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**F1 558340 DT Regulation on two- or three-wheel vehicles and quadricycles
Executive Summary**

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**Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
on the approval and market surveillance of two- or three-wheel vehicles and quadricycles**

Executive Summary of the Impact Assessment

This executive summary of the Impact Assessment report commits only the Commission departments involved in its preparation and does not prejudice the final form of any decision to be taken by the Commission.

Lead DG: DG Enterprise and Industry

Commission Work Programme 2010

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EXECUTIVE SUMMARY

Background

'L-category vehicles' is a term covering a wide range of different vehicle types with two, three or four wheels, e.g. powered cycles, two- and three-wheel mopeds, two- and three-wheel motorcycles, and motorcycles with side-cars. Examples of four-wheel L-category vehicles, also known as quadricycles, are on-road quads used on public roads and mini-cars.

Category	Vehicle Name	Characteristic vehicles	Category	Vehicle Name	Characteristic vehicles
L1e	Moped		L5e	Motor Tricycles	
L2e	Three-wheel Moped		L6e	Light Quadricycles	
L3e	Motorcycle		L7e	Heavy Quadricycles	
L4e	Motorcycle with side car				

Figure 1: Examples of vehicles covered by the current Framework Directive 2002/24/EC

The L-category vehicle market has three main sub-sectors. The largest comprises 'powered two-wheelers' (PTW): powered cycles, mopeds, scooters and motorcycles. In all, the number of vehicles currently in circulation is approximately 30 million, according to Eurostat. In 2007, the PTW market in Europe amounted to 2.7 million vehicles, taking imports into account. In 2006, the PTW sector had a turnover of €34.1 billion and employed 159 100 people.

In 2008, the all terrain vehicle (ATV) sector employed 12 000 people and had a turnover of €2 billion according to its industry association, ATVEA. Around 595 000 ATVs were registered in the EU in that year.

The EU's mini-car sector, comprising solely SME manufacturers, accounted for a total of 340 000 vehicles in 2008, 1.1 % of the L-category vehicle fleet. The market is more mature in France, Spain, and Italy. Global sales for 2007 were 35 000 vehicles. The global market leader employed approximately 200 people in 2008, and produced 13 500 vehicles per year, including 1 500 electrical vehicles (200–300 utility vehicles). Mini-car manufacturers are often established in regions lacking a developed industrial network. Conversely, the mini-car industry supports a complex network of partners, on which 20 000 jobs depend in Europe.

Type-approval requirements for new L-category vehicles are currently set out in Directive 2002/24/EC (the 'Framework Directive'). In addition, a series of directives referred to in the Framework Directive contain detailed technical requirements.

As part of a review of the current legislation, a public consultation was conducted from 22 December 2008 to 27 February 2009 to seek the opinions of associations, companies and public authorities on key aspects of proposed measures relating to the type-approval of L-category vehicles. The opinions of stakeholders were sought especially on items perceived to be controversial, including the mandatory fitting of anti-lock brake systems on PTWs, revised emission limits for all L-category vehicles, and re-categorisation of vehicles into more appropriate subcategories. The opinions received were summarised in a report¹ and published on the Commission's website.

Two studies were carried out during 2008 and 2009 to evaluate the economic, social and environmental impacts of proposals relating to L-category vehicle type-approval. One was by TRL Ltd ('TRL report') on potential safety measures² and the impact of simplification on existing L-category vehicle legislation. The second study by the University of Thessaloniki ('LAT report') reported³ on environmental measures for L-category vehicles. Both policy reports were used as inputs for the impact assessment. The quantitative cost/benefit estimates in the

¹ http://ec.europa.eu/enterprise/automotive/consultation/2_3_wheelers/results_report.pdf.

² http://ec.europa.eu/enterprise/automotive/projects/report_new_measures_l_category.pdf.

³ http://ec.europa.eu/enterprise/automotive/projects/report_measures_motorcycle_emissions.pdf.

impact assessment were based on both reports and, with the exception of the costs for advanced brake systems, were deemed plausible and correct by stakeholders. ACEM, the European motorcycle industry association, also proposed a number of measures covering environmental and safety aspects of L-category vehicles in order to proactively address various environmental and safety concerns identified in the two reports

1. PROBLEM DEFINITION

The Commission has identified a number of key concerns associated with the current provisions for the type-approval of L-category vehicles:

- the complexity of the legal framework,
- the level of emissions and its increasing share in total road transport emissions, which are decreasing overall,
- safety aspects, and
- lack of a legal framework for new technologies

1.1. Complexity of the current legal framework

It has been pointed out to the Commission that the existing system for L-category vehicles is too complex and that there is therefore scope for simplification and international harmonisation.

