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Annex to the

Proposal for a

**DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on the promotion of clean road transport vehicles**

IMPACT ASSESSMENT

{COM(2005) 634 final}

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COMMISSION STAFF WORKING DOCUMENT

Impact Assessment of the proposal for a Directive of the European Parliament and the Council on the promotion of clean and energy efficient road transport vehicles

1. EXECUTIVE SUMMARY

The objectives of the proposed Directive to increase the use of clean road transport vehicles is both to reduce pollutant emissions from road transport vehicles, and to broaden and promote the market for clean vehicles in order to support vehicle manufacturers' efforts to develop and offer such vehicles.

Two approaches for a legislative action have been developed and independently assessed. A technology oriented approach took as basis the selection of specific technologies. A technologically neutral approach considered the environmental performance of vehicles, including all technologies.

The Commission has undertaken broad consultations with stakeholders and Member States on possible measures to promote the development and market penetration of clean vehicles. The initiative for a legislative action on the promotion of clean vehicles has also been presented to the High Level Group of the CARS 21 group of Commission and industry. Support for the proposal of a procurement obligation for public bodies has been expressed in all stages of the consultation, with the recommendation to take a technology-neutral approach.

The results and conclusions of these assessments and consultations have led to the current proposal for a technology neutral approach based on environmental performances and on an existing emissions standard. Moreover, the high share of public procurement on the markets of heavy duty vehicles with weight over 3.5 t presents an important market force which could generate economies of scale effects.

The proposed Directive on the promotion of clean road transport vehicles requires the allocation of a certain quota (25%) of the annual procurements of vehicles over 3.5 t weight to clean vehicles. The selection criterion of clean and energy efficient vehicles is performance oriented and based on the Enhanced Environmentally friendly Vehicle (EEV) emission standard already defined in existing Community legislation. This covers all technologies, including conventional diesel and gasoline vehicles, as well as alternative technologies such as: biofuels, Compressed Natural Gas (CNG), Liquefied Petroleum Gas (LPG), hydrogen, electric vehicles and electric/combustion engine hybrid vehicles.

2. PROBLEM DEFINITION AND OBJECTIVES

2.1. Identification of the problem

Improving the health and welfare of the population within the EU and achieving long-term environmental sustainability are significant objectives for the EU authorities. The challenge is particularly acute in relation to the road transport sector, which emits significant quantities of CO₂ and pollutants harmful to the environment and human health. The continuing growth in the transport sector has also increased concerns about the economic costs of the energy supply as well as the impact on the environment. In the EU, the road transport sector is responsible for 26% of final energy consumption and 24% of CO₂ emissions. Energy use and emissions from the road transport sector continue to grow around 2% per year. Pollutant emissions from road transport contribute to a large extent to the poor air quality in many European cities where Community standards are not met.

The EU, on the other hand, is committed to an 8% reduction in greenhouse gas emissions by 2008-12 relative to 1990. The Sustainable Development Strategy acknowledges the need for a continued reduction in greenhouse gas emissions after the present Kyoto commitment period, extending to 2012. Recent estimates in a business-as-usual scenario reported in the 2001 White Paper “European Transport Policy for 2010: Time to Decide”, however, indicate that CO₂ emissions from transport will be 27% higher in 2010 than in 1998. The energy Green Paper published in 2000 “Towards a European Strategy for the Security of Energy Supply” also emphasised the need for improvements in energy supply to reduce dependence on oil. As supplies of oil decline and demand continues to grow, severe problems of shortage and increasing prices are likely to result. The recent price hike appears already as an early indication of the developments projected.

In order to address the problems of energy consumption and CO₂ emissions of the road transport sector, a number of EU policy actions have considered transport and energy issues such as:

- The Communication on the taxation of passenger cars, which calls for the use of differentiated taxes to encourage lower CO₂ emissions from passenger cars;
- The agreement on CO₂ emissions of cars;
- The Directive on labelling of CO₂ emissions of cars.

However, no EU legislation currently constrains energy consumption by individual vehicles.

EU legislation has successfully regulated vehicle emissions through “Euro” standards, with limit values tightening progressively over the years. The latest standards implemented are the new *Euro 4* standard for Heavy-Duty Vehicles and passenger cars which came into force in January 2005. A new *Euro 4* standard for Light-Duty Vehicles is also expected in 2006, and new, tighter limits are foreseen from October 2008 for Heavy Duty Vehicles.

The effect of these measures on pollution levels from transport has been significant. Emissions of the various regulated pollutants, on average, have fallen by 20 to 50% since 1995. By 2015 further reductions will reduce emissions to less than 20% of the level in 1995¹.

Despite this, many cities are still in breach of air quality standards, and emissions from road transport continue to be a significant contributing factor. In several European cities schemes that restrict the free circulation of vehicles have already been introduced in an attempt to address the problem.

In this context, technologies that reduce the energy consumption and the emission of pollutants of vehicles are becoming increasingly available. The wider use of these technologies is wished and may best be achieved by action at European level. The Commission therefore proposes a new legislative initiative to ensure the increased use of clean vehicles.

2.1. Objectives of the legislative initiative

The objectives of the proposed Directive are as follows:

- To reduce overall pollutant emissions and energy consumption by road transport vehicles;
- To broaden and promote the market for clean vehicles.

Creating a significant demand for clean vehicles would help the market for low emission vehicles mature and grow, and thus incentivise the production of new technologies and fuels, and assist industry by promoting economies of scales to reduce costs. Manufacturers would therefore be encouraged to further develop and promote clean vehicles, which could become competitive with traditional ones and increase their market share.

