Working group L-EPPR
25 - 26 April 2013

International environmental and propulsion performance requirements for L-category vehicles – EC perspective

Structure presentation

- Introduction
- Status revision EU type-approval legislation of L-category vehicles
- Highlights proposed environmental measures in near future EU type-approval legislation
- Test type I emission laboratory test
- Structure EU Regulation on Environmental and Propulsion Performance Requirements (REPPR)
- Availability of UN Regulations or GTRs regarding environmental and propulsion performance requirements
- Conclusion

Introduction

- **L-category vehicles**

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 On-road 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		

Introduction

- Identified concerns in current EU approval legislation for L-category vehicles:
  1. the complexity of the current legal framework;
  2. the level of emissions and its increasing share in total road transport emissions, which are decreasing overall;
  3. safety aspects related to type-approval requirements for vehicles;
  4. the lack of a legal framework for vehicles fitted with new technologies;
  5. the entry of products into the EU market which do not comply with the current type-approval requirements regarding functional vehicle safety and/or environmental protection.
- Main Objective: efficiently and effectively address the above listed issues.

Introduction

- Identified environmental concern: high share of hydrocarbons, carbon monoxide and volatile particles emitted by L-category vehicles

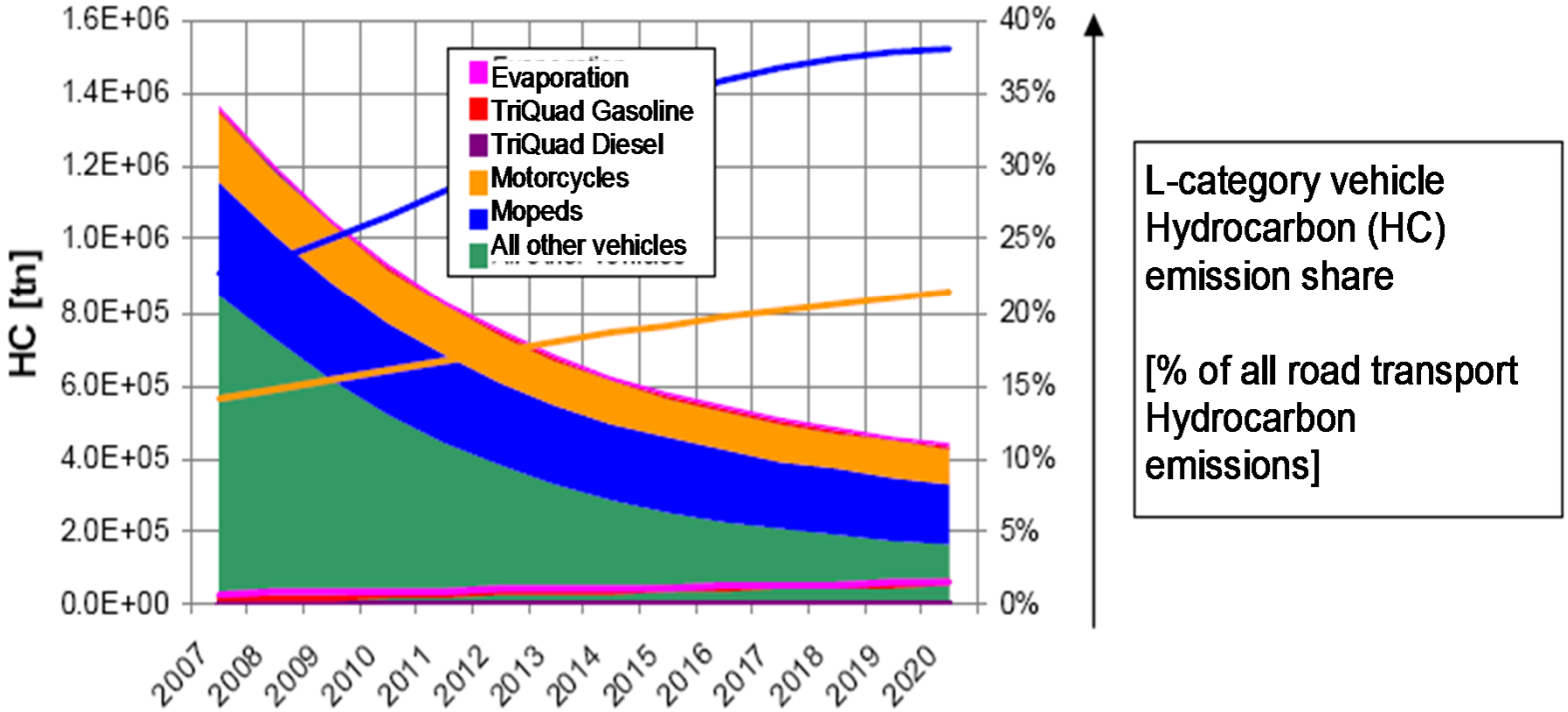


Figure 1: Trend over time of L-category vehicle, absolute and relative share of hydrocarbon emissions if no change in policy.
NB. The "all other vehicles" category includes passenger and delivery cars, trucks and busses. Source: the LAT report
Primary Y-axis (left): HC = HydroCarbon emissions; 2.0E+05 = 200,000, 1.0E+06 = 1,000,000, 1tn=1000 kg.
Secondary Y-axis (right): L-category vehicle Hydrocarbon (HC) emission share as % of all road transport Hydrocarbon emissions

Codecision act - status