The national authorities in charge of applying the Framework Directive are facing unnecessary additional costs in their attempts to operate in this complex regulatory framework.

L-category vehicles have to comply with a series of requirements found in a number of separate directives. The Framework Directive is linked to another 13 detailed technical directives, which themselves have been amended by 21 amending directives to reflect technical progress.

In addition, many directives contain references to regulations and standards applied worldwide, such as those adopted by UNECE⁴, which are also subject to amendment. Ultimately, the disparate nature of the regulations governing type-approval for L-category vehicles leads to a lack of legal and regulatory clarity. Constantly updating these can be a burdensome process and lead to additional costs for administrations and industry.

The administrative costs for public authorities in this 'no change' scenario are significant. Based on the cost estimates of six Member States, the cumulative cost to the EU27 Member States between 2009 and 2020 is estimated to be €3.1 million. This high cost will remain, and is likely to increase, if no simplification exercise is carried out to delete obsolete measures and reduce complexity.

1.2. High level of emissions

The engines of L-category vehicles emit undesirable by-products such as toxic air pollutants and greenhouse gases. Evaporative emissions from fuel storage and delivery are considered to be toxic as well. Toxic air pollutants, like certain hydrocarbons, are known or suspected to cause cancer or other serious health effects, such as reproductive or birth defects. Air pollutants may also cause other adverse environmental effects, such as acid rain or smog.

The introduction of the Euro 5 & 6 emission standards for passenger cars and Euro VI heavy-duty emission standards means that the contribution of L-category vehicles will become increasingly important in the years to come. For example, it is estimated that the total evaporative and exhaust hydrocarbons (THC) emitted by L-category vehicles will increase from a share of 38% to **62%** of the total hydrocarbon emissions of the entire road transport sector by 2021, if no additional measures are taken. This is mainly due to the significant reductions in hydrocarbon emissions from other road transport categories. Mopeds are already today one of the most significant contributors to hydrocarbon emissions, and are expected to account for **38%** of total hydrocarbon emissions from road transport by 2020.

⁴ <http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29pub/wp29pub2002e.pdf>.

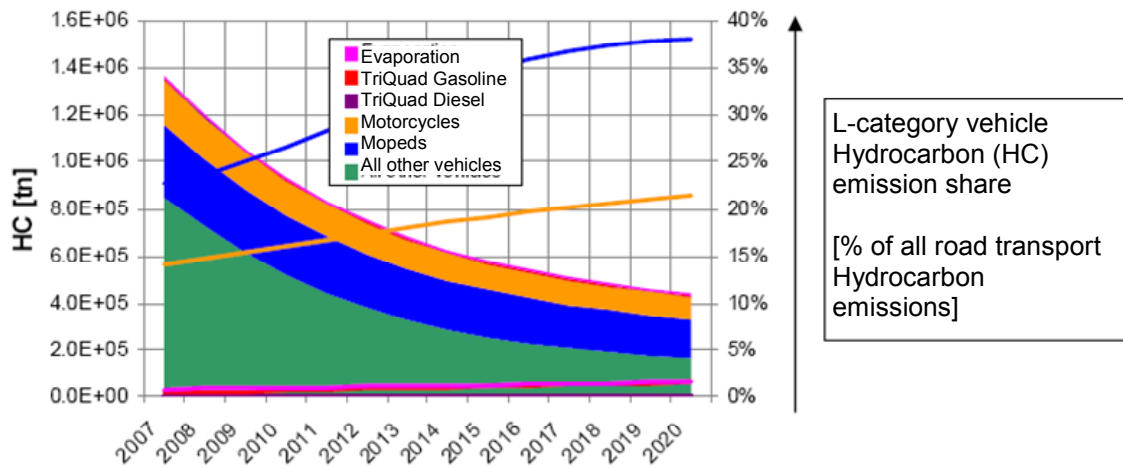


Figure 2: For L-category vehicles, trend over time in absolute and relative shares of hydrocarbon emissions, assuming no change in policy⁵.

The share of CO emitted by L-category vehicles is already very high, and is expected to rise from about **20%** to around **36%** of total road transport emissions in 2020. In a number of southern European cities, PTWs are banned from city traffic in the event of a fine-dust alarm on hot summer days to prevent excessive particulate emissions. As L-category vehicles are responsible for only 3% of total road transport mileage, their pollutant emissions are considered disproportionately high.