2.2. Justification for intervention at Community level

Improvements in conventional vehicles with petrol and diesel engines, and new technologies based on alternative fuel and innovative propulsion systems could make a significant contribution to tackle the problems of pollutant emissions and energy consumption. The potential for alternative fuels is recognised at the EU policy level, and the energy Green Paper and the transport White Paper have suggested that alternative fuels should have a 20% share of the road transport market by 2020.

Policy at the EU level is important to support and encourage the automotive industry towards cleaner vehicles, as well as helping developing a sustainable market for them. Several policy actions have already been undertaken, such as standards and labelling of cars, some of which are enforced by EU regulation. The green public procurement policy option considered in this Directive proposal complements and supports these existing policies by aiming to make the purchase decisions of public bodies more environmentally friendly.

Green public procurement was mentioned in the 2001 Communication of the Commission “A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development” as a means to favour environmentally friendly products and services. A Handbook on Green Public Procurement was produced by the European Commission in 2004.

¹ The Auto Oil II programme, final report, October 2000

The EU new Public Procurement Directives, adopted in March 2004, underline that public authorities can adopt environmental considerations into their procurement procedures. Together with policies relying on research, benchmarking and demonstration projects, green public procurement is seen as a means to accelerate the spread of new technologies.

Policies to promote green public procurement and cleaner vehicles have been already adopted in some places at local level. Local or national incentives, however, are not sufficient to encourage more investments of the manufacturers vehicles who operate on a European-wide and global stage. Mandatory targets for Green public procurement at EU level could provide the market with significant assurance for the future of clean and energy-efficient vehicles and thus provide a real stimulus to vehicle manufacturers. This could help considerably with the economics of vehicle production where a critical mass needs to be reached to make production profitable. Moreover, this action at EU level would support the competitive position of the EU automotive industry, as underlined in the Commission's 2004 competitiveness report.

The increased production and use of cleaner vehicles could be a critical factor in helping cities meet the obligations arising from EU regulation on air quality. Directive 96/62 on ambient air quality assessment and management, and its daughter Directives on a range of pollutants tackle the problem of air pollution. The first daughter Directive 1999/30 establishes ambient air limit values for sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and oxide of nitrogen (NO_x), particulate matter (PM₁₀) and lead (Pb); the Directive 2000/69, the second one, establishes limit values for concentrations of benzene and carbon monoxide; and the third one, the Directive 2002/3, sets target values for ozone to be attained by 2010. This has led, in a number of cities, to the imposition of restrictions to free circulation of vehicles.

The European Institutions have already started to tackle the issues of pollution in transport. Further action is clearly necessary, and mandatory targets for clean vehicle procurement are essential to bring air quality in cities within regulatory limits. The proposed Directive is justified and essential since it is clear that voluntary measures will fail on their own to create the necessary incentive for manufacturers to offer clean vehicles. Action at Community level is therefore needed to create a sufficient basis for the investment required to develop low emission vehicles. The proposal will be complementary to the different EU measures already existing.

3. POLICY OPTIONS

Policies on clean vehicles that are relevant at the EU level include standards, voluntary agreements, eco-labelling, taxation, and green public procurement. The last of these is the type of policy considered in the proposed Directive.

Policies can be classified regarding the extent to which freedom is left to decision makers in choosing their behaviour. Voluntary agreements and policies based on information, like eco-labelling, leave higher freedom to the decision makers. Regulation imposes constraints on the choices of the decision makers with different intensity: command and control instruments like standards; market-based instruments, like taxation, which create positive or negative incentives to influence consumer's behaviour.

The first option to be considered is the no-policy option scenario, which provides a benchmark against which the other policy scenarios can be compared.

3.1. Present policy situation

The main existing policy initiatives that have targeted transport energy and emission issues are the following:

- Euro standards, with an Euro 4 standard for passenger cars and Light-Duty Vehicles (LDV) that is in force from 2005, an Euro IV standard for Heavy-Duty Vehicles (HDV) which has come into force in 2005, a Euro V standard for HDV which will enter into force in 2008, and the Directive 2005/55/EC providing an Enhanced Environmentally Friendly Vehicle standard (EEV) applicable to HDV
- The Commission Communication on “Alternative fuels for road transportation and on a set of measures to promote the use of biofuels” (COM(2001) 547);
- Commission Recommendations on the reduction of CO₂ emissions from passenger cars 1999/125/EC of 5 February 1999 (ACEA) 2000/303/EC of 13 April 2000 (KAMA) and 2000/304/EC of 13 April 2000 (JAMA);
- Directive 1999/94 of 13 December 1994 relating to the availability of consumer information on fuel economy, CO₂ emissions in respect of the marketing of new passenger cars and COM(2005) 261 final on passenger car related taxes;
- Com (2002) 431 Final: “Taxation of passenger cars in the European Union – options for action at national and Community levels”.
- The Green Paper on energy efficiency (Com (2005) 265: “Energy Efficiency or Doing More With Less”) proposes concrete actions, such as the public procurement of less polluting and more energy efficient vehicles in order to build up a market for these types of vehicles.
- Thematic Strategy on Air Pollution COM(2005) 446 final, in which the Commission stresses the need to consider “obligations and recommendations on public authorities to implement minimum annual procurement quotas of new cleaner and energy efficient vehicles”.

Despite these measures, air quality standards in many cities are still not met, and the health of citizens will be threatened in these conditions also in future without additional actions. Also energy consumption in transport has been ever increasing in spite of important technological improvements offering better energy efficiency of vehicles.

3.2. Alternative policy options

Policies on clean road transport vehicles aim to achieve two different objectives: to increase the production of vehicles with better performance in terms of reduced energy consumption and reduced pollutant emissions, and to develop and safeguard a market for those vehicles.

Several policy options can be identified and selected against the overall objectives of the proposed Directive, in particular, with regard to their effectiveness and efficiency. The ones that are suggested to contribute to the promotion of a market for clean vehicles are:

- Spreading Member States' knowledge and experience on using energy and environmental criteria in the vehicle procurement process.
- A voluntary agreement;
- An explicit requirement that public procurement of road vehicles takes into account energy consumption and pollution emissions.

