



## **PUBLISHED PROJECT REPORT PPR652**

### **International L-category approval in the area of environmental and propulsion performance requirements Revision of UN Regulations and Global technical regulations**

Mid-term report on the progress of the project

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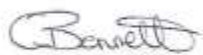
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## 1 Introduction

On 4<sup>th</sup> October 2010, the European Commission adopted a proposal for a Regulation of the Council and European Parliament on approval and market surveillance of two or three-wheel vehicles and quadricycles, as of now referred to as 'the codecision act'. A wide range of different light vehicles are within the scope of this codecision act, among others powered cycles, two- and three-wheel mopeds, two and three-wheel motorcycles, motorcycles with side cars, tricycles, light and heavy on-road quads and light and heavy quadrimobiles, covering both vehicles used for private and commercial purposes. The two or three-wheel vehicles and quadricycles are grouped under the family name "L-category vehicles", where the "L" stands for "Light".

In order to simplify the European type approval legislation requirements for L-category vehicles, following the CARS 21<sup>1</sup> agreement it has been decided that they can be replaced, where appropriate, with references to the corresponding regulations of the United Nations Economic Commission for Europe (UNECE). In parallel, Global Technical Regulations (GTR) are being established to globally harmonise certain aspects of vehicle legislation and these can be referred to as well where appropriate.

In the current EC directive on type-approval, although the various UN regulations are used, for example as a reference for the emission test cycle, the testing methodologies are not. For instance the EU has not acceded to UN regulations No 40 and 47. Still the vehicle speed traces detailed in those Regulations are used in EU type-approval legislation and are combined with pollutant measurement procedures which are close but not entirely aligned with the provisions set-out in those UN Regulations. The EU's mid- to long term goal is to allow vehicle manufacturers to type approve in accordance with the codecision act, where appropriate, by means of obtaining type approval under the relevant UN Regulations. To facilitate this, the various requirements of the latest EU proposals may need to be proposed as draft amendments to the current UN Regulations and/or entirely new UN Regulations and GTRs may need to be proposed. This requires an impact assessment for each measure, or logically grouped set of measures, that must include environmental, societal and economical aspects.

The aim of this project is to derive cost effective measures and various proposals for new UN Regulations and Global Technical Regulations in order to strengthen the world-harmonisation of L-category type approval legislation. This will also support the objective of the EU to replace legislative text in the Regulation for Environment and Propulsion Performance Requirements (REPPR) to the maximum extent possible with references to applicable UN Regulations.

To date, over the last two years, this project has performed the following tasks: stocktaking of legislation, consultation with stakeholders to understand the key areas already under thought and/or pertinent, a mailing to draw attention to the project and the associated proposed UNECE informal group, the creation of the UNECE informal group, the development of a roadmap for the informal group, and a questionnaire to all

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<sup>1</sup> European Commission, Enterprise and Industry Directorate-General (2006). CARS 21 Final Report, A Competitive Automotive Regulatory System for the 21st century from <http://ec.europa.eu/enterprise/sectors/automotive/competitiveness-cars21/cars21/>

stakeholders to both understand their needs and concerns as well as collect data required for a cost benefit analysis.

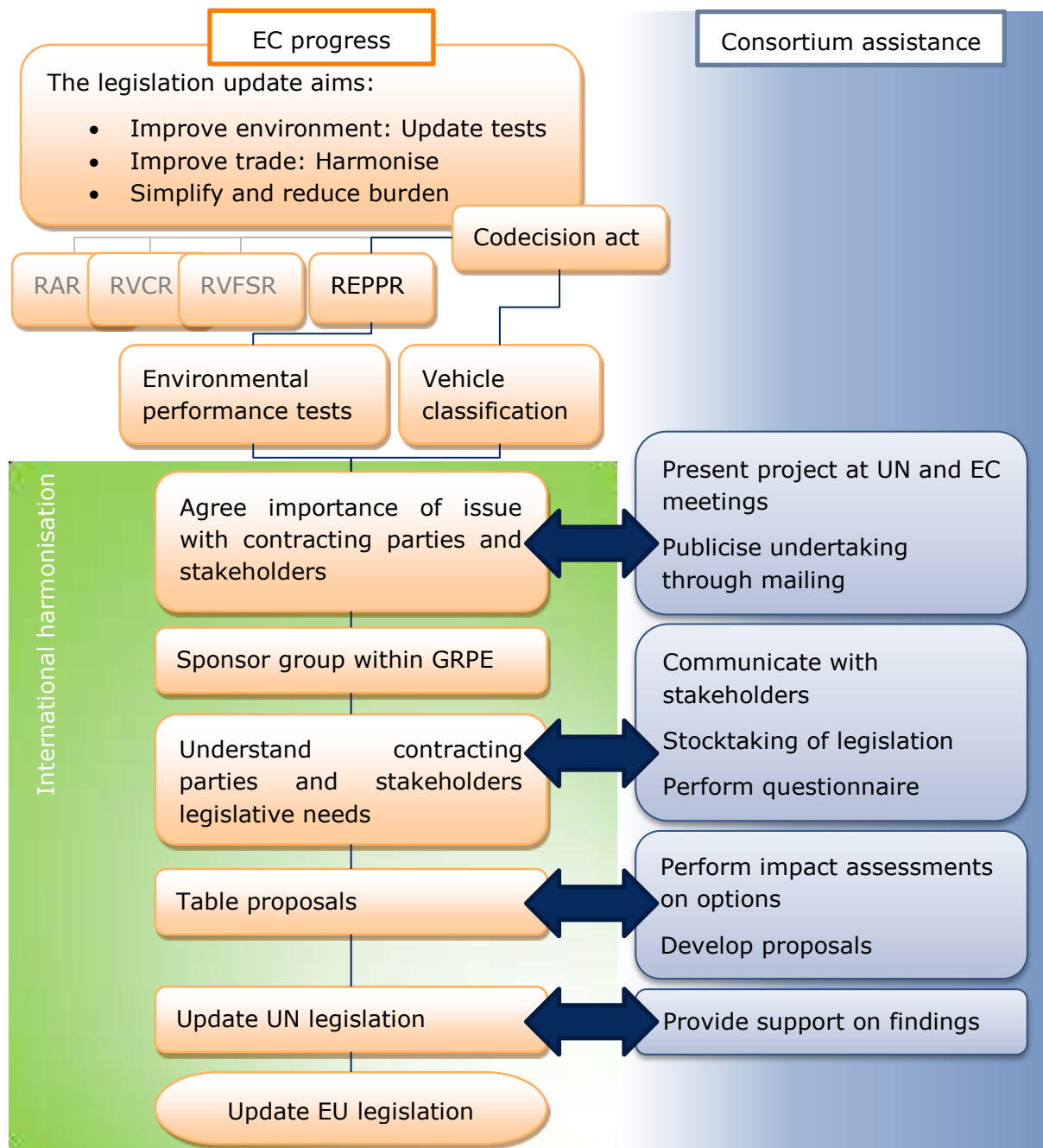
The next steps until completion of the project until January 2014 are to: collate and analyse all data received, provide this information to the UNECE informal group to assist them in their work, develop options for legislation based on the information provided by stakeholders for the full range of environmental and propulsion performance requirements of L-category vehicles, followed by proposals for legislation to be worked on further by the informal group for eventual submission to WP.29 and accession into international and regional legislation.

## 2 Project plan

### 2.1 Overview

This project to help harmonise legislation is led by the European Commission, on behalf of the EU through the UNECE’s framework for globally harmonised vehicle legislation. The project consortium, made up of Ecorys and TRL, is providing a range of supporting roles both to assist the EC and to provide an independent view on some key areas of their undertaking.

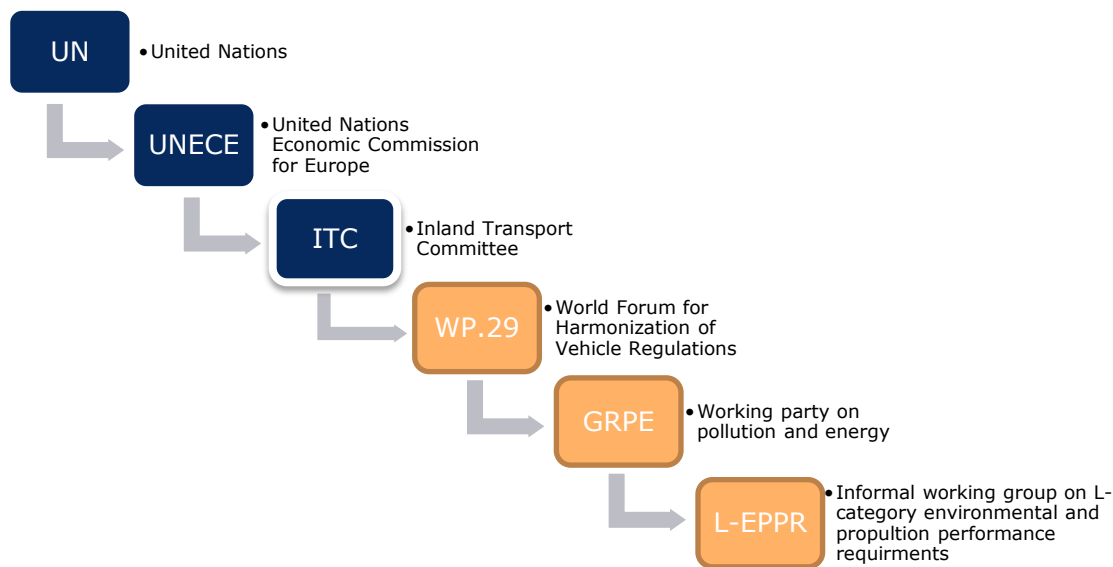
Figure 2-1 shows an overview of the EC’s intended process, with the consortium’s assistance for specific tasks shown on the right:



**Figure 2-1: Overview of the EC’s intended process**

The international harmonisation is being performed through the United Nations Economic Commission for Europe (UNECE). The UNECE was set up in 1947. It is one of five regional commissions of the United Nations<sup>2</sup>. Although called “European” many other regions have joined both the 1958 and 1998 Agreements in order to harmonise vehicle legislation at an international level.

A mandate (informal document: WP.29-158-15) was accepted at the 158<sup>th</sup> session of the WP.29 (13-16<sup>th</sup> November 2012) to establish an informal working group under the working party on pollution and energy<sup>3</sup>. The hierarchy of the UN system is shown below in Figure 2-2, the informal group is under the jurisdiction of WP.29.



**Figure 2-2: Informal working group hierarchy**

The aims of the informal group are summed up in item 2 of the proposal for the creation of the group:

"2. Through this initiative, the sponsor and the international partners that have shown an interest to collaborate on these topics aim to:

- "exchange information on current and future regulatory requirements in the area of environmental and propulsion performance requirements for L-category vehicles,
- "minimize the differences between these regulatory requirements, with a view toward facilitating the development of L-category vehicles to comply with such international requirements;
- "where possible, develop common requirements in the form of one or more UN Regulations and one or more UN Global Technical Regulations (UN GTR)."

The aims of the L-EPPR informal group are to have members from key international regions in terms of developing legislation together (among many others China, India, Japan, Korea and the USA), as well as industry groups and environmental groups such as NGO's.

