made to estimate the cost of the strategy if no road measures were taken (Table 6).

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15 The RAINS model included emission reductions for diesel passenger cars and light duty vehicles assuming that they would be mandatory from 2010 onwards and would reduce both particulate matter and NO_X emissions. For new heavy duty vehicles, the assumption was that tightened emission limit values would take effect from 2013 in all Member States. See Section 2.1 of CAFE Report #5: http://www.iiasa.ac.at/rains/CAFE_files/CAFE-C-full-march16.pdf

16 The RAINS model was only able to model emissions reductions from diesel cars, so no reductions from petrol vehicles were able to be forecast.

Table 6: Cost of reaching the Interim Objectives of the Thematic Strategy with and without transport measures

	Annual cost in 2020 (M€)
Cost to other sectors without road transport measures	7,629
Cost to other sectors with road transport measures	5,281
Additional cost to other sectors if no transport measures were taken	2,348

Source: RAINS

If no transport measures were implemented, other sectors would need to reduce emissions more. This would imply an additional annual cost for these sectors of € 2.35 billion in 2020. According to preliminary estimates, if additional measures in heavy duty vehicles were taken, they would generate an annual cost of € 0.78 billion. This would imply that, if Euro 5 were not adopted, but assuming that measures for heavy duty vehicles were taken, other sectors would need to undertake emission reduction measures costing annually € 1.57 billion.

The TREMOVE model estimated that the annual cost of implementing Euro 5 would be € 1.65 billion. This shows that cost of Euro 5 is around 5%[17] greater than the cost of measures in other sectors. The Commission services considers these differences small and within an appropriate uncertainty range (e.g. +/- 10%) for this kind of analysis.

Furthermore, it should be noted that according to the Systematic Review on Health Effects of Air Pollution (WHO 2004) specific efforts should be undertaken to reduce emissions from combustion sources emitting primary particulate matter[18]. Thus, the Commission services conclude that the cost-effectiveness of Euro 5 is comparable with measures that would be undertaken in other sectors.

6.4. Impact of other measures

In addition to the options for reducing emission limits there are a number of additional aspects that have been considered as part of the proposal. These measures contribute to the policy objectives of the proposal, i.e. ensuring the proper functioning of the internal market while providing for a high level of environmental protection.

6.4.1. Particulate emission limits for lean-burn petrol direct injection vehicles

The proposal includes the introduction of a particulate matter emission limit of 5 mg/km for lean-burn petrol direct injection vehicles. Particulates from petrol vehicles are

[17] See the Figure 18 of the Impact Assessment of the Thematic Strategy on Air Pollution SEC(2005) 1133.

[18] See p. 11 of "Health aspects of air pollution results from the WHO project "Systematic review of health aspects of air pollution in Europe". WHO 2004 available at http://europa.eu.int/comm/environment/air/cafe/activities/pdf/e83080.pdf

currently unregulated in the EU. Since there is a concern about the health effects of particulate matter and lean-burn engines produce high levels of particulates, the PM emissions should be regulated.

At present, petrol lean-burn engine technology is not widespread with only a few vehicles available on the market. However, forecasts that were developed for the market share of the technology over the coming years suggest that by 2015, up to 10% of petrol cars will use such engines.

Particulate emissions from lean-burn petrol engines are lower than from diesels without after-treatment but are significantly higher than from those fitted with filters. Particulate emissions from lean-burn petrol engines are also much higher than petrol engines that operate stoichiometrically. Test results on currently available lean-burn vehicles suggest that there is some variation in the levels of particulate emissions produced by such vehicles, ranging from about 3 to 8 mg/km.

Results from the stakeholder consultation have suggested that manufacturers would not seek to use particulate filters for lean-burn petrol engines to meet a particulate matter standard. Particulate matter abatement would be achieved through engine management and therefore would imply reasonable costs.

Moreover, the 5 mg/km limit proposed in Euro 5 for lean-burn petrol vehicles is in line with those in other countries. Making international comparisons on emission limits is difficult due to differences in test procedures. However, the proposed standard of 5 mg/km is the same level as the new Japanese standard that is due to enter into force by 2009 and similar to the standard used in the United States since 2004 of 6.5 mg/km (10 mg/mile).

6.4.2. Regulating the number of particulates emitted

The proposal indicates that as soon as the results of the UN/ECE Particulate Measurement Programme are going to be available, a PM number standard will be introduced. The standards would be set so that they broadly correlate with the petrol and diesel mass standards of the current proposal.

The existing regulation focuses on the total mass of particulate that is emitted. However there is serious concern about the health effects of ultra fine particulates (of very low mass). The main issues with ultra fine particles are summarised in Box 1.

Box 1: The importance of controlling emissions of ultra fine particles

Discussion on particulate pollution frequently focuses on impacts from two different size thresholds, these are all particles below 10µm (PM 10) and a subset of those which are smaller than 2.5µm (PM 2.5). Diesel exhaust particles are considerably smaller than 2.5µm and thus contribute to both statistics. In addition, concerns have been raised about the health impact of ultra fine particles (commonly defined as those below 0.1µm). For example:

- Wichmann (2003) reports that the limited numbers of available studies suggest that ultra fine particles do have health impacts beyond those of fine particles.