In the assessment carried out, all the policy options have been considered and screened but only one considered at quantitative level throughout a cost-benefit analysis.

3.3. Voluntary agreement option

A voluntary agreement is a supply-oriented policy. The agreements of the European, Japanese and Korean car manufacturer associations (ACEA, JAMA and KAMA) on the reduction of CO₂ emissions from passenger cars have set a target of 140 g/km by 2008/2009 for the average of new passenger cars sold across the vehicle fleet. These agreements were acknowledged by Commission's Recommendations. The Commission has monitored the implementation and effect of this initiative and reported that good progress has been made, and intermediate targets have already been met.

The voluntary agreements' disadvantage is that outcome is uncertain and that it is difficult to assess the evolution and the implementation of efforts to reach the objective. They are nevertheless an incentive to progress for manufacturers.

Overall, a voluntary initiative would only involve a part of public bodies and this would mean that its effect on the overall market would be very much smaller than a general obligation. Another problem might be that vehicles responding to the procurement initiative might not be offered by manufacturers in the whole of the EU. Since the objective of the policy is to promote the market for clean road transport vehicles it does not seem effective to pass a new voluntary agreement with the car manufacturing industry. The policy action should comprise a legislative measure.

A voluntary scheme would imply a campaign of information and persuasion to be enforced with the aim of orienting purchase decisions.

3.4. Spreading knowledge and experience

This policy option aims to achieve the objective of promoting a market for clean vehicles through information building and sharing. Public bodies are encouraged to take better account, when procuring vehicles, of the environmental impacts from good examples and best practices

This policy option will not involve any direct requirements. However, information and knowledge spread must be organised and EU can provide information to the Member States, for instance:

- Guidelines on how to incorporate environmental parameters in public procurement decisions in general and specifically with respect to tender procedures.
- Best practice examples showing what have been promoted by public bodies concerning procurement of clean vehicles.

- Demonstration projects (also supported under the Community R&D Framework Programme) that show what is technically feasible even if it is not economically viable immediately.

Access to information will make it easier for public bodies to take environmental criteria into account when awarding contracts and purchasing vehicles. Availability of information about technical characteristics and additional financial cost will help decision making when procuring vehicles. It may be a useful for overcoming lack-of knowledge barriers and increase public sectors procurement of clean vehicles.

The collected information will also be publicly available which may influence also private bodies to procure clean vehicles.

3.5. The regulatory option of public procurement

A mandatory scheme can concern the public procurement, applying to all the purchase decisions or a quota of them.

The regulatory public procurement option can be based on 2 different approaches: a. technology neutral performance based approach or a technology oriented approach. The difference is the logic of technology selection. As developed further, the performance-based option gives preference to the technological solution that is most profitable at the time of the purchase, whereas the technology-based option provides support for promising technological solutions for the future which still have to overcome economic hurdles of higher prices in order to be self-supported by the market.

3.5.1. A technology oriented approach

The option of a technology-based selection requires the allocation of a certain quota of the annual vehicle procurements of public bodies to clean vehicles. The type of vehicles would be specified in the obligation.

A quota system on selected technologies is already implemented nationally for the procurement of vehicle fleets by public bodies in some Member States. Beyond the transport sector, the quota system for green procurement policy is widely used in Member States, for instance in the electricity markets through incentives to electricity generated with renewable resources.

The option of a technology-based selection would contribute to the development of a market for the vehicles that are specified in the obligation.

Therefore, technology selective market promotion would be a logical follow-up of R&D support already given by Community funds to these technologies, which have difficulty to access to the market and which would be beyond the economic profitability horizon of industry without additional support. Captive markets through public procurement could provide this bridge to a fully commercial broad market.

3.5.2. A technology neutral cost based approach

A technology-neutral approach was based on the inclusion of additional award criteria into the procurement process: the cost for pollutant emissions and the cost for energy consumption. This approach does not use a definition of a clean vehicle.

Thus, the economically most viably clean vehicles would be supported. The criteria of energy and emission costs would apply for all vehicle types to be procured.

However, there is no certainty with this option that a change in the fleet composition will take place to favour the more advanced clean vehicles, nor those which have a larger potential for substantial improvements in the longer term. The least cost choice normally made by purchasers would discard advanced technologies presently still more expensive.

This policy, on the other hand, would ensure that the fleet renewal is accomplished with the least total societal costs at the time of procurement.

3.5.3. A technology neutral performance standard based approach

The selection of clean vehicles could also be based on performance standards for the emission of pollutants and greenhouse gases. Such an approach would correspond to the approach taken for the emission regulations where so-called Euro standards are defined, which set limit values for the exhaust emission of certain pollutants, different for different vehicle categories.

An alignment of clean vehicle specifications along the Euro emission standards, but with more stringent requirements, would provide an incentive for industry to push technological development further along the lines of the Euro standard evolution with vehicles of superior environmental performance.

An Enhanced Environmentally friendly Vehicle (EEV) standard has been defined in EU vehicle emission legislation for heavy duty vehicles with a weight of more than 3.5 t. This EEV standard sets advanced emission limits lower than generally binding Euro standards in particular for hydrocarbons, NO_x, particulates, and smoke.

Wider deployment of heavy duty vehicles meeting the EEV standard would be particularly beneficial for the urban environment where serious problems with air quality persist in many cities in Europe. Low emission buses, garbage vans, utility vehicles, etc could greatly improve the situation.

Enhanced environmental performance standards could gradually be developed for other vehicle categories as well, in particular passenger cars and light duty vehicles. Public procurement could be encouraged for all vehicle categories in order to stimulate demand and support the development of a new class of better performing vehicles more widely.