<sup>2</sup> <http://www.unece.org/about-unece.html>

<sup>3</sup> <https://www2.unece.org/wiki/pages/viewpage.action?pageId=5800520>



As shown in Figure 2-1 the key tasks for the consortium are:

- Publicising the project;
- Collecting and stocktaking legislation, standards and proposals;
- Developing options for the group, and to perform an impact assessment on; and
- Developing the EC's proposals to submit to the group.

In addition the project consortium will assist the EC to present and negotiate the proposals at the WP.29.

Three areas of stakeholder consultation are being performed:

- Direct communications (including email, phone and face-to-face meetings)
- Publicising requests for information to be submitted (at UN and EC working group meetings as well as a wide scale email mailing); and
- Through a questionnaire.

Using these communication methods, the project aims to develop a good understanding of the current state and future needs of the various contracting parties and other stakeholders, and to use the information collected to perform impact assessments required.

## 2.2 Method

The main aim of the project is to develop proposals for legislation, which will be acceptable for adoption by WP.29; while adhering to the EU's requirements. All other tasks are designed to assist with this primary aim. See below for an explanation of the tasks:

- Create a UNECE informal group
  - The EC undertook the required legal and administrative tasks within the UNECE to create the informal group
- Publicise the endeavour
  - The consortium is performing steps to publicize the study and its importance, including a workshop and mailing
- Perform a stocktake of appropriate international legislation, proposals and opinions.
  - This will minimise the likelihood of missing a special requirement of a region. It may be that these different requirements are needed for good reasons and by seeing them early on in the process it may be possible to take such requirements into account.
- Undertake a questionnaire study to gather stakeholder views. This serves two purposes:
  - The first is to gain a further understanding of the opinions of the stakeholders, this feeds into the stocktake and choices made in developing the options
  - Its second purpose is to obtain numerical data which is required for the impact assessment. In order to cost any given option data such as the

cost of person/hours of a given skill level or the capital cost of a certain piece of test equipment needs to be weighed up against fleet sizes and use

- Develop future options.
  - With the guidance of the stocktaking, a set of options will be developed. This activity will highlight the main intentions of a given option, not specify wording. These options can then be distributed amongst the L-EPPR group for further discussion, and an impact assessment performed on a short listed number of them.
- Identify the best option for each regulatory requirement.
  - Using the results of the impact assessment the best option will be selected for each regulatory requirement (test area).
- Develop proposals:
  - With the options chosen, the proposals for each regulatory requirement (test area) and UNECE Agreement (1958 and 1998) can be written.
  - The options will provide the direction for certain changes and choices in the wording.
- Finally the developed proposals will be submitted to the L-EPPR group.

### **2.3 Test areas to be assessed**

The areas being covered in the project are environmental performance tests, together with the categorisation which is key to assigning which version of a specific test is used. These areas have been grouped to improve clarity:

- Categorisation
  - L-category vehicle classification (L1e-B, L3-A1 etc.)
- Propulsion performance
  - Maximum vehicle speed
  - Maximum propulsion power and torque
  - Maximum peak power
- Emissions (tailpipe related)
  - Type I test – Tailpipe emissions after cold start (over driving cycle)
  - Type II test – Idle emissions / free acceleration test
  - Type V test – Durability of pollution control devices
  - Type VII test - CO<sub>2</sub> emissions, fuel/energy consumption, and electric range
- Emissions (other)
  - Type III test – Crankcase emissions
  - Type IV test – Evaporative emissions
  - Type VIII test – OBD (on-board diagnostics) (environmental part)

## 2.4 International legislation

For each of the areas a comparison of the differences can be used to see where harmonisation can be improved. To perform a full assessment 320 areas would need to be looked at. This is based on multiplying the 10 test areas (including the categorisation), 8 regions (including the EU, UN and international standards), L and M & N category and both current and proposed legislation.

A full assessment of all 320 areas is beyond the scope of this project. However by concentrating on the key areas that have been selected for each of the Regulatory requirements, these have been prioritised. Therefore, other areas will be subjected to a fuller analysis when it becomes apparent that pertinent information is available.

A table of these areas is shown below in Figure 2-3. The table highlights the legislation which is likely to form a base for the proposals and the key regions already using or working on updating testing methods:

**Figure 2-3: Table of legislation areas**

		L Categories		L Type I		L Type II		L Type III		L Type IV		L Type V		L Type VII		L Type VIII		L Max vehicle speed		L Max engine power	
		L	M & N	L	M & N	L	M & N	L	M & N	L	M & N	L	M & N	L	M & N	L	M & N	L	M & N	L	M & N
EU	Current																				
	Future																				
UN	Current																				
	Future																				
China	Current																				
	Future																				
India	Current																				
	Future																				
Japan	Current																				
	Future																				
USA (federal)	Current																				
	Future																				
USA (California)	Current																				
	Future																				
Standards	Current																				
	Future																				

Key:

Main base text



Work being performed



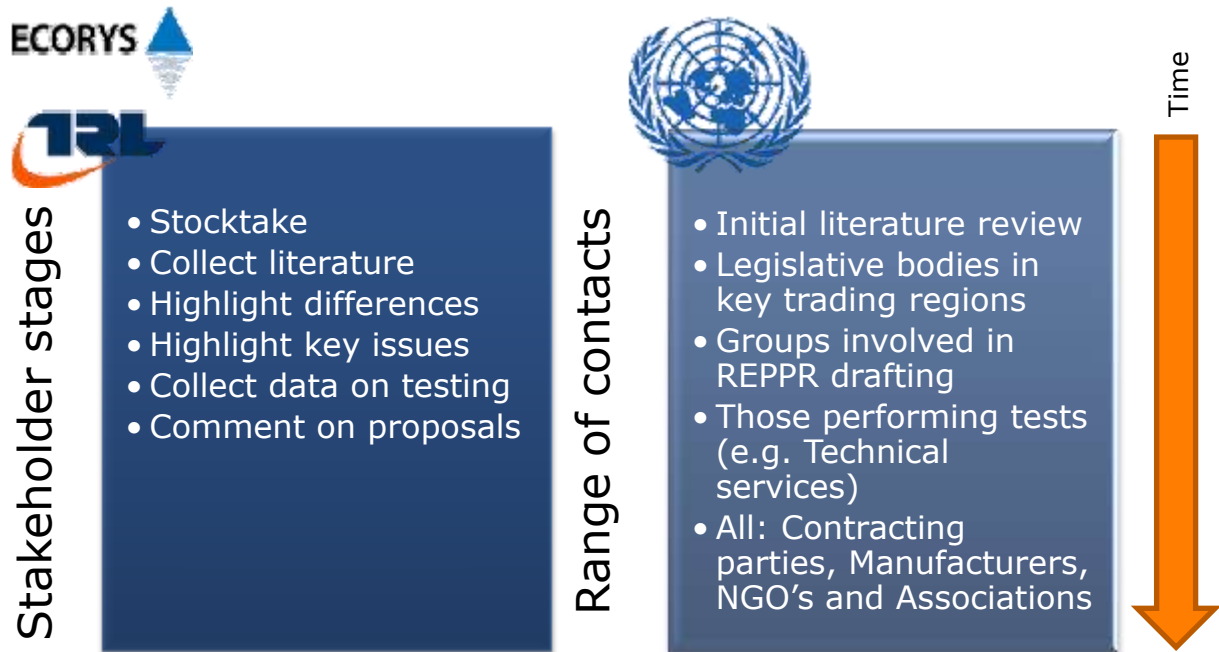
Other Legislation investigated



## 2.5 UN contracting parties and other stakeholders

A pivotal factor in this project is involvement from UN contracting parties and other stakeholders, because the project requires their assistance to gather all the information necessary to perform its proposed work, i.e. stocktake, impact assessment and proposal

development. Also, many stakeholders are members of the L-EPPR informal working group, and it is this group which will eventually develop and agree on the final legislation. Considering the breadth of the projects, it was reasoned that contacting everyone at once, for all of the test areas, would have caused more confusion than clarity. Therefore for the stocktake, a staged approach was taken (see Figure 2-4).

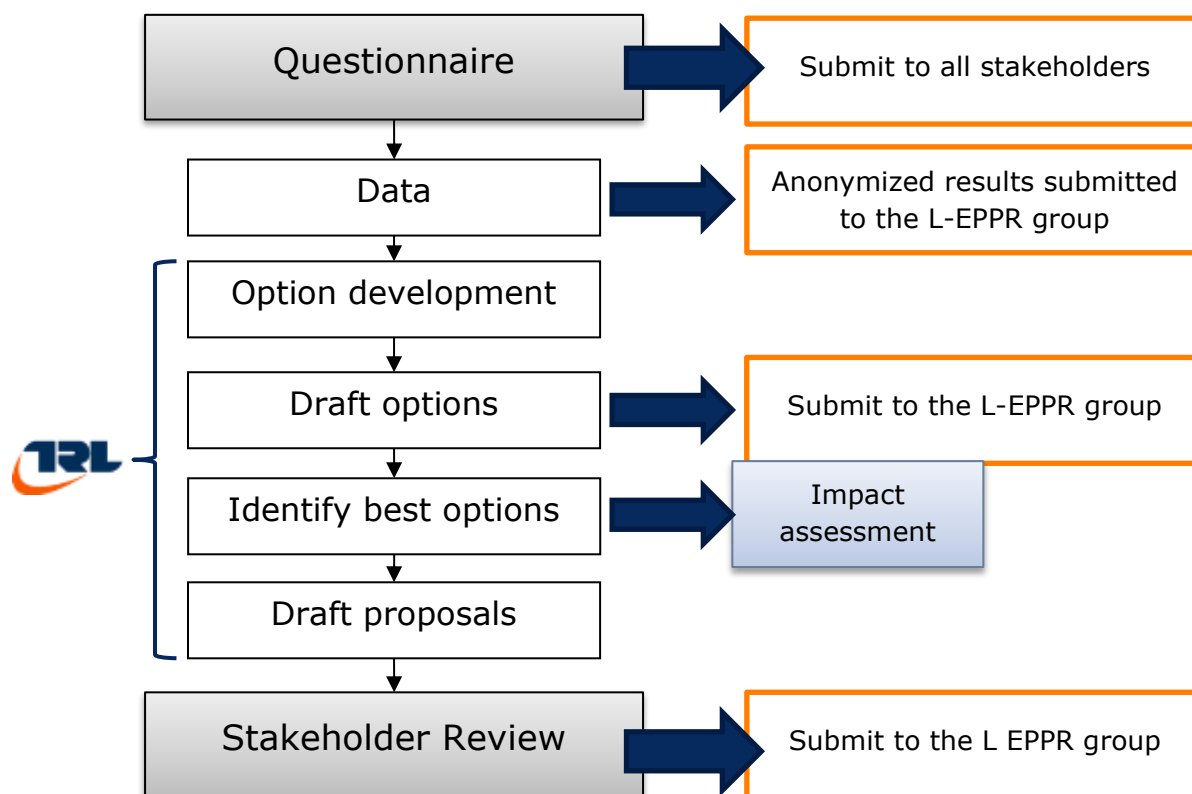


**Figure 2-4: Stocktake stakeholder involvement**

To create the informal working group within the UNECE, publicity was required. It was thought that other regions may not want to become involved with the topic. Therefore it was considered important in the presentations at the multiple EC meetings (MCWG) and UNECE meetings (GRPE) that in addition to the technical analysis the entire reasoning for the need for an update to the legislation was also given a high priority.