- The study on Health Effects of Air Pollution on Susceptible Subpopulations (HEAPSS) study reported that particle number concentration and CO, both originating from traffic and other combustion processes, were the pollutants most strongly associated with all the health effects considered (HEAPSS 2004).

In addition to effects on the function of the lungs and blood circulation, more recent evidence also points to a penetration of ultra fine particles into nerve tissue including the brain (see e.g. Oberdörster et al. 2005).

The Scientific Committee on Health and Environmental Risks (SCHER) of DG Health and Consumer Protection of the European Commission has stated in its opinion[19] that there is increasing epidemiological evidence that PM 2.5 may be related to adverse health effects especially in susceptible populations and vulnerable groups. An unambiguous threshold for PM 2.5 dose has not yet been established and it appears to depend on the health effect endpoint, populations and vulnerability.

The scientific evidence suggests that limiting emissions of ultra fine particles is especially important to health.

The much reduced particulate emission limits which the Euro 5 proposal is considering will most likely be met by the use of diesel particulate filters. Current technological solutions use wall flow (or 'closed') filters which are effective at reducing emissions of all types of particles including the ultra-fine. Other filter technology also exists that operates on 'open' principles. These filters are effective at removing most of the mass of particulates from the exhaust stream, but may not result in significant reduction in the ultra-fine particulates. As development of filters continues it is possible that greater use will be made of open filters to reduce the mass of particulates. This would lead to a situation where high emission levels of ultra-fine particles continue to be created.

The use of a particle number standard is a means to ensure that emissions of ultra fine particles are controlled and that developments in filter technology continue to focus on the removal of ultra fine particles. Present test procedures set down in European legislation do not include a method for measuring particle number. Therefore a new procedure would be required to be adopted if such an emission standard were to be introduced. Work on developing and testing a new measurement protocol for both particulate mass and number has been taking place at the United Nations Economic Commission for Europe (UN-ECE) under the World Forum for Harmonisation of Vehicle Regulations (WP 29) in Geneva. Once this work is complete, the new standard shall be implemented into European legislation.

Introducing a new test procedure introduces costs to industry and testing facilities in adapting their practices. However as a number of laboratories are involved in the work piloting the procedures, some of the costs have already been incurred. Furthermore, introduction of the new procedure would be for a wider set of factors rather than simply the purposes of particulate number counting. The key reason for the development of the test procedure was to find a method of measuring particulate mass that was more reliable in providing repeatable results at low emission limits. Therefore there are good reasons

[19] Scientific Committee on Health and Environmental Risks (SCHER): Opinion on "New evidence of air pollution effects on human health and the environment", 18 March 2005, http://europa.eu.int/comm/health/ph_risk/committees/04_scher/docs/scher_o_009.pdf

for introduction of most of the measurement methodology to improve the accuracy of particulate mass measurement, irrespective of whether the number measurement component is used.

Consequently, measuring the number of particulates instead of their mass could be considered as a more effective means of regulation in the future.

6.4.3. Durability requirements

For the time being, existing regulations require manufacturers to confirm the durability of pollution control devices in light duty vehicles for 80,000 km. The proposal includes the extension of this durability period from 80,000 km to 160,000 km. The period would more realistically reflect the actual life of vehicles and ensure that emission control systems continue to function throughout the life of the vehicle.

Given the average life of vehicles across the EU is in the order of 13 years[20] and the average distance travelled is at least 13,000 km per year, cars sold in Europe will cover a distance of around 170,000 km in their lifetime. The current durability requirement extends to only half of the distance travelled in the life of a vehicle, therefore this figure has been reviewed.

Extending the durability requirements would therefore be in line with the principle of ensuring that a vehicle continues to produce low emissions for its entire lifetime. Similar principles apply in other parts of the world. In the United States, emission standards are now set for 192,000 km (120,000 miles). California has gone further and now provides incentives to manufacturers for certifying the emissions performance of their vehicles to 240,000 km (150,000 miles).

At present, there are two ways in which manufacturers demonstrate the durability requirement:

- Manufacturers can test for durability using either operation on track, road, or on a chassis dynamometer using a defined test protocol; or

- A manufacturer may choose to apply standardised deterioration factors to the measured emissions limit. The factors vary for petrol and diesel vehicles and for some pollutants. They reflect the general changes in performance that can be expected over time of standard emission control technologies.

The vast majority of manufacturers make use of the second approach as this avoids the need for extensive testing. Thus, changing the durability requirements to 160,000 km will not impose any significant testing costs on manufacturers as they would apply an amended set of deterioration factors. It does not appear that this requirement as such imposes significant costs on manufacturers, as aftertreatment devices are designed to function for such distances without the need for replacement.

[20] FEBELAUTO Rapport Annuel, 2004.

