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Accompanying document to the

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND COUNCIL
on the review of the Community strategy to reduce CO_2 emissions and improve fuel efficiency from passenger cars and light-commercial vehicles

Executive summary of the impact assessment

[COM(2007) 19 final
SEC(2007) 60]

1. PROBLEM DEFINITION

1.1. Nature of the issue or problem that requires action

The European Parliament and European Council in spring 2005 reaffirmed the EU objective that surface temperatures should not rise by more than 2°C compared with pre-industrial levels in order to prevent dangerous and irreversible anthropogenic climate change. The European Council also stated that greenhouse gas emission reduction pathways in the order of 15-30 % by 2020 compared to the Kyoto Protocol baseline should be envisaged.

However, while the EU reduced its emissions by just under 5% over the 1990-2004 period, road transport is one of the only sectors whose emissions keep increasing (+26% over that period), making it harder for the EU to respect Kyoto and jeopardising the progress made in other sectors. This has competitiveness repercussions, as some of those sectors (e.g. energy intensive industries) are subject to international competition while transport is by nature a domestic activity.

1.2. Consequences of no change in policy

As proposed by the Commission in 1995[1] and supported by the European Parliament and Council, the current EU strategy is based on the voluntary commitments of the car industry to reduce CO_2, the fuel-economy labelling of cars and the promotion of fuel efficient cars through fiscal measures. Compared to an EU 15 average of 186 g CO_2/km in 1995, the EU25 average new car emissions was 162 g CO_2/km in 2004. Based on the experience gained in the implementation of the current strategy, the following points arise:

- Emissions from the average new car sold in the EU15 in 2004 were 12.4% below the 1995 average. Over the same period, **new cars sold in the EU have become significantly bigger and more powerful**, while prices increased less than inflation.

- The **impact of labelling and fiscal measures has been negligible, while the voluntary commitments delivered the bulk of the reductions.**

- The progress achieved so far goes some way towards the 140 g CO_2/km target by 2008/9, but **in the absence of additional measures, the EU objective of 120 g CO_2/km will not be met in 2012**.

2. OBJECTIVES

2.1. Policy objectives

General policy objectives:

- Provide for a high level of environmental protection in the European Union and improve the EU energy security of supply.

[1] COM (95)689 final and Council conclusions of 25.06.1996.

Specific objectives:

- Reduce the climate change impacts and improving the fuel efficiency of light-duty road vehicles (passenger cars and light commercial vehicles), by reaching the Community objective of an average emission value of 120 g CO_2/km for newly sold cars by 2012.

Operational objectives:

- On the supply side, define a 2012/2015 framework for fuel efficiency in light duty vehicles and their components (tyres, mobile air conditioning etc) under both type-approval and real-world conditions,

- On the demand side, identify the measures that should be taken at the EU and national level as well as by industrial stakeholders to drive demand towards more fuel efficient cars.

2.2. Consistency with horizontal objectives of the European Union (Lisbon strategy, Sustainable Development Strategy)

The policy objectives promote innovation and technological development, enabling the EU industry to achieve global leadership in the field of lean technologies. This leadership should pave the way to exports of technologies and vehicles to emerging markets where oil is scarce and that have set ambitious fuel efficiency targets. Promoting further advances in technologies will also promote highly qualified jobs in Europe. The June 2006 European Council unanimously reconfirmed[2] that "*in line with the EU strategy on CO_2 emissions from light duty vehicles, the average new car fleet should achieve CO_2 emissions of 140g/km (2008/09) and 120g/km (2012)*".

3. POLICY OPTIONS

3.1. Options Identified

Three policy options have been considered as possible means to meet the policy objectives identified in section 2.1:

(1) **"No policy change" approach**: the current Community strategy to reduce CO_2 emissions from cars and improve fuel efficiency remains unchanged, meaning that the Community objective of 120 g CO_2/km is to be achieved through the combined implementation of the existing three pillars of the strategy.

(2) **"Vehicle technology only" approach**: the Community objective of an average new car fleet CO_2 emission of 120 g CO_2/km by 2012 is achieved solely by improvements in passenger cars (M1) technology that are reflected under type approval[3] conditions.

(3) **"Comprehensive" approach**: CO_2 reductions at least equivalent to the reductions achieved with option (2) are delivered through a comprehensive approach

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2 Renewed EU Sustainable Development Strategy, June 2006

3 Measured in accordance with Directive 80/1268/EEC as amended

involving car manufacturers but also other stakeholders such as tire manufacturers, competent authorities in Member States etc. The measures analysed encompass both supply and demand measures.