## 2.6 Impact assessment

The data collected from the questionnaire will assist in developing the options. Once these options are developed, other information requested from the stakeholders in the questionnaire will assist in performing the impact assessment for the developed options.



**Figure 2-5: Consultation process for benefit assessment (Primarily tasked to Ecorys with TRL collaborations at key points)**

Figure 2-5 shows an expanded view of just the questionnaire within the whole project structure. The key aim of the impact assessment is to help “Identify best options”. Data for the impact assessment will be collected through; desk research, the questionnaire and targeted in-depth interviews of the following groups:

- Governments
- Technical Approval Authorities
- Testing houses
- Manufacturers of whole vehicles and parts

The impacts will affect different stakeholders in different ways resulting from:

- Amendment of existing test types
- Introduction of new test types
- Global harmonisation of test procedure
- Global harmonisation of test equipment, tolerances, and definitions

All of the above effects may have effects in the areas of:

- Environmental
- Social (safety; employment)
- Economic (costs changes both positive and negative; competitiveness)

Therefore the pros and cons of any policy intervention need to be balanced with respect to all consequences and effects.

## 3 Progress

### 3.1 Impact assessment

The following section describes the design of the methodology and the decisions made in the development of the impact assessment process.

To date work has been performed to decide exactly what is needed from the data collected. This preliminary work helps to keep a clear view of the data needed, the contacts required and helped in the design of the questionnaire.

We were able to bring together a full view of data required for the questionnaire such as its double purpose, the ability to collect data on options without having those decided, and to gather the opinions at the same time.

The following stakeholders have been identified for the worldwide L-category vehicle market:

- Policy makers on EPPR
- Industry (vehicle manufacturers, suppliers and aftermarket)
- Rider or user organisations
- Technical Approval Authorities
- Technical Services

Each of these stakeholders will have a range of impacts due to new legislation. The following categories of impacts can be distinguished, including specifying examples of each category:

- Environmental:
  - L-category vehicles have an impact on the environment due to their emissions when used. Legislation on EPPR has an impact on these emissions.
- Social:
  - L-category vehicles have an impact on the safety of the user and other road users when used. Legislation on EPPR has an impact on the vehicle's functional safety through propulsion performance requirements.
  - Furthermore, the worldwide L-category industry is of considerable size, employing many people across the world. Changing legislation can have an impact on the amount of people required in developing and producing L-category vehicles.
- Economic:
  - The number of employees may possibly be affected by new legislation, cost changes may occur as well due to different test types.
  - Additionally, legislation can have an impact on the competitiveness of the different markets across the world: the level playing field may be affected in a negative or positive way.

- The legislation may have an effect on the market price of products due to the described effects on costs for manufacturers, testing houses and (type-) approval authorities.

By means of an online questionnaire, as well as through several additional in-depth interviews, the impact of possible new legislation on each of the mentioned stakeholders is determined: qualitatively, and where possible quantitatively.

For the impact assessment it is important to have a clear base to compare against. This is usually "business as usual": no additional changes to future plans. This situation is however in this case not straightforward, as it *could* mean that the currently proposed REPPR is considered accepted. Since this is not yet the case, it was decided that to be able to have an accurate as possible data set to compare against, the currently in use legislation is needed.

With this in mind a minimum of three options can be seen:

- Business as usual
- Legislative package applied in the EU only
- Full international harmonisation

These will of course be adjusted as the options and proposals are designed in line with the results from the stakeholder's responses.

Where possible, impacts will be quantified and monetised, however if found that this can only be performed to a small proportion of the data it will all be presented in a positive-unchanged-negative style.

### **3.1.1 Stakeholder contacts**

As shown in Figure 2-3, 5 regions (including USA federal and California as separate regions) are being assessed as the basis to the development of the harmonised legislation. Each of them has one or multiple areas where their legislation will need to be taken into account in the formulation of the new harmonised legislation.

In addition, other organizations outside this group including nations and suppliers have made direct contact in response to the call for assistance.

As illustrated in Figure 2-4 the project's number of contacts has increased as questions arose and gaps were identified. Starting with a simple web search for national legislation, text from the EC, UN, USA federal and California legislation was obtained to help gain an understanding of the current legislative situation. This process was assisted with expertise gained from the previous L-category studies for the EC which were linked to the USA federal durability procedure. Following this the USA was then engaged in email and phone communications to understand fully the differences with the Type V and Type IV tests.

Contacts in China were made and using these an insight into their current legislation and future developments was gained. Interestingly China intend to follow the EU's lead and are waiting on and intend to develop future legislation based on the REPPR.

Indian legislation was more difficult to obtain, however some parts are publicly available in English.

Japan has been the most difficult region as legislation is only available in Japanese (unless it refers to an international standard). However, as seen from the 1<sup>st</sup> session of the L-EPPR meeting in Geneva they have been performing valuable work in the areas of test type IV and VIII.

### **3.1.2 Mailing**

During the planning of the impact assessment work, it was found that the requirements of the stocktake were quite different to those of the questionnaire. In addition it was noticed that the proposed date for the questionnaire publication would be too late for it to be used to publicize the L-EPPR meetings.

Therefore it was decided to separate this activity into two tasks, namely the mailing (previously referred to by the UK English term mailshot) and the questionnaire.

The mailshot was intended to:

- Disseminate the requests for involvement as far as possible
- Fully explain the intentions of the endeavour (i.e. the EC's intentions and those of the project)
- To explain the scope (of both the vehicles under consideration and tests)
- Request assistance in obtaining legislation, proposals and opinions
- Request involvement in the proposed L-EPPR informal group (especially in terms of getting the main regions involved and have a balance of environmental and industry focused groups)
- To inform stakeholders that the questionnaire will be sent out and to allow them to prepare for it with internal discussion before hand
- To provide contacts and links to key documents to allow stakeholders to understand the project fully
- To give an overview of the intended time scales

Having all of this information clearly set out allows the stakeholders to use this one document as a central point for a clear overview of the whole project. It allows them to plan their intended involvement and reduced their need for further clarification.

The mailing was sent out to 1,437 email addresses compiled from GRPE, WP.29, and MCWG mailing lists, all the other additional contacts we have established during the course of this project and other relevant projects, plus the addition of contacts for relevant NGO's.

### **3.1.3 Questionnaire**

The questionnaire was developed in order to gather information on the wide range of impacts that a change in legislation may have for each of the different stakeholders. Additionally, the questionnaire aims to find the stakeholders' views on elements such as:

- General information on the stakeholders' position in the L-category industry
- Cost-effectiveness of current legislation
- Shortcomings and benefits of current legislation



- Possible synergies between other category vehicle legislation and L-category legislation
- The effect of possible new worldwide harmonised legislation on the level playing field of the L-category industry and other industry stakeholders (i.e. the removal of disadvantages in terms of trade for some regions)

The aim of the questionnaire was to gather as much input from as many stakeholders as possible, on each of the mentioned effects and different elements. This means that the questionnaire is mainly focussed on the worldwide harmonisation of EPPR for L-category vehicles, and not so much on the different test types. The test types are predominantly used in the questionnaire to determine the cost-effectiveness of possible new worldwide harmonised legislation, rather than acquiring detailed views of stakeholders with in-depth knowledge on the actual testing process of L-category approvals. For this detailed information, the more in-depth interviews have been used.

The questionnaire was launched on the 21/1/2013 and originally sent to 1,100 contacts, with further requests for links to the survey from the Department of the environment, transport, energy and communication in Switzerland, the Society of Indian Automobile Manufacturers, an agricultural vehicle manufacturer and the International Council on Clean Transportation. A reminder was sent out to all stakeholders that had not filled in any answers by then, on 19<sup>th</sup> February 2013. A second reminder was sent out on 5<sup>th</sup> March 2013.

For a version of the questionnaire, please see Appendix C.

It was requested in the email as well as at the 1<sup>st</sup> L-EPPR group meeting that completed questionnaires should be returned by 31/3/2013, to meet the aim of distributing the results to the L-EPPR group by the 15/5/2013.

The questionnaire results will be made anonymous, so the results distributed in May will be anonymized, with perhaps the data combined or averaged in some manner to ensure that it is fully anonymous. How this will be done is discussed in section 5, Next steps.

## **3.2 UN group progress**

This section reports the consortium's role to provide key support in encouraging involvement, publicising the endeavour, presenting progress and developing the Roadmap as illustrated in Figure 2 1.

### **3.2.1 Roadmap**

The roadmap is a key document used to help control the function of a large group. The Roadmap Presented at the 1<sup>st</sup> L-EPPR informal group meeting / 65<sup>th</sup> GRPE (see Figure 8-1) was developed using the roadmap of the WLTP informal group as a template (at the suggestion of a representative of the UK delegation) and designed so that:

- It matches the needs of the group
- It shows the initially intended time span of the group rather than this project
- It takes into account the typical time scales for reporting to the WP.29

However at this stage, and in contrast to the 1<sup>st</sup> roadmap, instead of placing the issues into the roadmap, a gap was left for each of the test areas between the 65<sup>th</sup> GRPE and the time taken by final submission administration.

Notes:

This helped allocate the available time and gives a structure for planning the L-EPPR's tasks.

Although some issues were known, without the results of the questionnaire it was felt better not to presume they are all known or in what order they should be prioritised.

### 3.2.2 Key dates

These key dates have been presented

Date	Meeting
<b>20 December 2012</b>	Publicising study: Email Mailing to stakeholders
<b>10 January 2013</b>	Questionnaire published by Ecorys and TRL
<b>18 January 2013</b>	GRPE (65th session) / L-EPPR (1 <sup>st</sup> session) Tasks: Review among others: Rules of Procedure (RoP), Terms of Reference (ToR) & Draft roadmap
<b>12–15 March 2013</b>	WP.29 (159 <sup>th</sup> session) Tasks: Progress report
<b>TBD</b>	Multiple L-EPPR subgroup meetings or conference calls Tasks: To finalise ToR, RoP and roadmap
<b>25-26 April 2013</b>	L-EPPR (2 <sup>nd</sup> session) Task: Priority options/ proposals
<b>4-7 June 2013</b>	GRPE (66th session) / L-EPPR (3 <sup>rd</sup> session) Tasks: Adoption of RoP, ToR & roadmap, progress report, consultation results and 1st draft proposals
<b>12-15 November 2013</b>	WP.29 (161 <sup>st</sup> session) / L-EPPR (4 <sup>th</sup> session) Tasks: Adoption of GRPE decision and progress report
<b>2013-2016</b>	Multiple L-EPPR subgroup meetings or conference calls Tasks: Regularly reporting to GRPE and the Administrative Committees AC.1 and AC.3 in WP29
<b>2014-2016</b>	Adopt new and/or amendments to UN Reg(s) and GTR(s) Regions accede to agreed updated legislation

### 3.2.3 Meetings

So far the project consortium has attended and presented in 3 MCWG meetings in Brussels:

- 17/4/2012 MCWG
- 28/9/2012 MCWG

- 18/12/2012 MCWG

The main aim of attending these meetings has, up until now, been to publicise the project. However they have also played a key role in developing an understanding of the issues and stakeholder perceived issues. Presentations produced are on the relevant CIRCABC online areas<sup>4</sup>.