6.4.4. Removal of the exemption enabling heavy passenger vehicles to use emission standards of light commercial vehicles.

Existing emission standards have enabled passenger vehicles (Category M_1) with a maximum mass of over 2,500 kg to meet the less stringent emission standards set for light commercial vehicles (Category N_1, Class II and III). This exemption is seen to favour the largest vehicles on the road as it applies to the heaviest cars and sport utility vehicles (SUVs). Since there is no longer seen to be any justification for this exemption, the proposal removes it.

There has already been action in other major markets to remove exemptions to emission limits that may benefit the largest vehicles. For example, the California LEV 2 and the US EPA's Tier 2 standards, which have been phased in from 2004, introduced the same set of emission limit for all vehicles with a maximum weight of up to 3864 kg (8 500 lbs).

For heavy petrol vehicles, the removal of the exemption will have little perceived impact on the costs to manufacturers. Indeed there are very few vehicles type approved at the higher limit. Large petrol vehicles of this type manufactured in the EU are likely to be engineered for export to markets such as the US. They typically have low emissions so that they can be sold in those States which use the more stringent Californian regulations. Indeed many such luxury cars already meet today the standards that could be required for Euro 5.

The impact will be more significant for diesel vehicles that are not usually exported. A key constraint will be the requirement to meet the lower NO_x emission limits required for passenger cars. For some vehicles it is possible that some form of light NO_x after-treatment may be required to successfully bring emissions down to the required emissions limit. There may be some advantages to introducing NO_x after-treatment in a small number of vehicles first, in order to stimulate the further development of this technology. As the vehicles are usually high cost relative to the average vehicle fleet, additional after-treatment costs are easier to absorb in the retail price. However there are other views in the industry[21] that further NO_X reductions below Euro 4 limits can be achieved by use of DPFs and internal engine measures such as lower compression ratios, better control systems and advanced exhaust gas recirculation (EGR). It is therefore quite possible that a harmonised NO_X limit for M_1 vehicles will not result in after-treatment being specified.

Vehicles that are currently type approved[22] in this category include larger diesel minivans and also diesel SUVs. In addition there are vehicles such as London Taxis and van-derived minibuses. Many of these vehicles are types which may be attractive for manufacturers to export in a diesel form to the United States. Lower NO_X emission limits for these vehicles in the EU may support the development of cleaner versions of these engines so provide greater economies of scale for manufacturers if they were to develop variants for the US.

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21 http://www.eere.energy.gov/vehiclesandfuels/pdfs/deer_2004/session9/2004_deer_greaney.pdf

22 Euro 3 vehicles from the VCA database.

6.4.5. Access to vehicle repair information

The proposal requires the provision of vehicle repair information through websites in accordance with the specifications developed through the OASIS Technical Committee which the Commission chaired, in order to ensure access to this information for all service and repair operators, whether independent or within the supplier's distribution system.

The obligation to provide this information already existed; the provisions in this proposal constitute the details necessary for that obligation to be implemented in practice. The Block Exemption Regulation imposed a general requirement that motor vehicle suppliers provide all operators, whether independent or within the supplier's distribution system, access to the necessary information for repair and service of vehicles, but without further details of the method through which this obligation would be implemented. The legislation that set Euro 3 and 4 emissions standards (Directive 98/69/EC) noted the need for unrestricted and standardised access to repair information, in particular related to on-board diagnostic systems and the diagnosing, service and repair of vehicles. That Directive required the Commission to report on a standard electronic format for repair information by the year 2000, but international technical co-operation on this front proved difficult and ultimately was only possible through OASIS.

A standardised format for making such information available through websites has been developed by a technical committee of stakeholders under the aegis of the OASIS consortium. Other attempts at developing international standards in this area have been unsuccessful. Access to this information, which forms a vital part of testing and monitoring emissions performance, has proved highly variable across the internal market.[23] Indeed, it is likely that access to this information will only prove more difficult and more variable due to the increasing complexity of electronic systems incorporated in vehicles, which creates the knock-on effects of requiring more specialised tools and further specialised knowledge in order to perform repairs and maintenance which might previously have been non-existent or routine.

The principle of non-discriminatory access to this information for both authorised dealers and those outside the supplier's distribution chain was already established in the legislation mentioned above, so no additional burden on manufacturers is being created. The provisions in this proposal do not require manufacturers to create new webpages nor do they require the creation of repair information in a new format for existing vehicles (*i.e.,* there is no retrospective obligation). The effect of the proposed measures is only to require manufacturers to 'meta-tag' the information on their web pages Similar requirements to those proposed here have already been in operation in the United States, where fees appear to be reasonable and vary with the length of time for which access is required. The impact of this measure on manufacturers is likely to be cost-neutral as they will be able to charge reasonable and proportionate fees for access to the information.

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[23] See study COMP/F-2/2003/26/S12.371920 performed by the Institut für Kraftfahrwesen Aachen, October 2004, which examined access to repair information for nine major car manufacturers and seven major truck manufacturers across eight Member States.