Standards for CO₂ emission and energy consumption have not yet been developed in a way applicable to individual vehicles. The Community strategy on CO₂ emission, however, aims at a fleet average value of 120 g CO₂ /km of all new registrations of passenger cars within one year, by 2010 latest. Public authorities could be encouraged to use this target value as a guideline for passenger car procurements in order to give a lead for the general market. Differentiated standards could then be developed on the basis of a well-to-wheels analysis for wider use later.

4. ANALYSIS OF IMPACTS OF PUBLIC PROCUREMENT OBLIGATIONS

Different approaches for a legislative initiative to promote clean road transport vehicles have been analysed:

- a technology neutral approach based on the integration of energy and pollutant costs in the procurement decisions;
- a technology oriented approach based on selected technologies;
- a technology neutral approach based on an existing emissions standard.

Impacts should include all direct and indirect effects for all groups in the society. Hence, it is important to identify the most important stakeholders affected by the promotion of energy efficient and low emission road transport vehicle: public authorities responsible for transport services; car industry; and the society in general (from changes in environmental effects).

4.1. Assumptions for the impact assessment

General assumptions

- It is assumed that the initiative could come into force in 2006 and end in 2015. Considering an average lifetime of vehicles of 15 years, the assessment covers the period from 2006 to 2030;
- Full compliance with the requirements of the legislative initiative is assumed.
- EUCAR, CONCAWE and the Joint Research Centre of the EU Commission have performed a joint evaluation of the Well-to-Wheels energy use and greenhouse gas (GHG) emissions for a wide range of potential future fuel and power-train options. This well-to-wheels study considers production, distribution and retail of each fuel, including infrastructure, and calculates the accumulated energy consumption and greenhouse gas emission along the whole pathway of each fuel, in a first step from the original source (“well”) to the tank on board a vehicle (“Well-to-Tank” assessment), and in a second step during the operation of a vehicle (“Tank-to-Wheels” assessment). The integral results of both steps in the overall “Well-to-Wheels” balance have been compared for a large number of fuels and for the main vehicle technologies. The specific objectives of the study were mainly to establish, in a transparent and objective manner, a consensual well-to-wheels energy use and GHG emissions assessment of a wide range of automotive fuels and power-trains relevant to Europe in 2010 and beyond, and to consider the viability of each fuel pathway and estimate the associated macro-economic costs.

Cost/Benefit assumptions

- The vehicle costs considered are averages of the costs of the vehicles of each category;
- In the particular case of buses, the cost assumption is based on an analysis provided by the Alternative Fuels Contact Group.
- Technological progress will have the effect to increase vehicle performances and to progressively decrease the costs of new technologies;
- Only extra costs due to the vehicle procurement are considered.
- The differences for maintenance and operating costs between different technologies are neglected.

- All taxes and charges are excluded.
- The same commercial lifetimes are assumed for all vehicles.
- Environmental costs include the costs of pollutants and GHG emissions as well as energy costs. The following values are assumed:

Table 1: External cost of emissions considering equal weight of urban and rural conditions

	GHG	CO	NOx	CH	PM
Monetary value (euro/kg)	0,02	0,78	4,20	2,10	55,25

Sources: EU, 2002 : BeTa version E1.02 ; ExternE Report (European Commission, 1998).

Environmental assumptions

- Future Euro 5 and Euro 6 standards are expected to reduce PM emissions by up to 80% of current Euro 4 limits for diesel light duty vehicles from 2010, up to 50% of current Euro 4 limits for heavy vehicles from 2013, and NOx emissions up to 20% of current Euro 4 limits from 2015.
- The voluntary agreement on CO₂ reduction is expected to result in a 15% reduction in vehicle energy consumption from now to 2010. A further 6% reduction from 2010 to 2015 is expected.

Fleet assumptions

Data for the estimate of the fleet is coming from several sources among which EUROSTAT statistics, data received from Industry Stakeholders and National Experts involved in the initiative. The total vehicle fleet owned by public bodies and private companies operating public transport services under concession in EU is estimated through an extrapolation from real data available.

The composition of the public fleet of a Country among different technologies, when specific data are not available, is assumed to be proportional with the total fleet of that Country.

The result of the estimate procedure is reported in the following table:

Table 2: Composition of the EU 25 public bodies' total fleet

	Passenger cars	Light Duty Vehicles	Heavy Duty Vehicles	Buses	TOTAL
Conventional DIESEL	73.654	368.436	90.965	232.765	765.821
Conventional PETROL	282.929	84.918	567	10.645	379.059
Natural Gas - CNG	553	951	112	2.975	4.590
LPG	3.732	4.154	19	459	8.365
BIOFUEL	n.a	n.a	n.a	674	674
HYDROGEN	n.a	n.a	n.a	n.a	0
ELECTRIC	954	1.044	n.a	497	2.495
HYBRID	243	n.a	n.a	452	694
TOTAL	362.065	459.503	91.663	248.467	1.161.698

It is assumed that the total size of the vehicle fleet remains unchanged in the time horizon of the analysis.

The following average mileage for each vehicle class is assumed.

Table 3: Mileage for vehicle class

	Passenger cars	Light Duty Vehicles	Heavy Duty Vehicles	Buses
Mileage (km/veh.year)	16.000	21.000	50.400	44.800

Sources: Calculation based on TREMOVE Baseline data for 2004; COPERT, Road Transport Emission and Inventory Guidebook, 2002.

4.2. Social impacts

Social impacts are those which can be considered as a cost or a benefit for society as a whole. Among the social impacts which are quite general, the following can be underlined:

- Reduced illness and less health care demand as a result of possible reductions in emissions;
- Demand for innovative and technically highly qualified engineers and workers and changes to the level of activity in the fuel supply sector;
- In the short term, more public money could be spent on vehicle procurement and therefore less would be available for other public investments, but in the long term less money would be necessary to operate and then more for other expenditures.