The project consortium has also attended two UN level meetings:

8/6/2012 Workshop (64<sup>th</sup> GRPE)

18/1/2013 1<sup>st</sup> L-EPPR (65<sup>th</sup> GRPE)

In the first of these interest in the project was generated and also information was found about the types of legislative issues and concerns that regions have. The second was the first meeting with the L-EPPR attending, with IMMA taking up the secretariat duties of the informal working group. The very good level of participation showed that the contracting parties and stakeholders probably share the EC's concerns about the emissions of L-category vehicles, their effect on air quality and the effect that the approval legislation has in international trade.

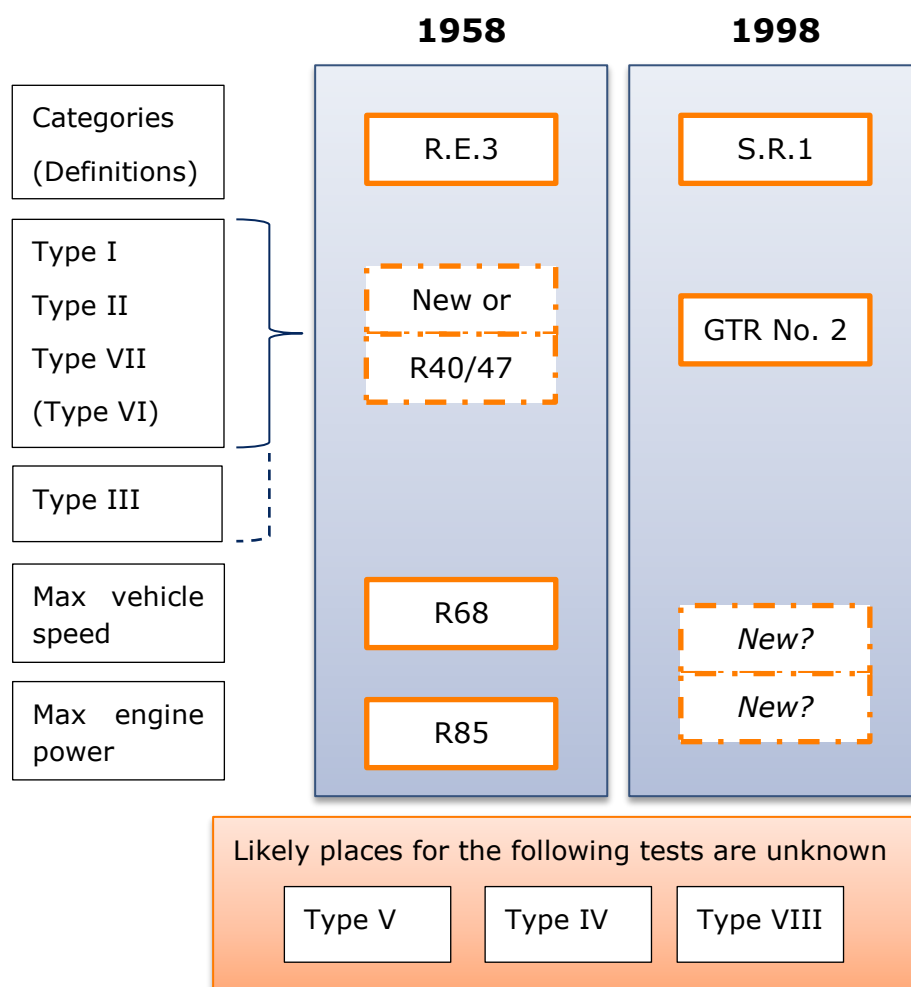
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<sup>4</sup> <https://circabc.europa.eu/w/browse/15e469a3-6f76-4f51-aae6-9b2691737f00>

## 4 Findings

The assessment up to this point has already answered some key questions such as in what areas which type of legislation should be used (see Figure 4-1), where there are gaps in testing procedures, what UN legislation should be used as a base, and how the final goal can be reached.

There are still gaps in the information about international legislation, which further data is required to fill, however over the coming months these data will be collected to provide the capability needed to provide the required depth to the proposals and to provide assistance to the L-EPPR group.



**Figure 4-1: Known legislation locations**

Of the test areas under investigation, the intended location in the UNECE legislation at the start of the project was only known for the categorisation (within R.E.3 under the 1958 agreement and S.R.1 under the 1998 agreement). All the others needed to be decided with the agreement of the L-EPPR group. The L-EPPR group will develop in parallel legislation under the '58 or '98 agreements, which have different requirements, and so the location for a given area must be decided twice.

Since then the meetings at the GRPE and 1<sup>st</sup> L-EPPR and the stocktake of legislation have helped to begin to fill in this picture. It has been agreed at least in principle at the 1<sup>st</sup> L-EPPR meeting that the update to the Type I test and all related tests shall go within

the GTR No.2, the '58 agreement version of this will fit within a new regulation so as to not interfere with the legacy uses of the R40 and R47. And in addition the cold start and test equipment harmonisation may be able to go within the R40 and R47 with the agreement of the L-EPPR informal working group.

It has also been found that there are relevant 1958 Agreement Regulations which exist already, where updates to the maximum vehicle speed and engine power and torque test procedures could be placed. Although the scope of these existing Regulations only includes M and N category vehicles today, the tests could be designed so that as much as possible is harmonised while specific differences between the engines used in the respective vehicles could be catered for in separate annexes. This would allow a consistent single location for this test for all vehicles. It is however unknown where a 1998 Agreement version of this would fit and it has therefore to be assumed that a new GTR will need to be established for this purpose.

For test types V, IV and VIII (Durability, Evaporative emissions and OBD), no location has been decided yet, however test types V and VIII are in part tailpipe emission tests and both rely on test type I, it therefore follows that these could be included within the respective 1958 and 1998 type I legislation. Test type IV however may suit new regulation and GTR best.

It was suggested that R83, R101, R40 and R47 could be opened up, however there are so many areas in R83, R101 where they are M and N category specific that it could be problematic, similarly R40 and R47 are used by nations with emerging traffic problems to begin emission testing vehicles and so changing these regulations could cause these regions difficulties.

#### **4.1 Part 1: International harmonisation of L-category vehicle classification**

In the EU legislation, there are different groupings or sub-categories used to define the various types of L-category vehicles. Additionally, different categorisation methods are used to define the vehicles for different purposes:

- The "type" which is used to decide the construction/safety/emission requirements, to match the use of that type of vehicle
- The "performance and propulsion method" which is used to decide the specific testing methods, to match it to the vehicle's technology capabilities
- And there are additional categorisation methods used in licencing, taxation etc.

Having the same groupings allows easy transfer of paperwork such as registration and licensing, and affords the manufacturers with clearer understanding of differences in legislative requirements between regions. Therefore, to ease the trade of vehicles and parts across borders it would be beneficial to harmonise the (sub-)categories.

In the following legislation relevant vehicle classification systems are defined:

- United Nations: UN R.E.3 and S.R.1 detail categorisation of all motor vehicle types, and the definitions of key metrics which are used to categorise them, e.g. engine displacement. GTR No. 2 categorises based on engine displacement and maximum attainable vehicle speed. UNECE Regulations 40 and 47 uses performance and propulsion classification criteria as well, although with different values in comparison to GTR No 2.

- EU: The Regulation (EU) on the approval and market surveillance of two- or three-wheel vehicles and quadricycles, referred to by the REPPR, follows the base categories of UN R.E.3 for vehicle type, but with more detailed sub-categorisation. The type I and V tests both use categorisation based on GTR No. 2. GTR No 2 has been transposed into the draft REPPR but some omissions for low engine displacement mopeds and 3- and 4-wheeled vehicles have been identified. A categorisation based on engine displacement and attainable maximum vehicle speed would open the scope of the GTR to L-category vehicles with 3 or 4 wheels by using the same engine / vehicle classification thresholds as 2 wheeled vehicles. The EC argues that the lower engine displacement of 50 cm<sup>3</sup> appears somewhat arbitrary and that a test cycle valid for a 50 cm<sup>3</sup> motorcycle of the L<sub>3</sub> category should also be valid for a 49 cm<sup>3</sup> moped of the L<sub>1</sub> category. This is what the EC has proposed in the REPPR when transposing GTR No 2 into EU type-approval legislation, which opens the scope of the WMTC to low performance vehicles with a displacement less than 50 cm<sup>3</sup> and could include 3- or 4-wheel light vehicles of category L.
- China: GB/T 15089-2001 states the type categories and GB 14622-2007 details the performance split for L-category vehicle testing. Both of these are similar to the EU and UN systems.
- USA: Federal: Motor vehicles are defined in CFR Title 40 Part 86 Subpart E (§ 86.401 to § 86.449), with §86.419-2006 defining motorcycle classes by engine size. CFR Title 49 Part 523 covers some aspects of quadricycles.
- California: VC §400 to §406, separately define motor vehicles, including motorcycles, mopeds and motorised bicycles. Emission testing uses CCR Title 13 §1958 which classes 2-wheelers by engine size.
- India: The vehicle performance and engine capacity based categorisation is similar to GTR 2.
- Japan: Information on Japanese vehicle classification would be gladly accepted.

## 4.2 Part 2: Propulsion performance requirements

This area is concerned with tests to determine the maximum power and maximum torque a propulsion system can produce, and the maximum speed a vehicle can attain. There are different test procedures defined, for different vehicle categories and different propulsion systems, i.e. positive or compression ignition engine, electric motor, hybrid or alternative drive.

### 4.2.1 Maximum design vehicle speed

In the current EU type approval legislation, Directive 2002/24/EC for the type approval of L-category vehicles, states that combustion ignition vehicles should be tested in accordance with Directive 95/1/EC (as amended up to 2006/27/EC). There are no tests specified for quadricycles, with the scope of the directives worded around numbers of wheels rather than category, however, it is assumed that the tests in 95/1/EC are used for these vehicles as well.

The forthcoming REPPR, defines a common test procedure to determine the maximum vehicle speed for L-category vehicles limited in vehicle speed and all propulsion systems, i.e. positive or compression ignition engine, electric motor, hybrid or alternative drive.

The international standards ISO 7116 (for mopeds) and ISO 7117 (for motorcycles) define very similar test procedures. They were revised in 2011 and 2010 respectively and are therefore in an up-to-date state. They apply to mopeds and motorcycles as defined in ISO 3833 and do not explicitly mention electric, hybrid or alternative drive vehicles, but there are no apparent reasons, from a technical perspective, why they could not, with some changes, be used for these propulsion systems. However, legislators are hesitant to refer to technical standards as there are a number of issues with them. ISO, SAE and other technical standards are not free of charge and are not available in languages other than English and French. This can be problematic for many UN contracting parties, including the EU, who have to deal with 24 languages.

The European standards EN 1821, part 1 and 2 apply to tricycles and quadricycles with purely electric and hybrid drive, respectively. The test procedures defined to determine the maximum design speed of a vehicle do not appear to be as detailed as those in REPPR or ISO standards, however, the provisions on preconditioning of the vehicle and different operating modes of hybrid vehicles are relevant.

It has been suggested by the customer that the updated legislation could be placed in an entirely new regulation for L-category vehicles; however it would be preferable to update an appropriate current regulation. This would then require the EU and other nations to accede to this next revision / series of amendments or to the regulation in general if this hasn't occurred already.