The benefits of the proposal are manifest. The proper flow of this information should create beneficial competition in the sector which will give consumers greater and freer choice of when and where to repair their vehicles. Access to this information in a reasonable and non-discriminatory manner is not only useful for routine maintenance, but can be crucial for motorists in more isolated or remote areas where there may be no choice of repairer, or when travelling from an area where one marque of vehicle may be common to an area where that is not the case.

Access on reasonable terms to this information for small and medium-sized enterprises in the sector is vital as they cannot afford the myriad specialised tools and dedicated information services available to a distributor. Roadside assistance organisations, which need access to repair information in order to perform even simple tasks such as helping motorists with battery replacement, will benefit and in turn will be able to provide the service expected of them by motorists in difficulties. Expected benefits of the proposal will therefore exceed any incurred costs for manufacturers to make any changes required and they will be able to recoup those costs through charges for the information.

6.5. Preferred Option

The preferred policy option is the 'Regulatory approach', which means further regulation of vehicle emission limits. This is seen as an essential means of sustaining a single market for vehicles and providing for better air quality in Europe, while safeguarding the affordability of vehicles at the same time. Taking into account the need for striking the balance between higher environmental standards and the continued affordability of cars for the consumers, the following emission limit values are proposed for diesel and petrol vehicles, which result in a significant overall reduction of pollutants.

6.5.1. Diesel Emission Limits

- 5 mg/km emission limit value for PM

The 5 mg/km limit was selected for a number of reasons:

- It constitutes a significant reduction in particulate matter emitted.
- It has the advantage of being in line with the level at which Member States are currently setting fiscal incentives for vehicles with low PM emissions. –
- It is in line with future Japanese standards and slightly more ambitious than the present US standard.
- In addition, the 5 mg/km limit is in line with the standards proposed for lean-burn petrol vehicles.

- 200 mg/km emission limit value for NO_X

The reasons for selecting this emission limit value are as follows:

- It is the lowest limit that can be achieved without requiring the installation of a NO_X after-treatment device on most of the vehicles.
- The pace of replacement of older, more polluting vehicles is crucial for improving the air quality. The proposal already specifies a PM limit value that would necessitate the installation of a particulate filter.

- Any lower NOx limit would require the additional installation of a NO_X after-treatment device and would imply a considerable increase in costs that could slow down the turnover of the existing fleet.
- A relatively higher increase in the price of a diesel vehicle might result in a shift of the demand from diesel vehicles towards petrol cars.
- The lower share of diesel vehicles would have a negative effect on the reduction of greenhouse gases, as petrol vehicles emit considerably more CO_2 than diesel vehicles.
- The improvement in CO_2 emissions that Europe has seen in recent years and which was to a large degree due to an increasing market share of diesel vehicles. Substantial changes in the current balance between petrol and diesel vehicles would then risk the reductions in CO_2 emissions that have occurred so far..

6.5.2. Petrol Emission Limits

The impact assessment has shown that further tightening of the emission limits for petrol vehicles is justified. Reducing emissions further can be simply achieved through better optimising the after-treatment system – which is a longstanding and well proven technology. The impact assessment shows that a HC emission limit value of 75 mg/km and a NO_X value of 60 mg/km is the most cost-effective scenario for petrol vehicles.

- 75 mg/km emission limit value for HC

- The information provided by stakeholders suggested that there was no cost difference between keeping the limit value at 100 mg/km and reducing it to 75 mg/km.
- However, further reduction of the limit would impose higher costs.

- 60 mg/km emission limit value for NO_X

A NO_X limit value of 60 mg/km was selected for the following reasons:

- It provides for a high level of environmental protection.
- It ensures the affordability of vehicles for the consumers. This way, the turnover rate of the existing fleet can be maintained and therefore, the improvement of air quality is ensured.
- It is closer to the US Federal standards[24] than the existing Euro 4 limit of 80 mg/km.
- Introducing a particulate emission limit for lean-burn petrol vehicles is also contributing to lowering the emission of pollutants.

6.5.3. Additional requirements

The additional aspects of the proposal ensure that the overall emission of road transport is reduced. For instance, the extension of the durability requirements provides for a stable environmental performance of the vehicles throughout a much longer period of their actual life without imposing a significant cost on manufacturers. The manufacturers could make sure that the vehicles do not exceed the specified limit values during their lifespan by better engineering techniques. The removal of the exemption enabling heavy passenger vehicles to use emission standards of light commercial vehicles also supports

[24] The US Federal standard foresees a fleet average of 43 mg/km, though on a different test cycle.

the overall reduction of emission of pollutants. Furthermore, the introduction of a particulate number standard will reduce the risk that open filters are specified in the future as engine and filter technology develops.

7. MONITORING AND EVALUATION

7.1. Indicators of progress towards meeting the objectives

The key mechanism by which the proposed Regulation will take effect is through the vehicle type-approval process. Vehicle manufacturers will need to demonstrate that vehicles comply with – amongst other things – the emission limit requirements in order to receive a type-approval certificate. The core indicators of progress will therefore be the number of vehicles which are successfully type-approved to the Euro 5 standard.