It is expected that the social impacts are more relevant in the longer term. However, some positive impacts in the area of health can be expected more rapidly in the cities in breach of air quality standards.

4.3. Environmental impacts

Changes in the share of different technologies within the vehicle fleet are expected to have an environmental impact mainly in air quality, global warming connected with the greenhouse effect and energy consumption. The main pollutants emitted by a vehicle, which are highly local or regional, are Carbon Monoxide (CO), Nitrogen Oxides (NO_x) Hydrocarbon Compounds (HC) and Particulate Matter (PM). CO₂ has effects on climate change and is a global concern.

Clean road transport vehicles are expected to reduce tail-pipe pollution and greenhouse gases emissions. Energy consumption and greenhouse gases emissions should be assessed on a well-to-wheel basis. Pollutant emissions, on the other hand, are mainly important at the vehicle level, i.e. emissions at the tail-pipe.

EU legislation has successfully regulated vehicle emissions through the so called “Euro” standards, with limit values tightening progressively over the years. The latest standards implemented are the new Euro 4 standard for Heavy-Duty Vehicles which came into force in October 2005 and Euro 4 standard for passenger cars and Light Duty Vehicles which came into force in January 2005. A new Euro 5 standard proposal for passenger cars and Light-Duty Vehicles is expected in 2006, and new, tighter limits will enter into force from October 2008 for Heavy Duty Vehicles.

The effect of these measures on pollution levels from transport has been significant. Emissions of the various regulated pollutants, on average, have fallen by 20 to 50% since 1995. By 2015 further reductions are forecast to reduce emissions to less than 20% of the level in 1995.

The most important negative impacts of pollutant emissions are related to health, agriculture and corrosion of buildings. The effects for human health are generally considered as the most significant negative impact of transport related air pollution.

Climate change has a very large number of impacts such as the rising of sea level or extreme weather events. It is a global and long term problem characterised by some irreversibility aspects. Indeed greenhouse gases have long atmospheric lifetimes and are stock and not flow pollutants, and this implies a great inertia.

Finally, the dependence of transport on fossil energy has implication for the security of supply. The EU transportation system is dependent on petrol and thus on importation.

4.4. Economic impacts

Higher procurement costs for environmentally friendly vehicles should be compensated by the gains from lower pollution emission resulting in lower damage cost. Higher costs for clean vehicle technologies are expected to be passed on by industry to the customer through higher purchase prices. An optimisation has to be made between the initially higher vehicle cost, the resulting economies of scale and the gain from pollution avoidance. The conclusions on the action to take are strongly influenced by the market weight of public procurement in the different vehicle categories.

Economic impacts are impacts that will concern the economic growth, price levels, public authorities’ budgets, industry behaviour, etc.

4.4.1. On public bodies

An initiative which would influence public procurement behaviour in the direction of cleaner vehicles would have an impact on public budgets, as it would lead to an increase of their procurement of vehicles budgets, at the expense of other public actions.

However, public bodies would also be expected to save costs because of less damage from pollutants. They would also be supportive to meet their obligations with respect to air quality standard. Extra costs could be sensitive in the short term, before the cleaner vehicles procured have fully achieved mass market and benefited from economies of scale.

Some alternative fuels technologies also require investments on infrastructure for refilling. This infrastructure must be provided and financed.

A number of financial instruments are available, in particular for the new Member States, to help public bodies to face the increased pressure on their budgets. In particular, a number of support programs and options for soft loans are available from the Structural and Cohesion funds, the European Investment Bank and the European Bank for Reconstruction and Development.

4.4.2. On industry

One important objective of this initiative is to provide a market for clean vehicles and to support general take-up of these vehicles. Higher performance requirements involve initially higher costs for car manufacturers that must be expected to be put on the products and carried by the consumers. A key issue is whether the initiative will be sufficient to enable economies of scale in the industry for the technologies under consideration.

Where economies of scale are achieved, a number of positive outcomes could result such as significantly reduced prices for the technology and increased industrial investment and a resulting increase in the number of vehicles offered with the technologies concerned.

The assessment whether economies of scale are achieved or not requires a distinction between different vehicle segments and between different technologies. Different vehicle categories can be underlined: buses, medium and heavy commercial vehicles, light commercial vehicles, and passenger cars.

Public procurement represents about 33% of the annual European bus market, while it accounts for less than 1% of the total annual passenger car market. Thus the impact of such an initiative would be very different for the different sectors, depending whether the public fleet represents an important share of the overall market or not. Therefore, the larger the public fleet share for a specific sector, the larger the ability of the initiative to move the market.

In the light vehicle sector, the Directive is unlikely to achieve economies of scale on industry. Indeed, the total market size for these vehicles is very important (over 60 million light vehicles) and public procurements do not represent a sufficient share. Moreover, light vehicle manufacturers are under strong competitive pressures in this segment.

The increase in EU firms expenditure that could be expected for the development of specific technologies is unlikely to come from an increase in research and development global funds but more from a redistribution of these existing funds.

Focussing the initiative on a category of vehicles for which public fleets represent an important share therefore could ensure more effectiveness to the initiative.

This initiative could be expected to achieve economies of scale within the segment of buses and heavy commercial vehicles above 3.5t. This potential can be expected as a result of the combination of a relatively small market size and the high share of public procurement in these sectors. Some positive effects could be particularly foreseen for some specific type of heavy duty vehicles like the ones used for waste and removal.

The initiative may also, together with other existing initiatives such as the voluntary agreement on CO₂ emissions, support the European car industry in enforcing and further developing its competitive position with regard to clean vehicles by providing them with a stronger home market.