UN Regulation No. 68 defines a maximum vehicle speed test for vehicle categories M1 and N1 (all propulsion systems), however, has not been acceded to by the European Union. The UNECE list of accession to treaties states that Regulation 68 has only been acceded to by: 14 EU members, 5 prospective EU members and the Russian Federation<sup>5</sup> and the dates of succession seem to align with their membership of the UNECE. This Regulation was updated only once in 1996 and it is not referred to in any European L, M, N or T category type approval directive. On this basis, it is uncertain whether any nation currently uses it. Therefore it does not appear feasible to use this regulation as a framework for any transposition of the maximum vehicle speed test for L-category vehicles. Rather, it should be considered to establish a new regulation with L-category vehicles only in scope.

#### **4.2.2 Maximum power and torque**

The current EU type approval legislation for L-category vehicles, Directive 2002/24/EC, states that vehicles equipped with combustion engines (CEs) should be tested in accordance with Directive 95/1/EC (as amended to 2006/27/EC). In addition, a footnote states that the power of electric vehicles shall be tested in accordance with IEC 60034-1 for use with electric motors.

There is one omission: The reference in Directive 2002/24/EC for electric vehicles only mentions maximum power, however, it could be assumed that the IEC standard is used for the measurement of torque as well. Although Directive 2002/24/EC uses the wording two- or three-wheeled vehicles rather than categories, quadricycles fall within its scope as detailed in article 1.

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<sup>5</sup> [http://treaties.un.org/pages/ViewDetails.aspx?src=IND&mtdsg\\_no=XI-B-16-68&chapter=11&lang=en#2](http://treaties.un.org/pages/ViewDetails.aspx?src=IND&mtdsg_no=XI-B-16-68&chapter=11&lang=en#2)

The forthcoming REPPR, Annex IX contains test procedures for all L-category sub-categories and all propulsion systems. For vehicles with CE (positive and compression ignition) and hybrid propulsion separate, but very similar, test procedures are defined. For vehicles with pure electric propulsion, the REPPR refers to test procedures defined in UN Regulation No. 85. Electrically powered cycles (L1e) are exempted from this test procedure and instead have to perform tests according to EN 15194 and EN 60034 with additional provisions laid down in the REPPR.

The international standards ISO 4106 (for motorcycles), ISO 4164 (for mopeds) define test procedures for CEs that are virtually identical to each other (apart from a tolerance for fuel flow measurement) and which are very similar to the REPPR test procedures.

UN Regulation No. 85 defines test procedures for CEs, hybrid and purely electric drive trains intended for M- and N-category vehicles. The power and torque test are in principle similar to the REPPR tests. For electric drive trains an additional test is defined to determine the maximum 30 minutes power (referred by REPPR). For hybrid drive trains the tests have to be carried out separately for the CE and the electric motor. Regulation No. 24 defines, among other things, a similar test procedure to that in Regulation No. 85, however only for CEs.

The document on the status of EU accession to UN Regulations in the area of vehicle approval indicates that the EU have acceded to both Regulations 24 and 85<sup>5</sup>. Regulation 85 seems to be in an up to date state, includes provisions for electric vehicles and is comparable with the EU legislation for L, M and N category vehicles, however, there are some differences. Regulation 85 might therefore be a possible framework in which to include provisions on power and torque tests for L-category vehicles at an international level, however, at the moment it only applies to vehicle categories M and N.

### **4.3 Part 3: Tailpipe emissions; Test types I, II, and VII (& VI)**

The Type I test for pollutant emission details a driving cycle which can also be used for the array of type VII tests which cover CO<sub>2</sub> emissions, (electric) energy consumption, range and the calculation of fuel consumption.

The type II test, (typically performed following the Type I), is used to test a vehicle's roadworthiness in regards to pollutant emission and smoke, in some regions it is also used for in-use service testing.

- Legislation
  - United Nations: GTR No. 2 contains the WMTC test cycle and R40 and R47 contain two older test cycles. M & N category vehicles follow the cycle in R83 (the Elementary urban operating cycle and Extra-urban cycle), however this is currently in the process of being updated to the WLTP test procedure and cycle. R101 contains the current M & N cat Type VIII tests, however this specifies the older car driving cycle as used in R83.
  - EU: The EU uses the tests cycles from GTR 2, R40 and R47, with testing procedures differing from the UN's.
  - USA: A range of test cycles are used in different states depending upon local vehicle use. Further information would be gladly accepted
  - China: GB 14621-2011 (replacing GB 14621-2002) and GB 18285-2005 cover the Type II test. GB 18176-2007 (replacing GB 18176-2002) is the



moped Type I test with GB 14622-2007 (replacing GB 14622-2002) used for motorcycles. GB 19758-2005 is used to test smoke.

- India: For 4-wheelers the Bharat regulations, stages II, III and IV are used. Note: India uses a different test type numbering. Further information would be gladly accepted
- Other regions: Further information would be gladly accepted

In national L-category vehicle legislation in China, the USA, Japan, India and the EU test type VI, emissions when in cold ambient conditions (-7°C), is not required. Additional information from other UN contracting parties on this test type would be gladly accepted.

#### 4.4 Part 5: Evaporative emissions; Test type IV

- Legislation
  - **United Nations:** UN R83, applicable only to vehicle categories M, N (not L): hot soak test + 24 hour diurnal test
  - **European Union:** Current proposed REPPR: permeation test or 1 hour diurnal plus hot soak test where the permeation test is defined similarly to the US federal level (EPA) regulations and the diurnal test is defined similarly to the current Californian (CARB) regulations
  - **United States of America**
    - Federal: CFR Title 40 Part 86 sets out tank and tube permeation test (not needed for metal tanks and certified tubing)
    - California: CCR Title 13 sets out a 1 hour diurnal + running loss (if required) + hot soak test

A new proposal includes: tip test + hot soak + running loss + 3 day diurnal
  - **Other regions:** further information would be gladly accepted
- Possible issues
  - **Test types:** different regions currently include different tests. The order and timing also vary between regions, with California (CARB) currently having the most up to date and demanding set of tests.

However, the EC has proposed in the REPPR to use exactly the same test procedures as currently used in the USA. As many other contracting parties that have introduced evaporative emissions requirements for L-category vehicles use the USA's evaporative emission test procedures, it seems obvious that those requirements should be the base for world-harmonisation of the test type IV requirements.

  - **Alignment with M & N class:** these tests could be aligned with the M & N category procedures, but with a different driving cycle for conditioning, plus a more appropriate default vehicle volume (needed to find the volume of air within the test shed) for the calculations.
  - **SHED:** the short diurnal test can be done with a fixed volume SHED, whereas the longer diurnal test requires a variable volume SHED.

However, for M & N category vehicle approval, technical services are likely to already have upgraded their SHEDs to variable volumes, while L-category vehicle manufacturers performing certification testing in-house may not have already made this high investment. The SHED normally used for cars can also be used for L-category vehicles, and provide test results comparable to those of a fixed volume SHED. Therefore it is envisioned that an option to use either could be allowed.

- **Running losses:** these can be evaluated outside a SHED on a normal chassis dynamometer using a number of sampling points at critical areas (filler cap, carbon canister etc.). If a running loss SHED is required, this will require a large capital investment.
- **Vehicle / propulsion family:** To reduce the burden on the manufacturer the REPPR allows a manufacturer to select a parent vehicle representative of a vehicle / propulsion family. It would have to be shown that this parent uses comparable fuelling equipment (tank, pipes, carb/injectors, carbon canister, etc)

#### 4.5 Part 6: Durability testing of pollution control devices; test type V

In the USA, China, India and Japan there are different durability requirements for the pollution control devices of L-category vehicles at type approval at the moment. In the European Union, L-category vehicles are currently not subject to any of these requirements, but this will change with the forthcoming REPPR. At the level of United Nations (UNECE) there are currently no regulations regarding the emission durability of L-category vehicles, however, there are for M- and N-category vehicles.

The different testing procedures follow a common principle: They consist of a certain driving schedule the vehicle has to perform for a defined distance on a test track, road or vehicle dynamometer, usually interrupted by soaking periods. Emission tests have to be carried out at defined intervals in order to identify a deterioration trend of the vehicle's emission values. Depending on the legislation, the vehicle has to cover either the whole distance, it is assumed to be normally used for (useful life), a part of that distance (followed by mathematical extrapolation of the emissions deterioration trend) or no distance (mathematical procedure based on a standard deterioration trend). UN Regulation No. 83 for categories M and N offers an alternative, which is to age pollution control devices separately from the vehicle on a catalyst ageing bench.

An analysis of the relevant legislation for different world regions was carried out under the aspect of possible harmonisation. The most notable differences between EU (REPPR), USA (CFR, CCR), China (GB) and United Nations (R83, applicable only to vehicle categories M, N) are presented in the following.

- Driving schedule: Different driving schedules in different world regions. CFR/CCR and GB use the AMA cycle. REPPR offers the option to choose between SRC LeCV and AMA for a limited time.
- Required mileage: Different mileages required in CFR/CCR, GB and REPPR. REPPR allows full, partial or mathematical procedure; CFR/ CCR do not have a purely mathematical procedure. R83 (vehicle categories M, N) offers a bench ageing procedure, i.e. catalyst and oxygen sensor are aged separated from the vehicle and then reinstalled for emission testing.

- Mileage accumulation dynamometer: Mileage accumulation on a dynamometer instead of a test track is possible within REPPR, CFR/ CCR, GB, R83 (vehicle categories M, N). Technical provisions regarding the dynamometer differ between R83, REPPR and GB.
- Soak periods: Provisions regarding the frequency and duration of necessary soak periods differ between CFR/CCR/GB and REPPR. The conditions required are the same (“ambient conditions”).
- Deviation from test vehicle: REPPR accepts differences between the tested vehicle and the vehicle to be type approved (different body style, gear box, wheels/tyres). GB offers the option to extend the type approval to a different type of motorcycle if the combination of engine and pollutant control device is the same.
- Golden parts: REPPR offers the repeated use of aged pollution control devices (“golden parts”) on different test vehicles (same vehicle type) later on in vehicle development. These can be used for durability performance verification and approval demonstration testing.
- Measurement of catalyst temperature: REPPR and R83 (vehicle categories M, N) require measurement of the catalyst temperature during parts of the mileage accumulation procedure. R83 uses the collected data to determine parameters for the bench ageing procedure.

## 5 Next steps

### 5.1 Questionnaire data analysis

To ensure that the questionnaire provides enough input for the impact assessment, different versions have been made for different stakeholders. The following four different questionnaires have been made:

- An industry version (e.g. manufacturers, after market and representatives)
- A (Type-)Approval Authority version
- A Technical Service version
- A version for all other stakeholders

The questionnaire responses will be analysed and the results will be presented for each type of stakeholder as follows:

- General information on the stakeholders' position in the L-category industry
- View of the stakeholders on the cost-effectiveness of current legislation
- View of the stakeholders on the shortcomings and benefits of current legislation
- View of the stakeholders on the possible synergies between other category vehicle legislation and L-category legislation
- View of the stakeholders on the effect of possible new worldwide harmonised legislation on the level playing field of the L-category industry and other industry stakeholders

### 5.2 Cost-effectiveness

With the input acquired from the different stakeholders, the next step is to determine the cost-effectiveness of possible changes to L-category legislation for the world-harmonised EPPR. The different versions of the questionnaire allow for more direct questions about the cost of changes for different stakeholders, e.g. using a specific (harmonised) test type might increase the costs of testing (or having the product tested) for a manufacturer, but perhaps decrease the amount of times the manufacturer has to approve a product when entering different markets. If adaptations are made to current legislation they could both increase the cost for a type approval authority of approving a product, and decrease the amount of type approvals that have to be performed which could result in an overall cost increase or decrease depending on the relative contributions of these effects.