7.2. Monitoring and evaluation

Monitoring of the effect of the Regulation is effectively undertaken by type approval authorities who oversee in-use compliance processes to ensure that requirements of the Regulation are met. More generally, monitoring data on air pollution levels and epidemiology on health impacts will point to the wider success of the policy.

ANNEX 1: PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

Consultation and expertise

In developing the proposal the Commission services have both consulted stakeholders and drawn on external expertise in a number of ways:

- There was consultation with the Motor Vehicles Emissions Group. This is an expert stakeholder working group responsible for supporting the regulatory processes of the Commission on emission related issues. A broad range of interested parties is involved in the work of this group: national authorities, vehicle manufacturers, component suppliers, industry associations and non-governmental organisations.

- A questionnaire was sent to stakeholders in February 2004 on possible scenarios of new Euro 5 emission limit values for passenger cars and light-duty vehicles. The questionnaire aimed at gathering views of stakeholders as to the required technology and associated costs of meeting various limit value scenarios. The Commission services consulted a wide spectrum of interested organisations through the questionnaire: national authorities, vehicle manufacturers, component suppliers, industry associations and non-governmental organisations.

- An expert panel of consultants was engaged to assess stakeholder responses to the questionnaires sent out by the Commission services in February 2004 on new Euro 5 emission limit values for passenger cars and light-duty vehicles. The panel was composed of three independent professionals, whose task was to assess and validate the stakeholder responses on various emission reduction scenarios and on costs of necessary technology. The results of the work of the expert panel were reported to the Commission services.

- To understand more fully the results of the questionnaire, the expert panel organised a number of targeted stakeholder meetings towards the end of 2004 to generate additional data on technology performance and related costs.

- There were presentations to key stakeholders in early 2005 on the results of the work, carried out by the expert panel. The panel produced a technology map and a cost range of meeting the various emission reduction scenarios.

- The Euro 5 proposal was developed at the same time as the Commission's thematic strategy for air pollution (CAFE Programme). Stakeholders were actively engaged in the discussion of this programme.

- Modelling of environmental and economic impacts was undertaken to understand the cost-effectiveness of different emission limit scenarios using the analytical tools developed under the CAFE Programme were used to model the impacts of different emission limit levels.

- Key elements of the draft proposal were presented to the CARS 21 High Level and Sherpa group, giving stakeholders an early opportunity to comment on new Euro 5 emission limit values.

- The draft proposal of the Euro 5 Regulation was put to public consultation in July 2005. The Commission services aimed to gather the views of all interested parties on the Commission services' draft and to take into consideration all relevant comments of stakeholders in its proposal.

- The provisions on access to repair information were developed from the start through a stakeholders technical committee chaired by the Commission and working intensively over a substantial period of time. The only point on which agreement was not reached during the work of that Committee was the issue of cost, which has been addressed in this proposal by allowing costs to be recouped and by imposing no retrospective obligation.

The Commission's standards for consultation of interested parties[25] were met throughout the consultation procedure.

Issues raised during the consultation

A total of 50 replies were received to the request for comments. Of these the breakdown by source is as follows:

- Governmental organisations 11
- Industry and business organisations 23
- NGOs, consumer and professional groups 13
- Individuals 3

During the consultation, a number of issues were raised by stakeholders. This section summarises the substantive issues raised and discusses how they have been taken into consideration.

1. Date of entry into force of the regulation

Some stakeholders wanted the Regulation to come into effect in 2010. Others said that a 2008 implementation date was necessary for air quality reasons. If a rolling implementation date were to be introduced, many industry stakeholders considered that application of the regulation should come into effect either 24 or 36 months after entry into force, rather than the 18 months currently proposed.

There was not much support for the proposed 18 month gap between the regulation applying to new type approvals and then all types, with a preference being expressed for a 12 month gap.

There was considerable variation on the viewpoints as to when the Regulation should come into effect. Some Member States, a number of public authorities and NGOs wanted early introduction for reasons of public health and air quality. There was great concern over the ability of some Member States to meet statutory air quality objectives for NO_X and PM. Industry generally favoured later introduction in order to plan production effectively.

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[25] COM(2002) 704, 11.12.2002.

The formulation used in the preliminary draft proposal will result in fixed entry into force dates, once the Regulation is adopted by the Commission. The formulation proposed is in line with other European legislation and can be seen to represent good regulatory practice. The original proposal by the Commission services seems to be a compromise between these opposing viewpoints, so there is no clear reason to change the proposal at this stage.

2. Dates of entry into force for light commercial vehicles

A number of stakeholders requested the addition of the approach used in Euro 3 and 4, where there had been a 1 year delay in application to heavier light commercial vehicles (N_1, Class 2 and 3) and heavy passenger cars (M_1 vehicles over 2.5 tonnes). It was pointed out that bringing the dates forward as set in the draft regulation reduced product cycles from 5 years to 3 years for these vehicles.