3.2. Options discarded at an early stage

- **Inclusion into the EU ETS** will not allow the objectives of the strategy to be met by 2012 since any adaptations to the design of the EU ETS other than inclusion of aviation could only take effect from 2013 onwards[4]. Besides the EU emissions trading scheme (ETS) is to place the compliance obligation with the entity responsible for the emissions i.e. the "direct emissions" approach. For road transport, **each individual owner of a light or heavy duty vehicle** would have to surrender allowances each year, leading to prohibitively high administrative running costs, at odds with simplification and better regulation, not to mention the practical impossibility of defining an allocation method and caps for individual vehicle owners (in the case of aviation, the "direct emissions" approach is feasible and is being respected[5]). Alternatively, two "indirect emissions" options could be considered. Firstly, **fuel suppliers could become the accountable entity,** but they would only be able to control their financial liability under the scheme through fuel pricing, thus *in fine* achieving no more than the excise duties. Alternatively, **car manufacturers become the accountable entity**: the system would rely on projected lifetime emissions for each new car sold, which would introduce significant uncertainties and could jeopardize the integrity of the EU ETS. Moreover, drivers that travel less than average would pay relatively more thus raising fairness and equity considerations without any incentive to use alternative transport modes. Besides, inclusion into the ETS would not allow to meet the objectives of the strategy, namely to provide a high level of environmental protection by **reducing the climate change impacts of road transport** (need for a comprehensive policy mix, and no one single tool can provide for the necessary flexibility in addressing climate change across different sectors) and to improve the EU's security of energy supply, **by improving fuel efficiency** (little fuel efficiency progress in the road transport sector would be delivered as CO_2 reductions would be achieved in other sectors/regions). A simplified **quantitative analysis** shows that the gap between 140 g CO_2/km and 120 g CO_2/km represents circa 4.5 Mtons over a vehicle's lifetime, translating into a cost per car of 90 € (at 20€/ton in the EU ETS): clearly cheaper in the short run than the fuel efficient technologies on cars. But the fact that all manufacturers selling cars in the EU would be subject to the same efficiency requirements allows precisely for ambitious measures driving technological improvements for long-term gain in the multiple markets across the world where oil is scarce.

- Concerns about its effectiveness and political acceptability have led to excluding the option of relying exclusively on **excise duties on transport fuels**.

- **Mobility/traffic and infrastructure management** (such as synchronisation of traffic lights, enforcement of speed limits and measures to curb congestion) are already part of the EU Common Transport Policy[6] and were thus not included in the review.

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4 See COM(2006)676 paragraph 3.1

5 Other relevant aspect is that kerosene is not taxed

6 COM(2006)314 final

4. ANALYSIS OF IMPACTS

4.1. Description of the methodology

4.1.1. Building of the cost curve for passenger cars (M1)

To build the cost curve, four scenarios have been run using the cost curve assumptions from the "Task A" study[7] looking at 135, 130, 125 and 120 g CO_2/km by 2012. The costs considered for a measure are the costs for society, equivalent to the sum of consumer surplus, producer surplus and the marginal cost of public funding. Three alternative cost hypotheses were implemented:

- The 1st hypothesis refers to the yearly 1.5% weight increase based on historic date;
- The 2nd cost hypothesis reflects the potential effect of demand oriented measures (taxation) on compliance costs: it relies on an alternative percentage of autonomous weight increase, that leads to a cost for reaching 120g by 2012 19% lower than the 1st hypothesis;
- The 3rd cost hypothesis refers to the alternative method for building the cost curve providing a further 17% reduction.

Table 1 – Societal costs, CO_2 savings and cost effectiveness of four reduction scenarios for passenger cars (cumulated over 2010-2020)

	135 g CO_2/km	130 g CO_2/km	125 g CO_2/km	120 g CO_2/km
M€[8]	-3,191 to 5,024	-2,074 to 17,072	1,873 to 32,884	7,465 to 53,123
Mt CO_2	97 to 100	195 - 200	293 - 301	392 - 403
€/ton CO_2	-33 to 50	-11 to 85	6 to 109	19 to 132