As well as the input acquired from the questionnaires, the results of the study by the Aristotle University of Thessaloniki commissioned by ACEM will be taken into account in determining the cost-effectiveness of the proposed measures.

### 5.3 Test areas

The changes envisaged for the following areas have not yet been decided. Test type III is under investigation by multiple bodies, and the type VIII requirements had not been decided within the EC REPPR at the time of writing.

### 5.3.1 *Part 4: crankcase emissions; test type III*

The Type III test is historically significant, being the first area of vehicle emissions to be legislated.

This was however using a method designed for cars equipped with a positive crankcase ventilation system. This method had the aim to ensure that aggressive crankcase gasses are not evacuated to the environment and do not mix with lubrication oil to prevent shortening engine life. Crankcase gasses are typically fed back to the engine in which they are combusted. This test set-out in R83 was found to be incompatible with the engine construction of many L-category vehicles, which sometimes are not equipped at all with a crankcase system to evacuate crankcase gases. Frequently L-category vehicle engines are designed to have a breather system which allows crankcase gases to escape to the intake of the engine and allows fresh air to enter into the crankcase.

Due to these differences an additional test could be discussed that ensures that crankcase gasses are not evacuated to the environment, but at the same time do not force vehicle manufacturers to entirely redesign the combustion engines fitted to L-category vehicles.

- Legislation
  - UN: M & N category vehicles are covered by R83, which tests the functioning of a positive crankcase ventilation system.
  - EU: The REPPR indicates requirements for a test. Various options under development. One copying the system set-out in R83 and an alternative one based on maintaining a positive pressure for a minimum amount of time to check for leaks.
  - Information gathered to date indicates that no other regions have a Type III test for L-category vehicles

### 5.3.2 *Part 7: On-board diagnostics; Test type VIII*

Environmental part only of OBD

- Legislation
  - **United Nations:** UN R83, applicable to M & N category to vehicle categories
  - **European Union:** Forthcoming REPPR covering Stage I and Stage II
  - **United States of America**
  - No current requirement for L-category, required for M & N category vehicles
  - **Other regions:** further information would be gladly accepted
- Possible issues
  - **OBD II:** The OBD standard has already been well defined for M & N vehicles. It makes sense to align with a sub-set of the M & N procedures.

Note: The REPPR only deals with testing the OBD system and not the specifications for the OBD system (connector, communication protocols etc.) which are dealt with in the RVCR (regulation on vehicle construction requirements)

## 6 Glossary

Term	Description
AMA	Approved Mileage Accumulation cycle, a driving schedule for mileage accumulation defined by the EPA in the CFR
ATV	All-terrain-vehicle, a quadricycle.
Carb	Abbreviation of carburettor, an apparatus for mixing air and fuel in PI engines.
CARB	California Air Resources Board
CBS	Combined Braking System, a system which distributes braking effort between front and rear wheels irrespective of the brake level applied.
CCR	California Code of Regulations
CE	Combustion engine
CFR	Code of Federal Regulations of the United States of America
CI	Compression ignition, used in diesel engines, where the pressure and temperatures caused by compression starts the combustion process.
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CVT	Constantly Variable Transmission
DfT	Department for Transport, UK
DSA	Driving Standards Agency (UK)
EC	European Commission, The EU's executive body
ECU	Electronic Control Unit, electronic control unit that manages the operation of an engine.
EPA	Environmental Protection Agency
EU	European Union
GTR	Global Technical Regulation
HC	Hydrocarbon
ICE	Internal Combustion Engine - an engine in which the combustion of a fuel occurs with air in a combustion chamber.
L-category vehicles	family name of light vehicles with 2-, 3- or 4-wheels such as powered cycles, 2- or 3-wheel mopeds, motorcycles with and without sidecars, tricycles and quadricycles
NO <sub>x</sub>	Nitrogen oxides, i.e. NO and/or NO <sub>2</sub> (nitric oxide and nitrogen dioxide)

O <sub>2</sub>	Oxygen, in its most common naturally occurring molecule.
OBD	On Board Diagnostics, an electronics self-diagnostic system.
PCU	Powertrain Control Unit, as ECU (see ECU) but also receives additional inputs from sensors to actuate the gearbox, clutch and/or torque converter.
PI	Positive ignition, i.e. spark ignition, used in petrol engines where a 'positive' addition of energy is used to start the combustion process.
PM	Particulate matter, in extreme cases this is visible as soot or an off-colour haze from exhaust gases.
RAR	Regulation on administrative requirements for the approval and market surveillance of L-category vehicles, a draft stage EU regulation planned to become applicable as of 01 January 2016.
REPPR	Regulation on the environmental and propulsion performance requirements of L-category vehicles, a draft stage EU regulation planned to become applicable as of 01 January 2016.
RPM	Revolutions per minute, a measure of engine speed.
RVCR	Regulation on the vehicle construction and general requirements for the approval and market surveillance of L-category vehicles, a draft stage EU regulation planned to become applicable as of 01 January 2016.
RVFSR	Regulation on vehicle functional safety requirements for the approval and market surveillance of L-category vehicles, a draft stage EU regulation planned to become applicable as of 01 January 2016
SbS	Side-by-side, a quadricycle where the driver and passengers are seated next to each other, as with a car.
SHED	Sealed housing for evaporative emissions determination
SRC	Standard Road Cycle for light-duty vehicles, a driving schedule for mileage accumulation defined by the EPA
SRC-LeCV	Standard Road Cycle for Le-Category Vehicles, a driving schedule for mileage accumulation with L-category (European) vehicles
UN	United Nations
UNECE	UNECE United Nations Economic Commission for Europe. A body of the UN of which Working Party 29 (WP.29) is tasked with world-harmonising international vehicle legislation.
Vd	Displacement volume of an internal combustion engine
Wash-coat	The coating of the catalytic converter monolith which hold the catalyst in place.

WHO	World Health Organisation
WLTP	Worldwide harmonized Light vehicles Test Procedure
WMTC	WLTP Worldwide harmonized Light duty vehicles Test Procedure
WOT	Wide Open Throttle, i.e. full throttle, the maximum throttle control position. This is not necessarily the highest fuel flow.
WP.29	Working party 29, World Forum for Harmonization of Vehicle Regulations. A body within the UNECE.
WTP	Willingness To Pay – measure used in cost benefit studies. Includes valuation for pain and suffering, as well as direct and indirect costs.