The present legal framework governing emissions by L-category vehicles was adopted in 2002. Since then, technology has evolved rapidly. Given the wide diversity of vehicle construction, design and propulsion technologies now on the market, the current legal framework is no longer up to date.

The non-toxic greenhouse gases (GHGs) emitted by PTWs, e.g. CO₂, represent overall a very small share of total road transport emissions. However, it is not obvious to the average consumer if a vehicle is fuel-efficient and what level of CO₂ it emits, as there are currently no labelling requirements (unlike for passenger cars). To inform the consumer in a clear, concise and harmonised way, objective measurement data are needed, e.g. measurements of CO₂ emissions and fuel consumption in type-approval demonstration testing, which can then be used as a basis for a labelling scheme later on. The type-approval requirement to determine this objective data by the manufacturer is currently not mandatory for L-category vehicles, which is a concern.

Emissions by older vehicles may significantly exceed the limits after only 20 000 km of driving, as there are no durability requirements in the Framework Directive. Durability is measured by emission testing of aged vehicles and their exhaust after-treatment components that have accumulated e.g. in the case of motorcycles 50 000 km before introducing a vehicle on the market, as demonstrated by the manufacturer to the type-approval authorities. These requirements are already in force in other parts of the world (USA, India, China, Thailand, Taiwan and Singapore) and also apply to other road vehicle categories in the EU (cars, trucks).

Finally, a clean vehicle may turn into a high polluter if an emission-relevant component or system fails or degrades. This calls for:

- Notification of the driver through e.g. a malfunction indicator light that an essential vehicle system or component is not operating according to its technical specification or fails;
- Availability of and easy access to standardised diagnostic information. The on-board diagnostic system can make this information available so that the vehicle can be repaired effectively and efficiently;
- Access to repair and maintenance information developed by the manufacturer of the vehicle. Unfortunately, this is currently only possible for contract repair shops, not for independent dealers nor for vehicle owners, which not only is a competition problem but also has high pollutant emissions and possibly safety concerns as negative side-effects.

1.3. High road fatalities and safety risks

L-category drivers face a much higher risk of fatal or serious accidents than other drivers. The fatality rate per million kilometres travelled is, on average, **18** times greater than for passenger cars. In 2006, L-category

⁵ NB. 'All other vehicles' includes passenger cars, delivery vans, trucks and buses. Source: LAT report. Primary Y-axis (left): HC = hydrocarbon emissions; 2.0E+05 = 200 000, 1.0E+06 = 1 000 000, 1 t = 1000 kg. Secondary Y-axis (right): share of L-category vehicles as % of all road transport hydrocarbon emissions

vehicles accounted for **2%** of the distance travelled but **16%** of road deaths in the EU-25 (ETSC, 2007). Furthermore, while other vehicle types have seen significant decreases in fatalities and serious injuries over time, the figures for L-category vehicles have remained static or even slightly increased.

In 2008, **5,520** PTW riders **died** in road accidents. In addition the number of **serious injuries** is estimated to be **5.5 to 13 times higher** than the number of fatalities (30 000 – 72 000 riders). The number of **slight injuries**, which is even more difficult to estimate, might be between **12 to 28 times higher** (66 000 – 155 000 riders) in the EU-27.