The consultations showed strong preference for a technology neutral approach based on performance criteria. Industry expressed this also in the CARS 21 High Level Group meeting. An alignment on Euro emission standards was recommended.

4.5. Qualitative impacts and quantitative Cost-Benefit Analysis

In order to assess the impacts of the different procurement obligations options, cost benefit analyses have been carried out and compared to the no policy option.

4.5.1. Base case: no policy option

In the no policy option case, only policies implemented so far are taken into account. Thus, pollutant emissions reduction comes from the progressive evolution of Euro standards and reductions of green house gas and energy consumption mostly from the voluntary agreement by industry and technological development.

Annual vehicle procurement is estimated from the available data sets as following, for the EU 25:

Table 4: Base case - Yearly procurement of public fleet

	Passenger cars	Light Duty Vehicles	Heavy Duty Vehicles	Buses	TOTAL
Conventional DIESEL	22.615	88.226	34.734	15.922	161.497
Conventional PETROL	85.715	20.189	216	733	106.854
Natural Gas - CNG	167	245	43	203	657
LPG	1.144	1.070	7	31	2.252
BIOFUEL	-	-	-	46	46
HYDROGEN	0	0	0	0	0
ELECTRIC	287	269	-	36	591
HYBRID	73	-	-	29	102
TOTAL	110.000	110.000	35.000	17.000	272.000

The following table shows the costs of pollutant emissions, green house gas emissions, energy consumption and vehicle procurement in the base case. All values are expressed in monetary terms and are referred to the period 2006-2030, which covers the average lifetime of vehicles procured under this initiative.

Table 5: Base case – Economic impacts in the period 2006-2030

Base case no policy option			Passenger cars	Light Duty Vehicles	Heavy Duty Vehicles	Buses	TOTAL
Economic Impacts in period 2006-2030							
Pollutant Emissions Costs	M euro		638	734	2.791	2.097	6.261
GHG Emissions Costs	M euro		624	1.027	1.879	1.425	4.956
WTW Energy Costs	M euro		2.070	3.399	6.209	4.755	16.433
Total Environmental and energy Costs	M euro		3.333	5.159	10.880	8.278	27.650
Purchase Costs	M euro		17.554	18.537	28.345	26.577	91.014
Total Costs	M euro		20.887	23.696	39.225	34.855	118.664

* GHG: greenhouse gas; WTW: Well-To-Wheel

4.5.2. Qualitative results

The performance target proposed in this approach would stimulate manufacturers to develop continuously the technologies in order to offer more environmentally friendly and more competitive vehicles.

Moreover, the possible directive would ensure that environmental performances are taken into account by public bodies.

Presently, public procurements are mostly conditioned by purchase costs. The initiative would impose public bodies to procure a quota of very environmentally friendly vehicles and thus is likely to have an impact in the sense of changing purchase behaviours towards more environmentally friendly vehicles rather than cheapest vehicles, and it would make very clean technologies competitive.

The directive will also raise the profile and visibility of clean vehicles among the general population and amongst companies, and thus stimulate those actors also to take much more account of energy and pollutant emissions when making their purchase decisions.

4.5.3. Quantitative Cost Benefit Analysis

For the cost benefit analysis, it is assumed that a share of 25% of the annual vehicle procurements of public bodies is allocated to clean vehicles in all vehicle categories.

Thus, the annual procurement composition can be estimated as following:

Table 6: Procurement Policy Option - Yearly procurement of public fleet

	Passenger cars	Light Duty Vehicles	Heavy Duty Vehicles	Buses	TOTAL
Conventional DIESEL	17.041	67.047	26.088	12.192	122.368
Conventional PETROL	65.459	15.453	162	558	81.632
Natural Gas - CNG	2.508	2.797	7.341	2.144	14.791
LPG	21.637	24.202	1.409	645	47.894
BIOFUEL	0	0	0	264	264
HYDROGEN	0	0	0	0	0
ELECTRIC	2.969	501	0	532	4.002
HYBRID	385	0	0	664	1.049
TOTAL	110.000	110.000	35.000	17.000	272.000

The total economic impacts in this policy option are shown in the following table.

Table 7: Procurement Policy Option - Economic impacts in the period 2006-2030

Procurement policy Economic Impacts in period 2006-2030		Passenger cars	Light Duty Vehicles	Heavy Duty Vehicles	Buses	TOTAL
Pollutant Emissions Costs	M euro	518	620	2.229	1.721	5.087
GHG Emissions Costs	M euro	594	991	1.817	1.355	4.757
WTW Energy Costs	M euro	1.969	3.210	5.726	4.754	15.659
Total Environmental and energy Costs	M euro	3.081	4.821	9.772	7.830	25.503
Purchase Costs	M euro	17.811	18.622	29.456	27.855	93.744
Total Costs	M euro	20.892	23.443	39.228	35.685	119.248

The CBA comparison between the procurement policy option and the no policy option can be summarised in the following table. The previous results enable to calculate the Internal Rate of Return (IRR) which is also provided in this table.

Table 8: CBA results for the procurement policy option compared to no policy option for each vehicle category

Comparison Procurement policy vs. Base Case CBA result in period 2006-2030		Passenger cars	Light Duty Vehicles	Heavy Duty Vehicles	Buses	TOTAL
Pollutant Emissions Costs	M euro	-121	-114	-562	-376	-1.173
GHG Emissions Costs	M euro	-30	-36	-63	-70	-199
WTW Energy Costs	M euro	-101	-189	-483	-1	-774
Total Environmental and energy Costs	M euro	-252	-339	-1.108	-448	-2.147
Purchase Extra Costs	M euro	257	85	1.111	1.278	2.730
Net Benefit	M euro	-5	253	-3	-830	-584
IRR	%	3,70%	37,61%	3,96%	**	0,1%

** Results are not included when IRR is lower than -10%

The internal rate of return (IRR) is highest for the sector of Light Duty Vehicles (LDV): 37.6%. For Heavy Duty Vehicles (HDV) it is 4%, the same order as for cars.