In relation to N_1 vehicles, the Commission services sees some merit in the comments made that the system currently in place which provides for a 1 year delay in implementation should be maintained to respect product cycles. The proposal has therefore been amended accordingly.

However with heavy M_1 vehicles, the Commission services considers that the additional 1 year delay allowed under previous legislation is still no longer justified. Many of these vehicles are derived from cars, so these vehicles should be treated in the same manner as lighter M_1 vehicles, even if this means that product lifecycles anticipated by manufacturers will now need to be 1 year shorter.

3. NO_X emission limits for diesel vehicles

There were a number of stakeholders who considered that the proposed NOx emission limit of 200 mg/km was too high and that lower limits of 150 mg/km or 125 mg/km should be adopted instead.

The rationale for the selection of the 200 mg/km emission limit is to avoid the need for after-treatment, given that otherwise there would be two additional aftertreatment systems on diesel cars, a particulate filter and a NO_x catalyst. Moreover the price of the vehicle would considerably increase. The proposal to harmonise emission limits for all M_1 vehicles, will still drive the development of technology used in diesel engines as the heavy vehicles will require higher reduction in NO_X emissions than lighter M_1 vehicles.

4. NO_2 limit for diesel vehicles

A number of stakeholders suggested that in addition to regulating total NO_X emissions from vehicles, there should be restrictions on the total proportion of NO_X that could comprise NO_2. There were concerns that even with lower emission limits for NO_X the amount of NO_2 that diesel vehicles were emitting was increasing, due partly to the nature of aftertreatment technology.

NO_2 is the pollutant which is regulated in European air quality legislation. The importance of this issue will increase with the introduction of the NO_2 limit value coming into force in 2010. At present there is not enough data available to justify changing the nature of emissions

regulations so that they focus on the NO_2 component of NO_X in addition to NO_X in general. This is an issue that will need to be kept under review going forward.

5. Euro 6 emissions limit

A number of stakeholders considered it important to provide a longer term perspective as to how emission limits would develop in the future. A particular issue related to NO_X emissions from diesel cars and the need to indicate future emission limits in order to provide long term signals to industry and facilitate the development of NO_X reduction technologies in diesel vehicles.

The work that has taken place in developing the Euro 5 proposal has focussed on evaluating the next stage of emissions regulation. It has been based on a review of the cost-effectiveness of currently available technology that would be applicable over the next few years. Overall the work undertaken has not set out to predict how vehicle technology will develop in the future. Therefore it is not considered appropriate to set longer term emissions standards at this point in time. Development of a 'Euro 6' standard will require a further round of data collection and analysis in order to develop an appropriate impact assessment that could justify any regulatory proposal.

However, if the Commission services were to consider NOx reductions at a later stage, it is likely that the priority will be to reduce emissions from buses and trucks (in the Euro VI proposal for heavy-duty vehicles that is under preparation) rather than from passenger cars.

6. Particle emission limits from diesel vehicles

There were a number of comments that the 5 mg/km emissions limit was too high and that a lower limit of 2.5 mg/km would be appropriate. In addition it was observed that the proposed limits for Light Commercial Vehicles (Class 2 and Class 3) were too high to ensure that particulate filters would be fitted.

At current levels of technology, the 5 mg/km emission standard would require the specification of diesel particulate filters, therefore setting the emissions standard at a lower level would not bring about any additional environmental benefit, but would increase the complexity and burden of the type approval process. It is therefore considered both unnecessary and inappropriate to introduce a lower particulate emission limit. As is discussed in the impact assessment, the introduction of a particulate number standard will be an effective means of ensuring that 'closed' as opposed to 'open' particulate traps are specified.

The draft particulate emission standards for Light Commercial Vehicles (LCV) were developed through applying the multipliers that have previously been used to differentiate LCV particulate emission limits from those applied to passenger cars. With the introduction of low emission limits that will require the introduction of particulate filters, the relationships which have existed before between the size of vehicle and the particulate emissions can no longer be justified. It is therefore considered appropriate to revise the draft limit values at this stage to reflect progress in technology. Therefore the proposal was amended to require a 5 mg/km emission limit for particulates across all vehicle categories.

7. PM mass measurement and number standard

A number of industry stakeholders commented that a change in measurement procedure was an unnecessary expense. In addition they considered that the introduction of a number standard was unnecessary due to a correlation between number counts and mass emissions. Furthermore, it was considered by some that the use of the new measurement procedure would require carrying out a large correlation study before it could be adopted.

Given the level of concern about the effect of particulate emissions on health, it is appropriate that the Commission services considers whether existing test procedures and emission standards continue to be acceptable. The repeatability of the current test procedure is problematic when measuring low levels of emissions; therefore there are questions as to whether it represents an effective tool for regulatory policy. Changing the procedure in order to overcome these issues is therefore well justified. It is considered that the finalisation of the PMP programme will result in an adequate test procedure being developed.