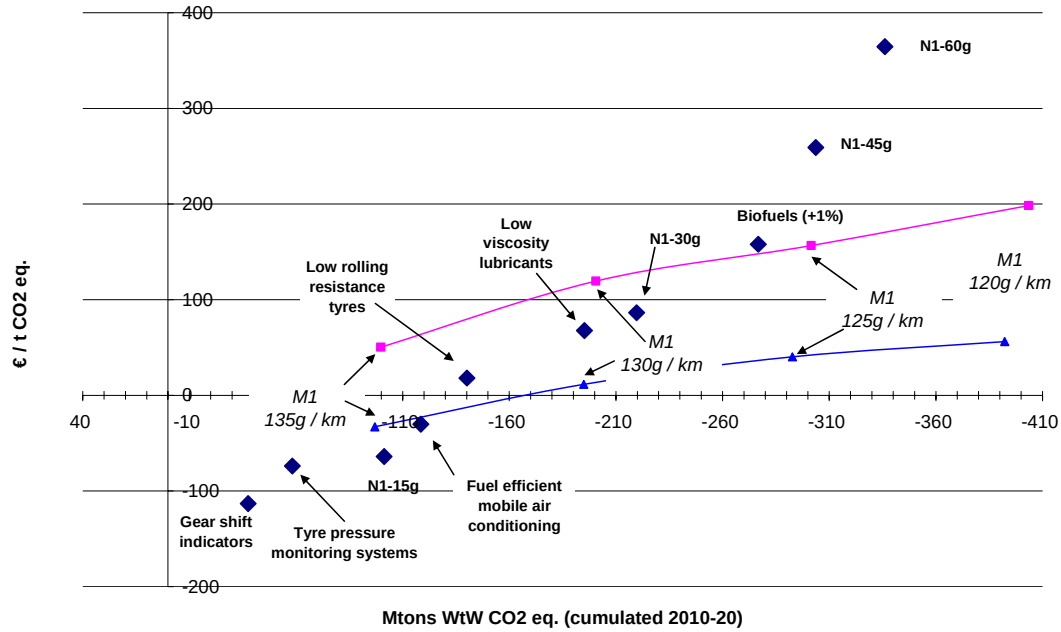
4.1.2. Assessing the costs and reduction potential of other measures

For each measure, greenhouse gas (GHG) abatement and cost-effectiveness have been assessed. Ranking the measures by decreasing cost-effectiveness allows building the following cost curve that can be combined with the M1 cost curve to determine the cost-optimal option (3) – see **Figure 1**.

Figure 1: Marginal cost-effectiveness analysis of the option (3) measures (source TREMOVE)

[7] See http://forum.europa.eu.int/Public/irc/env/eccp_2/library?l=/light-duty_vehicles/task_a&vm=detailed&sb=Title

[8] A negative cost is a gain to society, e.g. when fuel savings are larger than the increase in vehicle costs



The objective is to ensure that CO_2 reductions at least equivalent to the savings achieved by reaching the objective of 120 g CO_2/km by 2012 are delivered. Focus is given to those measures that are "*clearly measurable, with timetables for delivery, and identify the stakeholder responsible for delivering them. There should be a mechanism for monitoring progress and ensuring accountability*", inline with CARS21's final report. Political feasibility, affordability of cars, promotion of technical innovation and fairness are also taken into account in assessing option (3).

- From a marginal cost perspective, the adequate starting point for considering the introduction of other measures than improvements in M1 vehicles would be circa 125 g CO_2/km. Below, the other measures would not provide sufficient GHG savings and above, there are still other more cost-effective measures to fill the gap.

Taking into account these results two variants for option (3) have been considered:

- Variant 3A: The policy measures identified through the cost-effectiveness screening (namely GSI, MAC, N1 up to 15g CO_2/km reduction compared to the baseline, TPMS and LRRT), are added to the achievement of 125 g CO_2/km by M1 vehicles.

- Variant 3B: based on variant 3A but considering in addition measures to influence consumer demand (taxation and consumer information) leading to a 19% reduction in costs to reach 125 g CO_2/km by M1 vehicles.

4.2. Environmental impacts

The impact of all scenarios on transport demand would remain limited: option (2) triggers a small decrease in passenger transport demand, while the Options 3A and 3B correspond to a small increase in passenger transport, because the increase in vehicle price and maintenance costs is overlapped by fuel savings. Policy option 2 leads to an abatement of 403 Mt WtW CO_2 equivalent over the period 2010-2020, corresponding to an abatement

of 6% for road transport compared to the baseline. Policy options 3A and 3B lead to a somewhat greater abatement, respectively 421 and 416 Mt. Regarding conventional pollutant emissions, while Option 2 triggers a – small – decrease in SO_2, PM and NO_X emissions, Options 3A and 3B lead overall to a lower abatement due to increase in traffic.

4.3. Economic impacts

The impact of the policy options on vehicle sales remains also limited, with option 2 having the biggest impact on small cars. This points to the need to define an instrument taking into account the structure of the car markets, and specificities of various segments in relation to their ability to deliver affordable fuel efficiency improvements. See also **Table 2**

Table 2 - Welfare Analysis of the Policy options – EU25

Net present value 2010-2020, M€, difference with basecase (Option 1)	Option 2	Option 3A	Option 3B
Consumer Surplus *(including transport demand from business)*	**-17.124**	**12.564**	**30.212**
Sum welfare	**-53.123**	**-24.988**	**-7.214**

The cost estimates modelled were conservative: the costs of technological options do not take into account synergies in the integration of systems or new innovative technologies likely to appear between 2006 and 2012. Moreover, cost estimates used do not account for learning curves and economies of scale beyond 2012, and ex-ante cost estimates are usually much higher than actual compliance costs. Such alternative assumptions would result in lower cost, and a rebate of 17% has been included as an alternative – see **Table 3**.