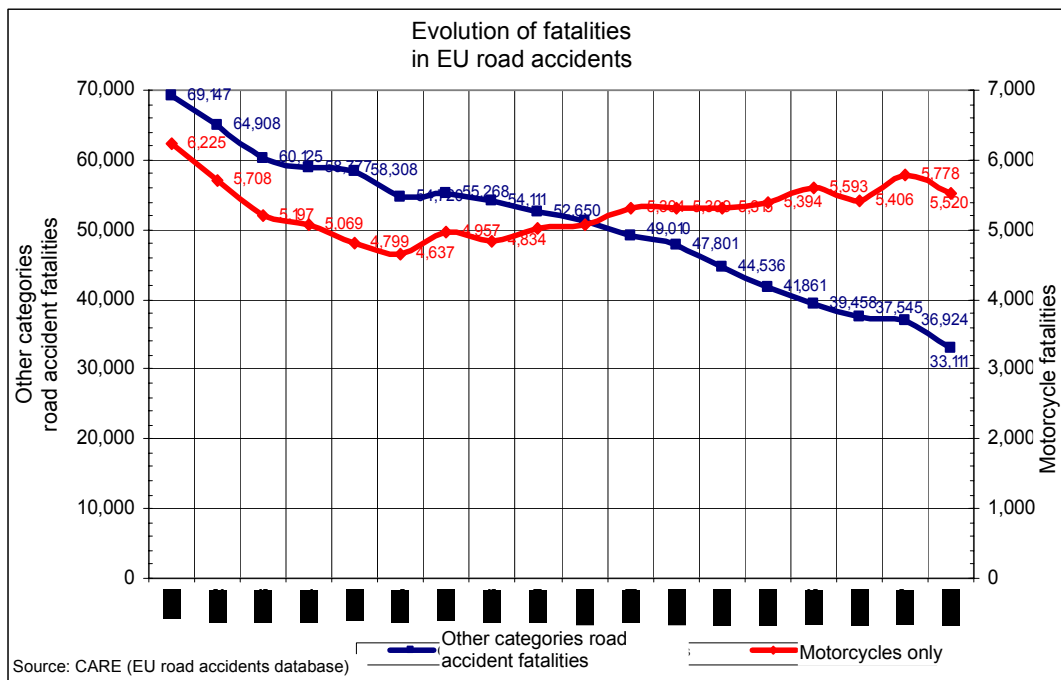


Figure 3: Evolution in road fatalities among motorcycle riders in the EU over time

Tampering may improve driveability and engine performance at the cost of pollutant emissions and fuel consumption. Further, higher engine performance increases the maximum vehicle speed (illegally) beyond the ability of other vehicle components to cope, e.g. underperforming brakes. This can result in an unsafe vehicle for both the rider and the environment. For this reason, anti-tampering measures are included in the current Framework Directive for mopeds and less powerful motorcycles. However, due to the shift from mechanical to electronic engine control and the increasing use of other types of propulsion (e.g. electrical or hybrid engines), the current measures may no longer be effective or may even be obsolete.

Mini-cars are defined as four-wheel vehicles with limited performance and mass. The problem with these vehicles is that drivers may assume the same level of active and passive safety as in passenger cars. However, their design concept, lower maximum speeds and less strict type-approval requirements mean that this assumption is not necessarily correct. The lower safety of mini-cars in comparison with passenger cars is therefore identified as a concern.

Another area of concern for safety is that quads designed to be used off-road (all-terrain vehicles) are frequently driven on public roads. As their name suggests, these vehicles are mainly intended to be used off-road. However, their use on public roads between trail routes is virtually unavoidable in Europe. Using ATVs on the road may raise safety issues because of their high acceleration capability and their high centre of gravity, which can result in the vehicle rolling while cornering. In order to perform well in terrain, these vehicles are not equipped with a differential on the powered axle, which is a basic safety feature for driving on hard-surfaced public roads. In a number of EU cities, their use is prohibited for safety reasons.

Gaseous fuels, for example CNG, LPG and hydrogen, are perceived by consumers as dangerous and as a potential safety risk, although they may provide significant environmental benefits. Hydrogen technology may not be sufficiently mature to be fitted on L-category vehicles.

1.4. Lack of a legal framework for new technologies

L-category vehicle technology has evolved very fast over the last decade. The development of the associated legislation has been much slower, with the result that certain vehicles can no longer be allocated to the right L-vehicle category and a number of current measures are no longer appropriate. On-road quads, off-road quads and mini-cars currently all come under the same category, L7e, and are all subject to the same requirements.

However, quads and mini-cars are inherently so different in design that they each require specific legal requirements to be safe and comply with appropriate environmental standards. Low-power electric bicycles (less than 250 W, up to 25 km/h) currently fall outside the legal framework. In addition, more powerful bicycles of up to 1000 W are also becoming very popular throughout the EU. At the moment, these more powerful bicycles (over 250 W, more than 25 km/h) are classified as mopeds. These bicycles must hence comply with the type-approval requirements for vehicles with combustion engines, which are not appropriate for a purely electric vehicle.

2. SUBSIDIARITY

Prior to EU type-approval for L-category vehicles, regulations were established at Member State level. The legislation adopted by Member States often differed and manufacturers selling on several markets were obliged to vary their production for each market and have their vehicles tested in each Member State in question, which was time-consuming and costly. Different national rules consequently hindered trade, and had a negative effect on the internal market.

It was therefore necessary to establish standards at EU level, especially to tackle EU-wide concerns regarding safety and the adverse health and environmental effects of air pollution. High emissions in local urban settings may be controlled by measures taken by individual Member States, but global emissions do not stop at borders. This concern can only be addressed by harmonised, EU-wide measures. Such a rationale is still valid today, as EU action is needed to avoid fragmentation of the internal market and to ensure a high and equal level of protection across Europe.