The absolute gain in terms of pollutant emission cost reduction, however, is by far largest for the categories of HDV (562 M€) and buses (376 M€), compared with the much lower gains for LDV (114 M€) and cars (121 M€).

The low extra cost for clean vehicles in the LDV sector is mainly due to the low extra cost for CNG, LPG, and hybrid vehicles, with a differential of only about 10% above diesel vehicles. In the HDV sector, however, considerably higher extra cost is involved for alternative technologies.

This comparison is based on the assumption that the share of technologies does not change with the policy options. The important purchase costs for the procurement policy option is therefore due to the procurement of electric or hybrid vehicles, which are particularly expensive, considered in the calculation.

But in practise, with the requirements of this Directive, the cheapest performing technologies would be privileged by public bodies. Diesel vehicles with specific equipment or CNG vehicles can be considered as examples of cheap performing technologies.

The bus sector, with the interesting aspects of a combination of a high share of public procurement and high gains from a reduction of pollutant emissions has been analysed more specifically by calculating cost/benefit ratios for model cases with full allocation of the 25% clean vehicle quota to one specific technology. This should give a better basis for the assessment of the impact of a clean vehicle procurement obligation, as cheaper technologies are expected to gain a larger market share. With the cheapest alternative technology of CNG, an IRR of 11% is obtained, and the gains from pollutant emission cost reduction would be higher, with 392 M€, compared to the case of re-distribution across all technologies.

Table 9: CBA results for Procurement Policy Option – Bus

Comparison Procurement policy vs. Base Case 25% on each technology for buses		Base Case	LPG	CNG	Bio-fuel	FC H2	Electric	Hybrid	Ethanol
CBA result in period 2006-2030									
Pollutant Emissions Costs	M euro	-	-416	-392	15	-501	-501	-341	-283
GHG Emissions Costs	M euro	-	-31	-30	-95	-121	-267	-71	-42
WTW Energy Costs	M euro	-	-253	-385	4.108	212	98	-231	7.960
Total Environmental and energy Costs	M euro	-	-701	-807	4.029	-410	-670	-644	7.636
Purchase Extra Costs	M euro	-	504	504	572	9.982	4.855	1.865	572
Net Benefit	M euro	-	197	303	-4.601	-9.572	-4.184	-1.222	-8.208
IRR	%	-	+9%	+11%	**	**	**	**	**

** Results are not included when Internal Rate of Return (IRR) is lower than -10%

As shown in this table for bus procurement, nearly all the alternative technologies have a positive impact on pollutant and greenhouse gas emissions; CNG and LPG technologies have better net benefit results.

For the CNG buses case, the net benefit of the procurement policy option compared to the no policy option would be 303 M€ and the Internal Rate of Return would be +11%. Considering technologies with the same level of price, e.g. diesel with specific equipment, the net benefit of the procurement policy option for buses is positive.

In addition, the expected decrease of the cost of these technologies resulting from economies of scale realized by industry could increase this net benefit over the time.

In summarizing, a cost/benefit comparison has been made between the no policy option and the procurement policy option.

The economic gain from the reduction of pollutant and greenhouse gas emissions and of energy consumption through green public procurement of vehicles is very different for different vehicle categories (in the time horizon of the analysis; 2006-2030):

Table 10: Summary of CBA results for Procurement Policy Option

	Passenger cars	Light Duty Vehicles	Heavy Duty Vehicles	Buses	Buses with cheapest technologies (e.g. CNG)	Whole fleet
Pollutant and greenhouse gas cost saving	151 M€	150 M€	625 M€	446 M€	422 M€	1372 M€
WTW Energy cost saving	101 M€	189 M€	483 M€	1 M€	385 M€	774 M€
Total environmental and energy cost saving	252 M€	339 M€	1108 M€	447 M€	807 M€	2146 M€
Net Benefit	- 5 M€	253 M€	- 3 M€	- 830 M€	303 M€	- 584 M€

The environmental gain is by far largest from procurement of clean vehicles in the category of Heavy Duty Vehicles (HDV), including buses.

The cost/benefit analysis balances the economic gains from the reduction of emissions and energy consumption against the higher purchase costs for clean vehicles, and determines the net economic benefit and the resulting rate of return on investment.

The highest rate of return is obtained from green procurement in the Light Duty Vehicles (LDV) category (37%). A modest return would result from the passenger car sector (3,7%). In the Heavy Duty Vehicle category, substantial rates of return can be achieved by focussing on the least expensive technologies. For buses e.g. rates of returns would be 9% for LPG, and 11% for CNG.

The impact assessment of the different options (whole vehicle fleet or specific vehicle categories) shows that an optimum impact can be achieved with the focus on the category of Heavy Duty Vehicles with weight larger than 3,5 t, which includes buses.

Focussing green procurement obligations on Heavy Duty Vehicles (including buses) is the preferred option for the following reasons:

- Largest environmental impact in terms of emission reduction and energy saving;
- Largest market impact from public procurement, with a market share of up to one third for buses;
- Availability of environmental performance criteria for Enhanced Environmentally friendly Vehicles (EEV), linked to the Euro emission standards

5. CONSULTATIONS

5.1. Stakeholders' consultation

The main stakeholders concerned were consulted on the different proposals. A meeting was called in July 2003 on a technology neutral proposal. A second one took place in April 2005 on a technology oriented initiative.

Background material had been circulated by the Commission before each meeting in order to inform the stakeholders and to support the discussions.

After these meetings, stakeholders sent detailed comments which were further followed up by the Commission.