Table 3 - Cost-Effectiveness of GHG Abatement 2010-2020

Cost per ton of CO_2 equivalent	**Option 2**	**Option 3A**	**Option 3B**
Conservative assumption	132 €/ton	59 €/ton	17.5 €/ton
Alternative assumption	84 €/ton	25 €/ton	-11 €/ton

An additional variant has been modelled, whereby 125 g CO_2/km average new M1 fleet and a 15 g CO_2/km reduction for N1 vehicles would be reached together with the reductions delivered through the complementary measures (GSI, TPMS, LRRT and MAC) by 2012 (option 3A), and further progress would deliver type approval levels of 120 g CO_2/km (resp. -30 g CO_2/km) for the average new M1 (resp. N1) fleet sold in 2015 (thus delivering in total a next step in reductions reaching 115 g CO_2/km). Implementation of this alternative leads for option 3A to a cost effectiveness ranging from 62 to 107€/ton. This is however based on 2012 technology estimates, and it is expected that 2015 costs 2015 will be smaller due to e.g. technological breakthroughs. Furthermore the modelling is done with the same time horizon (2020) which thus minimises the benefits.

4.4. Social impacts

The three options considered have no perceptive impacts on employment as a whole in the EU25, although there may be job transfers within the EU and, to a limited extent, outside the EU, especially in the case of option 2. Less CO_2 emissions from passenger transport by road will contribute to reducing climate change and its impacts on the society. Some of the measures foreseen will contribute to reduced CO_2 emissions and enhanced road safety, and may thus contribute to reducing the number of car accidents.

5. COMPARING THE OPTIONS

	Option 1 (no policy change)	**Option 2**	**Option 3A**	**Option 3B**
CO_2 reductions	-	= (reference scenario) (399 to 403 Mt CO_2)	++ (415 to 421 Mt CO_2)	+ (411 to 416 Mt CO_2)
Cost-effectiveness	**n/a**	**84 to 132 €/t**	**25 to 59 €/ton**	**-11 to 17 €/ton**
Measurability	☺ (based on existing type approval)	☺ (based on existing type approval)	☺ (need to amend type approval for GSI, MAC and need for measurement procedure for LRRT)	☺ (idem as Option 2A)
Monitoring	☺ (decision 1753/2000/EC)	☺ (decision 1753/2000/EC)	☺ (need to adapt decision 1753/2000/EC to cover N1, and set up monitoring for LRRT, MAC, TPMS and GSI)	☺ (idem as Option 2A)
Accountability	☺ (stakeholder responsible clearly identified: car manufacturers)	☺ (stakeholder responsible clearly identified: car manufacturers)	☺ (stakeholders responsible clearly identified: car manufacturers, tyre industry, automotive suppliers)	😐 (stakeholders responsible clearly identified: car manufacturers, tyre industry, automotive suppliers but

	Option 1 (no policy change)	Option 2	Option 3A	Option 3B
				lack of certainty concerning the implementation taxation measures)

Options (3A) or (3B) seem the most promising, in view of their better cost-effectiveness, and higher overall CO_2 reduction at a 2020 horizon, compared to option (2). Essentially, options 3A and 3B present the same level of ambition for the various measures under consideration, but their impacts differs due to the impact of consumer demand measures under option (3B). **This latter option is the most cost-effective, ranging from -11 to 17 €/ton**, but subject to the active implementation of demand oriented measures (taxation). Member States have a clear responsibility in ensuring that option (3B) is implemented, which would lower compliance costs for manufacturers for the fuel efficiency framework to be proposed in 2007. The inclusion of an additional longer term objective for M1 and N1 vehicles whereby an average new fleet of 120 g CO_2/km (M1) and a -30 g CO_2/km reduction (N1 vehicles) would be delivered under type approval conditions at a 2015 horizon has a limited impact on the additional costs to the society but will provide the industry the necessary lead time to meet further improvements and go beyond 120 g CO_2/km.

6. MONITORING AND EVALUATION

In order to follow the progress in the reduction of test-cycle CO_2 emissions, an adaptation of the current monitoring mechanism as established under Decision 1753/2000/EC[9] will be required, in order notably to cover also light-commercial vehicles (N1). Regarding tyres, mobile air conditioners and tyre pressure monitoring systems, producers will have to demonstrate that their products comply with the new requirements to be proposed in the coming years.

[9] Decision n°1753/2000/EC of the European Parliament and of the Council of 22 June 2000 establishing a scheme to monitor the average specific emissions of CO from new passenger cars, OJ L 202, 10.08.2000