As discussed in the impact assessment, the introduction of a number standard is important in order to ensure that closed particulate traps are installed on vehicles. It is also a concern that the correlation between mass standards and number standards is abatement technology specific, so the correlation only exists when a particular type of aftertreatment is used. Some experts consider that from an air quality perspective, regulation based on number of particles is a much better method than a mass based approach.

8. Petrol NO_X limit

A number of stakeholders commented that reducing NO_X levels for petrol vehicles would be problematic for direct injection vehicles, or would prevent future standards being developed that were fuel neutral. However, other stakeholders considered that petrol NOx emission limits should be reduced further, so they aligned to standards used in the United States.

The impact assessment work has explicitly addressed the issues associated with direct injection vehicles. Therefore the cost of these vehicles meeting lower limits has been included in the modelling.

The Commission services does not consider that it is yet appropriate in Euro 5 to discuss setting a fuel neutral standard for light duty vehicles, as it is not clear that such an approach is yet cost effective. Even if such an approach were to be adopted at some point in the future, there is little evidence at present that suggests diesel vehicles would be unable to achieve a NO_X limit of 60 mg/km if appropriate after-treatment were installed. For example, the US Tier 2, Bin 5 standard is a stated target for diesel manufacturers, partly because this limit also corresponds with the maximum emission limit allowed in the States which apply Californian standards. It sets a NO_X limit of around 32 mg/km but is measured on a different test cycle, so is not directly comparable. Retaining the petrol NO_X limit at 80 mg/km would create even more problems in Member States that have difficulties in meeting their air quality objectives.

Lowering the standards further beyond 60 mg/km has not been considered appropriate given the additional costs that it would impose on industry. In Europe, a maximum emission standard is in place, whilst in the United States, a different ('bin') system is used where the key features are a fleet average (43 mg/km NO_X under the Federal System) and a maximum limit (124 mg/km NO_X under the Federal system). Although these limit values are not directly

comparable due to differences in test cycles, the US system shows that some high emission vehicles are permitted. Therefore in some ways, the European limits are equivalent to the limits used in the US. They are also similar to the limits used in Japan, where there is a mean limit of 50 mg/km and a maximum limit of 80 mg/km, again measured on different test cycles.

9. Spark ignition engine HC standards and gas vehicles

A few consultation responses suggested the proposed hydrocarbon standards for spark ignition engines should be redefined as this would cause issues for vehicles which used CNG and LPG. Such engines emit higher levels of methane than those fuelled on petrol so meeting a lower emission limit based on Total Hydrocarbons (THC) would be difficult. A shift to an emission limit based on Non-Methane Hydrocarbons (NMHC) was proposed.

At the present point in time, the Commission services has not seen any data to show that a shift to a limit value based on NMHC would be beneficial. Therefore it is not proposed at present to make any changes to the regulation on this point.

10. PM limit for lean-burn direct injection petrol engines

A number of stakeholders were concerned that the PM limit for lean-burn petrol engines was set too high and should be further reduced to 2.5 mg/km. On the other hand others said that it should be removed in totality as it would require particulate filters to be fitted.

The PM limit for lean-burn direct injection petrol cars has been carefully selected so as to enable the technology to develop without the need for any form of particulate filter to be installed. From the data collected in the impact assessment, manufacturers stated that filter technology would not be used in such petrol powered vehicles. However, further lowering the emission limit to 2.5 mg/km risks limiting the further development of the technology. Therefore the Commission services does not see any reason to change this aspect of the draft proposal.

11. Removal of the exemption that enabled heavy passenger cars to be type approved as light commercial vehicles

Industry stakeholders proposed that the exemption for M_1 vehicles over 2.5 tonnes weight should be replaced with new exemptions for off-road vehicles, those with 7 or more seats and special purpose vehicles such as motor caravans.

As this impact assessment has discussed, it is considered that there is little justification for these types of vehicles to continue to benefit from less stringent emissions standards. Introduction of all the exemptions proposed would make deleting this exemption meaningless, as it seems that all vehicles that currently use this exemption fit into the categories outlined by industry. Therefore no further changes are considered necessary at this stage.

12. Changes in durability and in-use compliance provisions

Some stakeholders mentioned that changes in durability limits were not justified as they could be an additional burden on industry, and that further details of the requirements was necessary. Other stakeholders requested that durability requirements and in-use compliance

requirements should both be increased to 200,000 km in line with similar provisions in the United States. A number of stakeholders also requested an update of the In Use Compliance provisions and procedures.

Given the approach allowed in existing legislation to demonstrate durability through the use of deterioration factors, the Commission services considers that this requirement places very little additional burden on industry from a testing perspective. Requests for the limit to remain at 80,000 km for this reason have not therefore been considered as valid.

The requests from some stakeholders for similar changes in the distance requirements of the in use compliance regime would however create much higher cost for industry as this requires testing of a selection of vehicles which have covered the distance specified and have been maintained in an appropriate manner. Given the difficulty that manufacturers report having in obtaining suitable vehicles that have reached 100,000 km, it would not be appropriate to change this provision at this stage.