A further added value of EU legislation is that harmonised legal requirements allow industry to profit from economies of scale: for instance, products can be made for the whole European market, instead of being customised to obtain national type-approval for every single Member State. Consumers will benefit from lower product prices, which are constantly under pressure owing to EU-wide competition.

3. OBJECTIVES OF THE EU INITIATIVE

The objectives of the initiative are to **simplify** the current legal framework, to contribute to a **lower, more proportionate** share of overall road transport **emissions**, and to **increase vehicle safety** for new vehicles entering the market.

The specific **simplification objective** is to develop a less complex regulatory approach that ensures greater efficiency, less time loss and less burdensome adaptation to technical progress and which eliminates duplication of international standards, so that stakeholders are not confronted with several sets of different requirements addressing the same concern.

The specific objective for **emissions** is to keep the share of L-category vehicle emissions in total road transport emissions at least constant compared to current levels, or preferably to reduce them in proportion to actual use/total mileage compared to other road vehicle categories. Evaporative emissions may also need to be addressed.

The specific **safety objectives** are to help achieve the same high reductions in road accident fatalities and casualties as for other means of road transport, with the falling trend in passenger car fatalities since 2000 as the benchmark, to maximise accident mitigation to prevent serious and minor injuries as much as possible, and to help close the gap between actual road accident fatalities and casualties and the medium- to long-term road safety targets.

Finally, a number of technology developments should be reflected in legal requirements at EU level in order to allow the industry to type-approve a product only once and then to place not only certified products on the EU internal market but also in countries that opt to apply UNECE regulations.

4. OVERVIEW OF ASSESSED POLICY OPTIONS AND PREFERRED OPTIONS

A number of options have been analysed for each of the objectives (preferred options indicated in blue):

Simplification of existing EU legislation	<p>(1) No policy change;</p> <p>(2) Repeal current directives and replace with a minimum number of regulations;</p> <p>(3) Recast the current Framework Directive 2002/24/EC and its implementing measures.</p>
Environmental measures: new or revised measures for the type-approval of new vehicles	<p>Policy options for new emission limits:</p> <p>(1) No action;</p> <p>(2) New emission limits for L1e mopeds: a cold-start R47 test cycle and a 30 % cold weighting factor;</p> <p>(3) the motorcycle industry proposal (short–medium term);</p> <p>(4) New measures based on the best available technology;</p> <p>(5) New limits for all L-category vehicles equivalent in absolute terms to Euro 5 for passenger cars (long-term).</p> <p>Use of a revised World Motorcycle Testing Cycle (WMTC) for all L-category vehicles:</p> <p>(1) No change;</p> <p>(2) Use of the revised World harmonised Motorcycle Testing Cycle (WMTC) for all L-category vehicles</p>
Environmental measures: new or revised measures for the type-approval of new vehicles, continued	<p>Type-approval requirement for CO₂ measurement and fuel consumption determination and reporting:</p> <p>(1) No change;</p> <p>(2): Actual introduction of type-approval requirements for CO₂ measurement and fuel consumption determination and reporting.</p> <p>Evaporative emissions test and limit:</p> <p>(1) No change;</p> <p>(2) Replacement of all current carburetted models with fuel injection models;</p> <p>(3) Evaporative emissions test and limit ensuring evaporative emission control for all L-category vehicles.</p> <p>Durability requirements:</p> <p>(1) No change;</p> <p>(2) Deterioration reduced to 10 % over useful life and linear extrapolation for higher mileages;</p> <p>(3) Useful life increased by 60%, i.e. equivalent to the increase for passenger cars upon the move from Euro 3 (80 000 km) to Euro 5 (160 000 km).</p>
Environmental measures: new measures to control vehicle emissions from vehicles in use	<p>In-use conformity (IUC) testing and limits:</p> <p>(1) No change;</p> <p>(2) IUC procedure mandatory for all Euro 3 motorcycles.</p> <p>On-board diagnostic (OBD) systems and access to repair information:</p> <p>(1) No change (no introduction of OBD systems and/or access to repair information);</p> <p>(2) Use of OBD systems similar to those in passenger cars (European OBD), including catalyst efficiency and misfire monitoring. Provision for access to repair and maintenance information, as for passenger cars;</p> <p>(3) Use of best available technology (BAT): minor malfunction monitoring (e.g. circuit integrity check) (OBD stage 1) for all L-category vehicles, no catalyst efficiency monitoring. Provision for access to repair and maintenance information, as for passenger cars.</p>
Safety measures: type-approval measures for new vehicles	<p>Obligatory fitting of advanced brake systems:</p> <p>(1) No change;</p> <p>(2) Anti-lock brake systems on all PTWs;</p> <p>(3) Anti-lock brake systems on PTWs with cylinder capacity⁶ > 125cm³ and advanced brake systems (combined brake systems and/or anti-lock brake systems) on motorcycles with 50 cm³ < cylinder capacity ≤ 125 cm³;</p> <p>OR</p> <p>(4) Obligatory fitting of advanced brake systems on motorcycles that conform to the performance criteria for the A2 driving licence⁷. Obligatory fitting of anti-lock brake systems on all other L3e motorcycles;</p> <p>(5) Industry self-regulation.</p>