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# Appendix A Roadmap

## A.1 3<sup>rd</sup> Roadmap published for 1<sup>st</sup> L-EPPR meeting

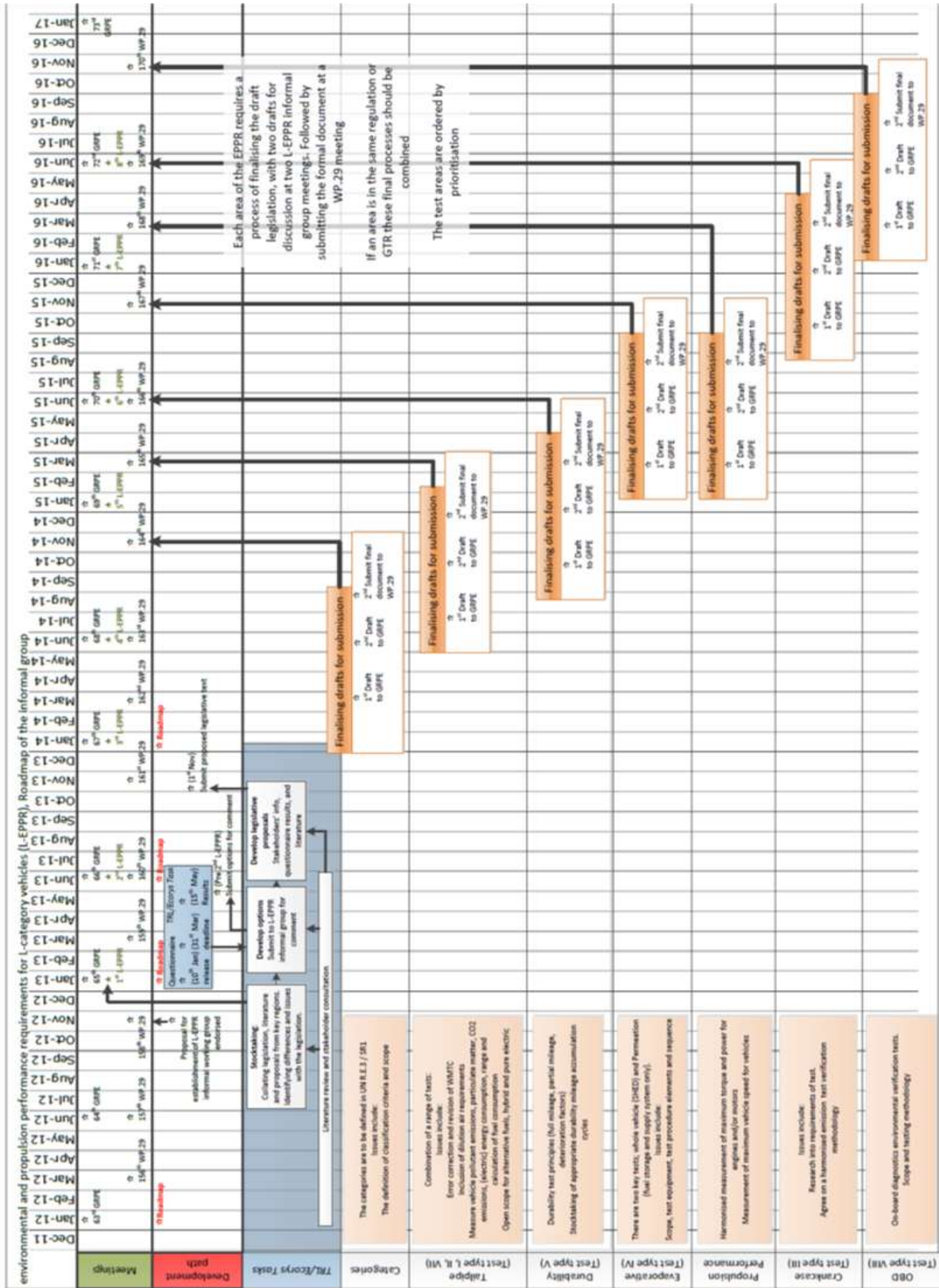


Figure 8-1: Draft roadmap January 2013, 1<sup>st</sup> L-EPPR

## A.2 Aligning Type I, II, VII from REPPR to UNECE

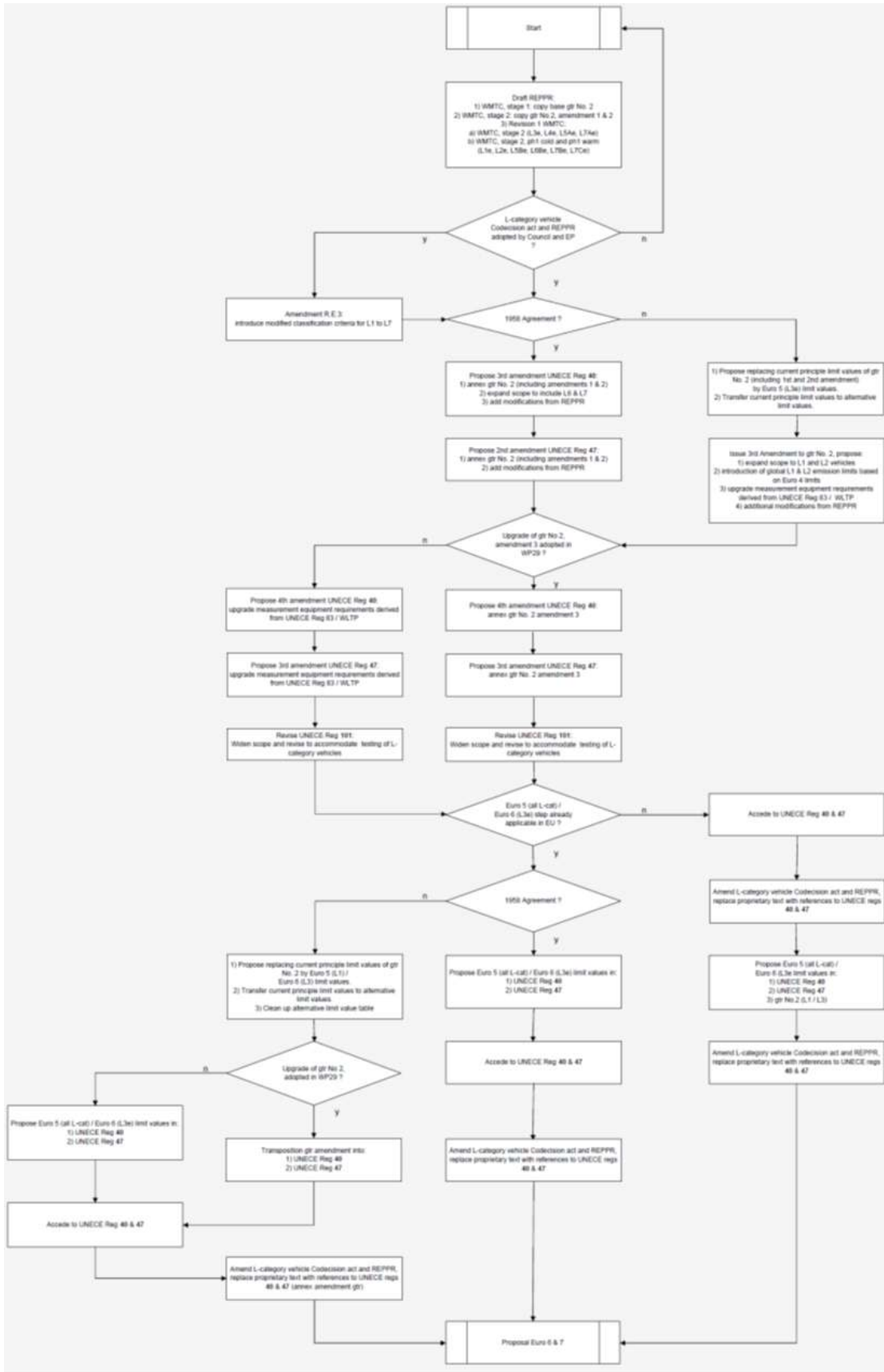


Figure 8-2: Draft roadmap aligning REPPR, R40, R47, R101 and GTR 2 (EC, 14/09/2011)



## Appendix B Mailing

Dear <<name>> ,

I am writing to you and your organisation to invite you to help in establishing world harmonised requirements, in the area of environmental and propulsion performance, for L-category vehicles (L-EPPR) at the level of the United Nations Economic Commission for Europe (UNECE). L-category vehicle is the family name for light vehicles such as powered cycles, mopeds, motorcycles, tricycles and quadricycles.

To assist this process, an informal working group was established within the Working Party on Pollution and Energy (GRPE) consisting of contracting parties to both the 1958 and 1998 Agreements with various national representatives from around the globe, industry associations and NGOs. The GRPE is a subsidiary body of the World Forum for Harmonization of Vehicle Regulations (WP.29), a framework within the UNECE.

In order to support this complex task of the working group the European Commission representing the EU as contracting party of both the 1958 and 1998 Agreements has contracted an independent consortium comprising of TRL and Ecorys (based in the UK and Netherlands, respectively to perform a study in support of harmonising certain portions of this approval legislation, internationally under the remit of the UNECE (United Nations Economic Commission for Europe). The study's title is: Internationally harmonised approval requirements in the area of environmental and propulsion performance of L-category vehicles (L-EPPR).

The scope of work to be undertaken by the consortium is stocktaking and analysis of relevant national, international and European legislation as well as proposals and literature in regards to environmental and propulsion performance requirements for approval or (self) certification of L-category vehicles. Areas where harmonisation can occur will be identified, and possible options will be highlighted, first for discussion within the informal group and subsequently as draft proposals for changes and additions to both UN regulations annexed to the 1958 Agreements as well as Global Technical Regulations annexed to the 1998 Agreement, having been selected using an impact assessment and cost benefit analysis.

### **Request for participation**

We would be very grateful for any assistance in obtaining and receiving guidance on national legislation related to L-category vehicles. In addition, proposals both new and old would be gladly received.

Participation in the informal group is welcomed for all contracting parties, industry stakeholders and NGOs that are participating in GRPE. For more details on participation in GRPE please contact the UN ECE secretariat.

A questionnaire will be sent out to coincide with the first meeting of the informal group at the GRPE meeting in January 2013. This questionnaire will cover the details required to perform an impact assessment on the proposed options. It would be very helpful for you to get yours or your organisation's views across by filling this questionnaire.

**The L-EPPR will cover the following areas:**

Part 1: International harmonisation of L-category vehicle classification;

Part 2: Propulsion performance requirements; Maximum vehicle speed, Maximum propulsion power and torque;

Part 3: Tailpipe emissions of conventional combustion engines and energy / fuel consumption as well as electric range of hybrid electric and pure electric vehicles; test types I, II and VII;

Part 4: Crankcase emissions; test type III;

Part 5: Evaporative emissions; test type IV;

Part 6: Durability testing of pollution control devices; test type V;

Part 7: On-board diagnostics; test type VIII.

**Key dates:**

12-16 November 2012: World Forum for Harmonization of Vehicle Regulations (158th session of WP.29) – agreement on establishment of informal working group by adoption of the mandate regarding environmental and propulsion performance requirements for L-category vehicles (L-EPPR);

10 January 2013: Questionnaire published by Ecorys / TRL;

18 January 2013: GRPE (65th session) first proposed official meeting of the informal working group, among others review of the Rules of Procedure (RoP), Terms of Reference (ToR) and draft roadmap.

12 – 15 March 2013: WP.29 (159th session) progress report;

TBD: multiple meetings and conference calls planned to finalise the ToR, RoP and roadmap;

4-7 June 2013: GRPE (66th session), progress report, adoption RoP, ToR and roadmap of informal group. Second proposed official meeting of the informal working group. Presentation of stakeholder consultation results and first set of draft proposals;

12-15 November 2013: World Forum for Harmonization of Vehicle Regulations (158th session of WP.29), adoption of GRPE decision and progress report;

2013-2016: Meetings of the informal working group, regularly reporting to GRPE and the Administrative Committees AC.1 and AC.3 in WP29;

2016: Possible adoption of new UN Regulation(s) and Global Technical Regulation(s) and/or amendments to existing Regulations.

**Contacts:**

For involvement in the informal group please contact the UNECE secretariat: <http://www.unece.org/environmental-policy/areas-of-work/education-for-sustainable-development-esd/envedsdcontacts/unece-secretariat.html>

To assist with the study please contact Ecorys/TRL via email on: [Int-L-Cat-Leg@trl.co.uk](mailto:Int-L-Cat-Leg@trl.co.uk)

**Links:**

UNECE Proposal for establishment of an informal working group addressing the environmental and propulsion performance requirements for vehicles of category L: <http://www.unece.org/fileadmin/DAM/trans/doc/2012/wp29/WP29-158-15.pdf>

UNECE current legislation can be found at: <http://www.unece.org/trans/main/welcwp29.html>

It is anticipated that a dedicated webpage regarding the informal working group meetings on L-EPPR will be established under the GRPE main page in which all working documents will be published prior to discussion and review: <https://www2.unece.org/wiki/pages/viewpage.action?pageId=917779>

This information will be publically available.



## Appendix C Questionnaire

### C.1 Industry / Manufacturers survey

Shown here is the industry / manufacturer's version of the questionnaire. The other versions ((Type-)Approval Authority, Technical Service version and a version for all other stakeholders), are different in that they do not ask for specific production costs. The approval authority and technical service versions do ask for costs, but for approval/testing costs. The "other stakeholder" version contains mainly qualitative / judgement questions.

Page 1

\* 1. Name:

\* 2. Contact email:

\* 3. Telephone number:

\* 4. Organisation:

\* 5. Position:

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\* 6. How would you classify your organisation?

- Policy maker on environmental and propulsion requirements
- Industry (e.g. manufacturer) or industry representative
- Type approval authority (TAA)
- Technical Services provider (an organisation or body designated by the approval authority of a Member State as a testing laboratory to carry out tests, or as a conformity assessment body to carry out the initial assessment and other tests or inspections, on behalf of the approval authority)
- Other governmental organisation, not one of the types mentioned above
- Rider or user association
- Other, please specify

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**8. Could you please specify your company or organization?**

- Association / representative organization
- Vehicle manufacturer
- Vehicle parts manufacturer
- Aftermarket & service
- Other, please specify

**9. Which types of L-category vehicles does your company or organisation deal with? (multiple answers can be chosen) Please see the table below for more information on the different types.**

- L1e, light two-wheel vehicle: L1e-A powered cycles
- L1e, light two-wheel vehicle: L1e-B moped
- L2e, three-wheel moped
- L3e, motorcycle: A1, A2, A3
- L4e, motorcycle with side car
- L5e, tricycles: L5e-A tricycles
- L5e, tricycles: L5e-B commercial tricycles
- L6e, light quadricycle: L6e-A light quad
- L6e, light quadricycle: L6e-B light mini car
- L7e, heavy quadricycle: L7e-A onroad quad: L7e-A1
- L7e, heavy quadricycle: L7e-A onroad quad: L7e-A2
- L7e, heavy quadricycle: L7e-B heavy all terrain quad: L7e-B1 all terrain quad
- L7e, heavy quadricycle: L7e-B heavy all terrain quad: L7e-B2 side by side buggy
- L7e, heavy quadricycle: L7e-C heavy quadri-mobile
- N/A

## Types of L-category vehicles

Category & Category Name	Sub category & Sub category name	Example	
L1e, light two-wheel vehicle	L1e-A powered cycles		
	L1e-B moped		
L2e three-wheel moped			
L3e, motorcycle	A1, A2, A3		
L4e, motorcycle with side car			
L5e, tricycles	L5e-A tricycles		
	L5e-B Commercial tricycles		
L6e, light quadricycle	L6e-A Light quad		
	L6e-B Light mini car		
L7e, heavy quadricycle	L7e-A Onroad quad	L7e-A1	
		L7e-A2	
	L7e-B Heavy all terrain quad	L7e-B1 all terrain quad	
		L7e-B2 side by side buggy	
	L7e-C Heavy quadri-mobile		

## 10. What market or markets does your company serve? (multiple answers can be chosen)

- Worldwide  
 The European Union  
 The United States  
 Asia  
 Other, please specify

11. Can you indicate what the annual turnover of your company is (in euro)?

12. Can you indicate how many employees your company has?

- 0-250 employees
- 250-1000 employees
- > 1000 employees

13. How are approval or certification tests performed for your products? (multiple answers can be chosen)

- We have in-house testing facilities
- We outsource our testing to a technical services provider (for example a testing house)
- Other, please specify

The information provided below is related to the following questions posted on this page.