The Commission services's proposal for durability requirements for 160,000 km strikes a balance between the different interests. It provides a signal that it is important for good emissions performance to be sustained for the whole life of a vehicle, rather than for the shorter distances that have existed in legislation up to this point in time. Some stakeholders mentioned that in the future it may be appropriate to move to a system based more on in-use compliance (IUC) rather then durability. However, before such a system could be considered, it would be necessary to review the effectiveness of the IUC systems that are in place in Member States. At present, the durability test provides a useful mechanism for ensuring that emissions performance is sustained over the life of the vehicle.

With regard to changes to the IUC provisions, there will be scope within the work to update the technical Annexes to review whether the procedures in place should be modified.

13. Access to OBD information

Some stakeholders felt that the provisions relating to access to OBD service information in the draft Directive duplicated those in the Block Exemption Regulation and thus were not necessary, whilst others considered that the draft was far too weak and needed to be supplemented. In particular, the associations representing repairers argued that the provisions relating to access to repair information should be made more precise by referring to the OASIS standard.

The Commission services consider that additional action relating to access to OBD information is important for the development of a competitive automotive industry. The Euro 5 Regulation is considered as the appropriate mechanism for ensuring that access to information is available. Therefore amendments have been made to the draft Regulation to ensure that these issues are adequately addressed.

14. Changes to test procedures

It was highlighted by some stakeholders that the test procedures used to regulate emissions should be updated to better reflect real world driving conditions. The suggestion was that air quality had not improved at the rate that would be expected from the emission reductions that

had occurred in the past, due to limitations in the European test cycle. Test procedures should be amended to ensure off-cycle emissions are better controlled.

The recitals of the draft regulation explicitly mention that the Commission will keep all test procedures under review and that revisions may be necessary to ensure that real world emissions correspond to those measured at type approval. It is not considered appropriate at the stage of the Euro 5 proposal to introduce substantive changes to test procedures; this issue should be considered in the future.

15. Other emission limits

In addition to the reduction in the main tailpipe emission limits, some stakeholders also requested reductions in the emission limits for evaporative emissions and also the cold start tests for HC and CO. Furthermore, updating and review of the crankcase gases test procedure was requested.

The focus of the draft Euro 5 regulation has been on reducing emissions of NO_X and PM. Emissions of HC are also important as these, along with NO_X, are precursors of ozone pollution. It is therefore appropriate for the draft to consider primarily tailpipe emissions over the regulated test cycle. Further action on evaporative emissions, cold start limits and crankcase gas test procedures would require additional research to assess the extent of the issue and the cost-effectiveness of potential changes in limit values. Therefore all of these issues would be best addressed in any future review of emission limits and test procedures to assess the impact of changing the limits.

16. Transitional issues in the repeal of Directive 70/220/EEC

It was suggested that there would need to be careful consideration of how the transition from a Directive to a Regulation should be handled. In particular there were questions raised as to how In Use Compliance arrangements would operate for vehicles type-approved under the Euro 4 regulations.

The intention of the Commission services is that vehicles approved under Directive 70/220/EEC (as amended) will continue to be governed by that Directive after the introduction of the Euro 5 Regulation. The Commission services has therefore reviewed the wording in the draft Regulation to ensure that the transitional issues in moving from the legacy system to the new system are adequately taken into consideration.

17. Clarification of scope

There were requests for further clarification of the application of the Regulation to certain types of vehicles. For example, it was asked how the Regulation applied to gas vehicles as the limits referred to 'Petrol' and 'Diesel' vehicles, rather than positive ignition and compression ignition. It was also questioned whether separate standards should be developed for vehicles running biodiesel or ethanol. In addition, clarification was sought as to whether the regulation applied to more than M_1 and N_1 vehicles with positive ignition engines. For example whether the scope included petrol positive ignition buses and whether the emission limits should be limited to M_1 only and not cover all M vehicles.

The intention of the Regulation is to make a distinction between vehicles with positive ignition engines (e.g. petrol) and those with compression ignition engines (e.g. diesel). Gas vehicles would therefore fall into the positive ignition category. The Regulation has been amended to reflect this clarification.

In terms of biofuels, it is most likely that these will be blended in certain quantities into petrol and diesel and used in conventional petrol and diesel vehicles. At this stage of development of the supply of these fuels it is unnecessary to develop separate emission standards.

The scope of the Regulation is set out in Article 2 of the draft Regulation, this highlights that it applies to all vehicles equipped with positive ignition engines. A change has been made to clarify the situation with regard to gas vehicles.

The emission limits set out in Table 1 apply to all vehicles which are subject to the laboratory test that measures tailpipe emissions (Type 1 Test). This test is restricted to vehicles with a maximum mass of less than 3.5 tonnes due to the nature of the test equipment required. The emission limits for M vehicles thus apply to M_2 vehicles which are able to be type approved under this regulation and have a maximum mass below 3.5 tonnes. The designation on the table of M category vehicles is therefore correct.