⁶ The figure of 125 cm³ relates to the thresholds in Directive 2006/126/EC (recast Driving Licence Directive) for class A1: motorcycles with a cylinder capacity not exceeding 125 cm³, of a power not exceeding 11kW and with a power/weight ratio not exceeding 0.1 kW / kg.

⁷ Thresholds from Directive 2006/126/EC (recast Driving Licence Directive) class A2: 1) power not exceeding 35 kW, with 2) a power/weight ratio not exceeding 0.2 kW / kg, and 3) not derived from a vehicle of more than double the power.

	<p>Anti-tampering measures: (1) No change; (2) Repeal Chapter 7 of Directive 97/24/EE, currently obsolete anti-tampering measures; (3) New anti-tampering measures.</p> <p>74kW power limitation for motorcycles (1) No change; (2) Repeal option given to Member States to limit power to 74kW; (3) Set a harmonised limit of 74kW; (4) Use an alternative limit, e.g. power to mass ratio.</p>
Improved categorisation of L-category vehicles	<p>Re-categorise vehicle types such as electric bicycles, tricycles (L5e) and quadricycles (categories L6e and L7e): (1): No policy change; (2): Exclude quadricycles and electric bicycles and tricycles from the Framework Regulation; (3): Return to the original spirit of the legislation for mini-cars; (4): Improve the legislation by adding new requirements for mini-cars based on car requirements; (5): Refine the vehicle categories by introducing specific subcategories in L1e, L5e, L6e and L7e. Add new/revised requirements for these subcategories.</p>
	<p>Specific requirements for category L7e vehicles (1): No policy change; (2): Exclude off-road quads (ATVs) from the Framework Regulation and add new safety and emission requirements for on-road quadricycles (on-road quads and mini-cars); (3): Keep the existing L7e category and add new safety requirements for all quadricycles; (4): Create new categories in L7e with specific requirements for off- and on-road quadricycles .</p>
	<p>Specific requirements for alternative fuels and propulsions (1) No change (legislation at national level); (2) Legislation at EU level through a more refined vehicle categorisation with specific measures for different vehicles and propulsion technologies.</p>

Table 1: Overview of assessed policy options and preferred policy options

5. ASSESSMENT OF IMPACTS AND CONCLUSIONS

Options were analysed in terms of the degree to which they would contribute to the objectives. Where data were available, a qualitative and quantitative analysis was made of all policy options. In other cases, only a qualitative analysis was conducted to examine the economic, environmental, safety and social impacts per option. In the final step, the advantages and disadvantages of the different options were compared in terms of effectiveness, efficiency, and coherence. The main impacts of the preferred options are presented below.

5.1. Simplification of existing EU legislation

Preferred option 2: Repeal current directives and replace with a minimum number of regulations. **Expected impacts:** benefits for national type-approval authorities, such as: **(1)** after initial investment, reduced annual costs of regulatory system, **(2)** no transposition and reduced translation costs. Over 2009 to 2020, the benefit for national authorities compared to the baseline is estimated at €1.12 million. Benefits for industry, including SMEs, and consumers: **(3)** standardisation of component and vehicle design, leading to economies of scale for industry and to lower consumer prices. The monetary benefits for industry and consumers could not be quantified.

5.2. Environmental measures: new or revised measures for the type-approval of new vehicles

5.2.1. Policy options for new emission limits

Preferred option 3: the motorcycle industry proposal for the short to medium term (2014 – 2017) and option 5 (the Euro 5 emission limits for passenger cars) for the long term. **Expected impacts:** **(1)** reduced emissions from new vehicles from 2009 to 2020: CO (-16%), HC (-15%), PM (-37%), and NOx (-27%); **(2)** best estimate of total cost (NPV) to industry for 2009–2020: € 7.6 million.