Worldwide there are three main systems of technical approval in use:

- Type-approval as used for instance in the EU
- Self-certification as used for instance in the United States and in Korea
- Approval based on United Nations legislations which is used for example in many developing countries

14. How many L-category vehicles and parts do you have to get technically approved on average per year?

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- > 20
- None

15. How many technical approvals on EPPR do you have to acquire for your L-category products on average per year? Please specify. If possible, it would be very helpful if you could describe how many technical approvals are needed for each of the three main systems mentioned above. If you do not know, please make an estimated guess.

16. Can you indicate for the total number of technical approvals for your products what the distribution is (in percentages) between the three main systems mentioned above : (1) approval on UN legislation, (2) type-approval and (3) self-certifications?

- UN approvals
- Type-approvals
- Self certifications
- 100 Remaining value

17. Can you make a rough estimate of the average percentage of the costs of your product that are related to testing for technical approval regulations?

18. What is your overall opinion on the current Environmental and Propulsion Performance Requirements worldwide? Do the requirements in an effective way enforce environmental and propulsion performance?

- Excellent
- Good
- Fair
- Poor
- Do not know

19. Please explain your answer given to the previous question.

20. What is in general your view on the cost-effectiveness of current Environmental and Propulsion Performance Requirements? Do, in your view, the benefits weigh up against the costs?

	Very cost effective	Cost effective	Hardly cost effective	Not cost effective	Explanation	Do not know
Level of cost effectiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>	<input type="radio"/>

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We will now ask you some questions on possible changes in EPPR.

Introduction of possible changes

The aim of international collaboration under the umbrella of the UNECE is to harmonize vehicle classification and the environmental and propulsion performance requirements for L-category vehicles worldwide. This allows for one or an alternative procedure per environmental performance test type to get products type approved in this field for any market. The goal of this worldwide harmonisation is to simplify the type approval procedures for manufacturers, by allowing for one type approval procedure per product.

Please answer the following questions specifically for EPPR as much as possible.

**21. What are in your view the advantages of international harmonisation compared to the current approval legislation?**

**22. What are in your view the disadvantages of international harmonisation compared to the current approval legislation?**

**23. Would you deem it feasible to recognise UNECE requirements as alternative to current approval legislation? Please explain.**

	Yes	No	Do not know	Explanation
Feasibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

The following environmental performance tests are proposed to be harmonised:

- The type I test – tailpipe emissions after cold start
- The type II test – tailpipe emissions at idle and high idle
- The type III test – crankcase emissions
- The type IV test – evaporative emissions
- The type V test – durability of pollution control devices
- The type VII test – CO2 emissions , fuel / energy consumption and range
- The type VIII test – on-board diagnostics environmental tests (OBD)

The following propulsion performance test procedures are proposed to be harmonised:

- Maximum power and torque
- Maximum design vehicle speed

**24. Nowadays, a manufacturer has to produce different (sub)models for different markets, due to different test regulations. If worldwide harmonisation would be the case, what would this mean for the amount of different submodels your company would have to make for one model? Please indicate the number of submodels that your company would have to produce in comparison to the current situation.**

25. If the above stated tests were to be accepted for every type approval, in other words if worldwide harmonisation would be the case, what would this mean for the level playing field of manufacturers across the world? If you feel that the level playing field would be affected, please indicate which market would be affected and why.

26. In terms of costs, could you please indicate which of the described tests is expected to be most costly to your organization in case of worldwide harmonisation? Please rank accordingly by clicking on the box in front of each test type, starting with the most costly test.

1  
2  
3  
4  
5  
6  
7  
8  
9

The type I test – cold start tailpipe emissions

1  
2  
3  
4  
5  
6  
7  
8  
9

The type II test – tailpipe emissions at idle and fast idle

1  
2  
3  
4  
5  
6  
7  
8  
9

The type III test – crankcase emissions

1  
2  
3  
4  
5  
6  
7  
8  
9

The type IV test – evaporative emissions

1  
2  
3  
4  
5  
6  
7  
8  
9

The type V test – durability

1  
2  
3  
4  
5  
6  
7  
8  
9

The type VII test – CO2 and fuel consumption

1  
2  
3  
4  
5  
6  
7  
8  
9

The type VIII test – on-board diagnostics environmental tests (OBD)

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Propulsion performance requirements: maximum power and torque

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Propulsion performance requirements: maximum speed

27. What are the expected costs (in euro) for one technical approval for the following tests in case of worldwide harmonisation? In addition, please indicate for each test type separately the costs divided between time and equipment costs (in percentages).

	Cost (euro)	Cost of which for equipment (percentage)	Cost of which for time (percentage)	Do not know
The type I test – cold start tailpipe emissions				<input type="radio"/>
The type II test – tailpipe emissions at idle and fast idle				<input type="radio"/>
The type III test – crankcase emissions				<input type="radio"/>
The type IV test – evaporative emissions				<input type="radio"/>
The type V test – durability				<input type="radio"/>
The type VII test – CO2 and fuel consumption				<input type="radio"/>
The type VIII test – on-board diagnostics environmental tests (OBD)				<input type="radio"/>
Propulsion performance requirements: maximum power and torque				<input type="radio"/>
Propulsion performance requirements: maximum speed				<input type="radio"/>



28. Regarding the costs you have described in the previous question, can you indicate whether you expect if there is a difference with the current costs for EPPR tests?

	Remains about the same	Increase	Decrease	N/A
The type I test – cold start tailpipe emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type II test – tailpipe emissions at idle and fast idle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type III test – crankcase emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type IV test – evaporative emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type V test – durability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type VII test – CO2 and fuel consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type VIII test – on-board diagnostics environmental tests (OBD)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Propulsion performance requirements: maximum power and torque	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Propulsion performance requirements: maximum speed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. If these costs increase or decrease, can you indicate how much (in euro), and what the most important cost drivers might be?

	Difference in costs (in euro)	Main cost drivers	N/A
The type I test – cold start tailpipe emissions			<input type="radio"/>
The type II test – tailpipe emissions at idle and fast idle			<input type="radio"/>
The type III test – crankcase emissions			<input type="radio"/>
The type IV test – evaporative emissions			<input type="radio"/>
The type V test – durability			<input type="radio"/>
The type VII test – CO2 and fuel consumption			<input type="radio"/>
The type VIII test – on-board diagnostics environmental tests (OBD)			<input type="radio"/>
Propulsion performance requirements: maximum power and torque			<input type="radio"/>
Propulsion performance requirements: maximum speed			<input type="radio"/>

30. Please indicate which percentage (or range of percentages: e.g. 5-10%) of the retail price of your product(s) in general is made up of the costs for testing.

**31. What is your overall view on the effect of worldwide harmonisation of the described tests on the environmental or propulsion performance of the products? Would it affect the performance of the tested products?**

	Strong positive effect	Positive effect	Neutral effect	Negative effect	Strong negative effect	Do not know
The type I test – cold start tailpipe emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type II test – tailpipe emissions at idle and fast idle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type III test – crankcase emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type IV test – evaporative emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type V test – durability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type VII test – CO2 and fuel consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type VIII test – on-board diagnostics environmental tests (OBD)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Propulsion performance requirements: maximum power and torque	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Propulsion performance requirements: maximum speed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**32. What is your overall view on the cost-effectiveness of worldwide harmonisation of the described tests? Do, in your view, the benefits weigh up against the costs?**

	Very cost effective	Cost effective	Hardly cost effective	Not cost effective	Do not know
The type I test – cold start tailpipe emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type II test – tailpipe emissions at idle and fast idle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type III test – crankcase emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type IV test – evaporative emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type V test – durability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type VII test – CO2 and fuel consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The type VIII test – on-board diagnostics environmental tests (OBD)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Propulsion performance requirements: maximum power and torque	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Propulsion performance requirements: maximum speed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33. Can you, overall, explain your judgement on the cost effectiveness indicated in the previous question?

34. In order to make maximum use of the existing knowledge on EPPR tests and also from a cost point-of-view, an option could be that legislation from other vehicle categories (categories M, N, T) could be taken into account in new legislation for EPPR requirements. Do you see possible synergies between the described EPPR tests for L-category vehicles and other vehicle categories? Please indicate for each test with which vehicle category you see possible synergies. If possible, please specify.

Description category vehicles:  
**M:** passenger vehicles (cars and buses)  
**N :** goods vehicles (light and heavy trucks)  
**T :** tractors

	Synergies with the following vehicle category/categories (M, N, T)	Specification	Do not know
The type I test – cold start tailpipe emissions			<input type="radio"/>
The type II test – tailpipe emissions at idle and fast idle			<input type="radio"/>
The type III test – crankcase emissions			<input type="radio"/>
The type IV test – evaporative emissions			<input type="radio"/>
The type V test – durability			<input type="radio"/>
The type VII test – CO2 and fuel consumption			<input type="radio"/>
The type VIII test – on-board diagnostics environmental tests (OBD)			<input type="radio"/>
Propulsion performance requirements: maximum power and torque			<input type="radio"/>
Propulsion performance requirements: maximum speed			<input type="radio"/>

90. The next stage of our study will look at options for updating environmental and propulsion performance requirements in more detail. Would you be open to be contacted again to comment on the impacts or specific drafts of these?

- Yes
- No

91. If you have any further comments relevant to Environmental and Propulsion Performance Requirements, or any additional information, please provide them below.

## Appendix D Legislative bodies' nomenclature

### D.1 United Nations

United Nations Economic Commission for Europe

Regulation ##, short form: R##

Global technical regulation Number ##, short form: GTR #

### D.2 European Union

European Commission

Directive year/##/EC (or EEC pre 1993)

Regulation (EU) No ##/year

The REPPR is a draft Regulation (Regulation and on the environmental and propulsion performance requirements of two- or three-wheel vehicles and quadricycles)

### D.3 United States of America

Federal: Code of Federal Regulations Title ## Part ## §##,  
short form: CFR ##

California air resource board: California Code of Regulations Title ##, short form: CCR ##. Vehicle Code §##, short form: VC §##

### D.4 People's Republic of China

Ministry of Environmental Protection

GB emission standards ##/year, short form GB ##/year

### D.5 Republic of India

Ministry of Environment & Forests:

Bharat regulations

### D.6 Japan

Ministry of Land, Infrastructure, Transport and Tourism