5.2. National experts' consultation

In the frame of the Joint Expert Group on Transport and Environment, a meeting in April 2005 addressed the legislative initiative to promote clean vehicles.

In addition to the discussions at this meeting, written contributions, statements and extensive documents on all aspects of the proposed initiative, with respect to both a technology neutral and a technology selective approach were provided. In particular, detailed and quantitative information on public fleets and green procurement initiatives at local, regional and national levels was obtained.

5.3. CARS 21 High Level Group consultation

The initiative for a legislative action on the promotion of clean vehicles has also been presented to the High Level Group of the CARS 21 Group of Commission and industry. CARS 21 is composed of representatives from industry, Member States governments and European Commission.

The CARS 21 High Level Group supported the Commission's initiative to put forward a proposal on the promotion of clean vehicles, on the condition that a technology-neutral and performance based approach is taken.

5.4. Consultation within Commission services

Steering groups were set up for the impact assessments of both approaches with the main Commission's services concerned: DG MARKT, DG ENTR and DG ENV. Three steering group meetings were organised between October 2004 and January 2005 on the technology neutral initiative. Three further meetings were developed for the technology oriented

approach and took place in April and May 2005. The Commission services involved supported a technology neutral approach.

5.5. Summary

The initiative to promote clean vehicles through public procurements was generally welcomed. Preference was expressed for using technology neutral approach based on environmental performance criteria.

Economic and environmental considerations finally suggest concentrating the additional investment required by mandatory clean vehicle procurement to the vehicle sector where a combination of large gain from pollution emission reduction and large impact on the market development from a large share of public procurement can be expected. The sector of Heavy Duty Vehicles, including buses, therefore should be chosen. This sector is also the only vehicle sector where an existing environmentally enhanced performance standard can be used. The latter allows a rapid implementation of green procurement policy and opens the way for a later extension to other vehicle categories, and to other criteria on energy efficiency.

A quota of 25% of clean vehicle procurement would be a good compromise between the objectives of large impacts on air quality improvement and clean vehicle market development on one side, and affordable extra investment cost and mass market availability of clean vehicles on the other side. Public authorities still need to be given the flexibility for procurement according to specific requirements for which no EEV vehicles are available yet.

The quota of 25% in the Heavy Duty Vehicle market, with a share of 1/3 of public procurement, represents about 10% of the total market. This would be about the minimum required for mass production series large enough to achieve economies of scale. Procurement of environmentally better performing vehicles also should not go beyond what is required to bring cost down in order to optimise the use of public money and confine it to the support necessary to get these technologies economically viable so that they are taken up by the wider private markets on a competitive basis. This broader market uptake will then provide also much larger environmental gains.

Only the Heavy Duty Vehicle sector with the large market power of public procurement offers the possibility of an effective market leverage with a reasonably small share of the orders. Therefore the obligation for clean vehicle procurement should be limited to this sector in a first stage. An increase of the quota and an extension to other vehicle sectors could be considered on the basis of the technical and economic development unleashed by this initiative.

Higher costs eventually incurred by public bodies can be compensated by appropriate European and national support programmes in order to avoid a negative impact on the quality of public transport services. Such support would be justified, as it is society at large which would profit from a wider deployment of clean vehicles.

6. CONCLUSIONS

In the context of this initiative for the promotion of clean vehicles, all possible policy options have been assessed. The preference expressed for a technology neutral approach together with the EU policy for the introduction of new and innovative alternative vehicle technologies have

been reflected in the proposed Directive. Therefore, the proposal follows a technology neutral approach based on environmental performance as defined in existing Community legislation. This covers conventional diesel and gasoline vehicles but also alternative fuel and vehicle technologies that contribute to the objectives of reduced pollution, reduced dependence of road transport on oil and reduced energy consumption.

Reductions of pollutant emissions and energy consumption by road transport vehicles could be expected with procurement obligations targeting all vehicles. But cost reductions of advanced vehicle technology through economies of scale could be achieved only for those vehicle categories where public procurement represents a sufficiently large market share.

The impact of selective public procurements on the markets could be significant in the sectors of buses and other heavy duty vehicles above 3.5 t weight where the share of public procurement is high.

Measures improving the perspectives of the markets for clean vehicles could help vehicle manufacturers to gain competitive strength for global markets by providing a profitable home market for these technologies.

A technology neutral approach is preferable in order to leave the choice to manufacturers to determine which technologies they want to promote to achieve the level of performances required. But it is also necessary to base the approach on environmental performances to support technologies which have a guaranteed performance level.

An environmental performance standard has already been defined in EU legislation for vehicles with weight more than 3.5 t through the “EEV” (Enhanced Environmentally friendly Vehicle) standard in directive 2005/55/EC.

Therefore public procurement obligations of clean vehicles should cover, in a first step, vehicles with weight above 3.5 t, using as selection criterion the existing EEV Community standard.

A mandatory quota of 25% of the annual procurements in this sector allocated to clean vehicles would fulfil the two requirements of contributing to improving air quality and kick-start a broader market development for clean vehicles.

7. LEGISLATIVE PROPOSAL

The proposed Directive on the promotion of clean road transport vehicles focuses on the procurement of vehicles with a weight of more than 3.5 t.

The selection criterion of clean vehicles is technology neutral and performance oriented, based on the EEV (« Enhanced Environmentally friendly Vehicle ») emission standard already existing as an optional reference in EU legislation for vehicles above 3.5 t.

The proposed legislative actions contain the following main points:

- An obligation for Member States to ensure that public bodies and operators providing transport services under concession or permission from a public body allocate a certain quota (25%) of their total annual procurements of vehicles with a weight larger than 3.5 t to clean vehicles;

- An adaptation of the EEV standard and the clean vehicle procurement quota to the technical progress through comitology procedures.