5.2.2. Emission laboratory test cycle

Preferred option 2: use of a revised World Motorcycle Testing Cycle (WMTC) for all L-category vehicles
Expected impacts: **(1)** economies of scale for manufacturers selling L-category vehicles globally, possibly lower costs passed on to consumers, resulting in lower vehicle prices; **(2)** better simulation of real-world driving conditions; **(3)** increased transparency for consumers, allowing them to compare different vehicle types in terms of fuel consumption, CO₂ emissions and pollutant (HC, CO and NOx) emissions.

5.2.3. Type approval for CO₂ and fuel consumption, vehicle labelling

Preferred option 2: Type-approval requirement to only determine and report CO₂ emission and fuel consumption

Expected impacts: **(1)** objective information for consumers on actual CO₂ emissions and fuel consumption to support decisions to purchase more fuel-efficient vehicles; **(2)** transparency of vehicle performance in terms of

fuel efficiency within the L-category (L1e to L7e), also providing a basis for comparison with other modes of transport; **(3)** marginal increase in costs anticipated, depending on competition in the market the industry may opt to transfer this cost to consumers or to absorb it.

5.2.4. *Evaporative emissions test and limit*

Preferred option 3: evaporative emissions test and limit for all L-category vehicles **Expected impacts:** **(1)** significant further decrease in evaporative HC emissions by PTWs only (see also 5.2.1) of approx. 2800 t by 2020; **(2)** the best estimate of the cost to manufacturers is €513 million for PTWs.

5.2.5. *Durability requirements*

Preferred option 2: deterioration limited to 10% over useful vehicle life (e.g. 12 000 km for L1e mopeds, 50 000 km for L3e motorcycles, etc.) with linear extrapolation for higher mileages. **Expected impacts:** **(1)** estimated emission reductions in EU15 by 2020: HC: 12 500 t; CO: 75 500 t; and NOx: 3 400 t; **(2)** better vehicle quality due to increased durability of emission-relevant components, e.g. catalytic converters; **(3)** increased compliance costs for manufacturers may translate into higher consumer prices, but this could not be quantified.

5.3. **Environmental measures: new measures to control vehicle emissions from vehicles in use**

5.3.1. *In-use conformity (IUC) testing and limits*

Preferred option 1: no change. **Expected impact (1)** considered not feasible for practical reasons.

5.3.2. *On board diagnostic (OBD) systems and access to repair information*

Preferred option 3: use of best available technology: minor malfunction monitoring (e.g. circuit integrity check) (OBD stage 1) for all L vehicle categories (L1e — L7e), no catalyst efficiency and misfire monitoring; provision for access to repair and maintenance information, as for passenger cars. **Expected impacts:** **(1)** significantly reduced environmental impact from malfunctions; **(2)** standardised malfunction information available to independent repairers, reducing cost and time needed to diagnose malfunctions; **(3)** use of OBD as an alternative to gaseous tests in periodical technical inspection (PTI) if applied, as for passenger cars; **(4)** low additional investment in technology (hardware and software) for manufacturers, as OBD stage-I features are available industry-wide (but not yet standardised).

5.4. **Safety measures for the type-approval of new vehicles**

5.4.1. *Obligatory fitting of advanced brake systems*

Preferred option 3: anti-lock brake systems on PTWs with cylinder capacity⁶ > 125cm³ and advanced brake systems (combined brake systems and/or anti-lock brake systems) on motorcycles with 50 cm³ < cylinder capacity ≤ 125 cm³;

OR

Preferred option 4: obligatory fitting of advanced brake systems on motorcycles meeting the performance criteria for the A2 driving licence⁷; obligatory fitting of anti-lock brake systems on all other L3e motorcycles.

Expected impacts: **(1)** significant reduction in road fatalities and casualties; best estimate for long-term (2011–2021) reduction in fatalities: **5332**; **(2)** best estimate of cost to industry (2011–2021): €3.46 billion; **(3)** best estimate of benefit to society due to reduced fatalities: €4.54 billion; fewer serious injuries: €1.4–3.3 billion, fewer slight injuries: €184–409 million; **(5)** best estimated benefit/cost for accident prevention (2011–2021): 2.4 – 3.2, Best estimated benefit/cost for lower casualties (2011–2021): 2.0 – 2.6

5.4.2. *Anti-tampering measures*

Preferred option 3: new anti-tampering measures. **Expected impacts:** **(1)** prevention of adverse effects of tampering such as increased fuel consumption and noise, pollutant and CO₂ emissions; **(2)** possible short-term adverse economic effects on certain after-market suppliers, which supply equipment and services for particular modifications of current vehicle technology resulting in adverse effects on safety and the environment.

5.4.3. *74kW power limitation for motorcycles*

Preferred option 2: repeal the option given to Member States to limit power to 74kW. **Expected impacts:** **(1)** no significant drop in overall safety anticipated; **(2)** reduction of burden on vehicle manufacturers.

5.5. **Improved categorisation of L-category vehicles**

5.5.1. *Re-categorise vehicle types such as certain electric cycles and quadricycles.*

Preferred option 5: introduce specific subcategories. Add new/revised requirements for these subcategories. **Expected impacts:** **(1)** Possible additional compliance one-off cost for manufacturers; **(2)** improved consistency of the regulatory system; **(3)** improvements in safety, noise, CO₂ and pollutant emissions, and in fuel consumption.

5.5.2. *Specific requirements for category L7e vehicles (quadricycles)*

Preferred option 2: create a new subcategory for on-road quads and one for mini-cars. **Expected impacts:** **(1)** possible additional compliance cost incurred by manufacturers for e.g. on-road quads, with the need for vehicles to comply with revised criteria **(2)** improved consistency and coherence of the regulatory system; **(3)** improved

safety, noise, CO₂ and pollutant emissions, and fuel consumption for on-road quads and mini-cars; **(4)** all-terrain vehicles (ATVs) will come under the Machinery Directive with regard to safety measures and under the Non-Road Mobile Machinery Directive as regards environmental measures.

The initially preferred option 4, with category L7e subdivided into three subcategories (L7A: on-road quads; L7B: off-road quads, i.e. all-terrain vehicles (ATVs); and L7C: mini-cars), unfortunately had to be abandoned as the new Regulation only covers on-road vehicles or those registered for public road use and because ATVs and on-road quads cannot be sufficiently distinguished on the basis of design criteria that are hard or expensive to modify.

5.5.3. *Specific requirements for gaseous alternative fuels and alternative propulsions (electric, hybrid)*

Preferred option 2: legislation at EU level through a more refined vehicle categorisation with specific measures for different vehicles and propulsion technologies. **Expected impacts:** **(1)** gaseous fuels in general: environmental benefits, e.g. lower emissions of particulate matter, non-methane hydrocarbons and CO, similar level of NO_x emissions; **(2)** simplified legislation through clearer, more appropriate measures, with elimination of obsolete or redundant requirements; **(3)** possibility to include international standards (CEN / UNECE). Hydrogen technology for powered two wheelers was considered to be not mature at the time of analysis (2009).

6. MONITORING AND EVALUATION

6.1. Simplification of existing EU legislation

The following issues should be assessed by the Member States to ensure that the existing EU legislation has indeed been simplified: key cost parameters used as the basis for analysis; number of amendments required to relevant directives per year; ongoing costs to Member States of implementing the current system; number of type approvals per year; time taken to implement regulatory changes, vehicle designs and standardisation; number of technical-standard group meetings; travel costs and number of attendees. Feedback from industry and other stakeholders must be included in this assessment.

6.2. Environmental measures for vehicle type-approval

Three years after first application, the new legal framework should be reviewed by the Commission to determine whether the assumptions and modelled emissions conform to reality. Included in this review should be whether the additional promotion of electric vehicles would address the disproportionately high emissions from L-category vehicles equipped with combustion engines. In addition, it should assess the need to include off-cycle emission provisions beyond 2020 for vehicles equipped with such engines. The long-term preferred option 5 should be confirmed by an environmental effect study. Further monitoring and evaluation by Member States will be required after or during the period when option 3 is in force.

6.3. Safety measures for the type-approval of new vehicles

In order to monitor the effect of any change in legislation, the number of motorcycle casualties should be monitored by the Member States, preferably in relation to the engine capacity of the motorcycle, the equipment fitted and the rider's driving licence category. The quality of the present impact assessment was influenced by the lack of reliable non-fatal casualty data, requiring some broad assumptions to be made. The availability of reliable data in this area would enable these assumptions to be verified and permit a more accurate evaluation of the effect of proposed changes. There was minimal information available on the cost and effectiveness of combined brake systems. Data from research studies similar to those on anti-lock brake systems would increase the confidence in the estimated social impact of casualty prevention.

6.4. Improved categorisation of L-category vehicles

Significant uncertainties remain regarding key costs in the approval process and in the safety and environmental impacts of the proposed options. These should be monitored and further data obtained by the Commission and the Member States to refine the assessment of impacts. More detailed accident data are required to provide information on the safety of quadricycles and to allow the impact of any measures to be assessed. A more specific categorisation of L1e, L6e and L7e vehicles would allow the safety impact of future measures to be monitored more effectively.