- Commission adoption of the proposal for a European Parliament and Council Regulation on the approval and market surveillance of L-category vehicles (two- or three-wheel vehicles and quadricycles) on 04 October 2010.

- Codecision act contains essential elements such as the emission limits, obligation to fit advanced brake systems, reference to applicable test procedures, application time table, structure delegated acts etc.

- Regulation (EU) No 168/2013 of the European Parliament and of the Council of 15 January 2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles (L-category vehicles)

- Published: OJ L60, 02.03.2013, p. 52

Delegated and Implementing acts - status

- Regulation on environmental and propulsion performance requirements (**REPPR**)
- Regulation on vehicle functional safety requirements (**RVFSR**)
- Regulation on vehicle construction requirements (**RVCR**)
- Regulation on administrative requirements (**RAR**)
- Latest draft versions MCWG meeting 19 Apr 13:
  https://circabc.europa.eu/w/browse/528fde84-43f7-4345-b64a-fc3c778aa53e
- The whole package of 5 Regulations is proposed to become first applicable as of **01 January 2016**.

Delegated and Implementing acts - status - timing

- **Planned adoption timing**

Task Name	Start	Finish
Delegated and implementing acts	Mon 02/05/11	Tue 22/04/14
Draft Regulation on environmental and propulsion performance requirements (REPPR)	Mon 02/05/11	Tue 22/04/14
Draft Regulation on vehicle functional safety requirements (RVFSR)	Mon 02/05/11	Mon 20/01/14
Draft Regulation on vehicle construction requirements (RVCR)	Mon 02/05/11	Tue 04/03/14
Draft Regulation on administrative requirements (RAR)	Mon 02/05/11	Wed 02/04/14

Highlights proposed environmental measures in Regulation 168/2013

- Vehicle type approval environmental measures for type-approval of <u>new</u> vehicles types:
  - Proposed environmental steps:
    - Euro 3 (L1e, L2e and L6e (mopeds): mid of 2014;
    - Euro 4 : (L3e, L4e, L5e, L7e): 2016;
    - Euro 4: (L1e, L2e and L6e): 2017
    - Euro 5: 2020
- Durability and evaporative emission requirements
- Environmental effect study to be conducted in 2015 – 2016 timeframe before taking final decision to mandate Euro 5 step

Highlights proposed environmental measures in Regulation 168/2013

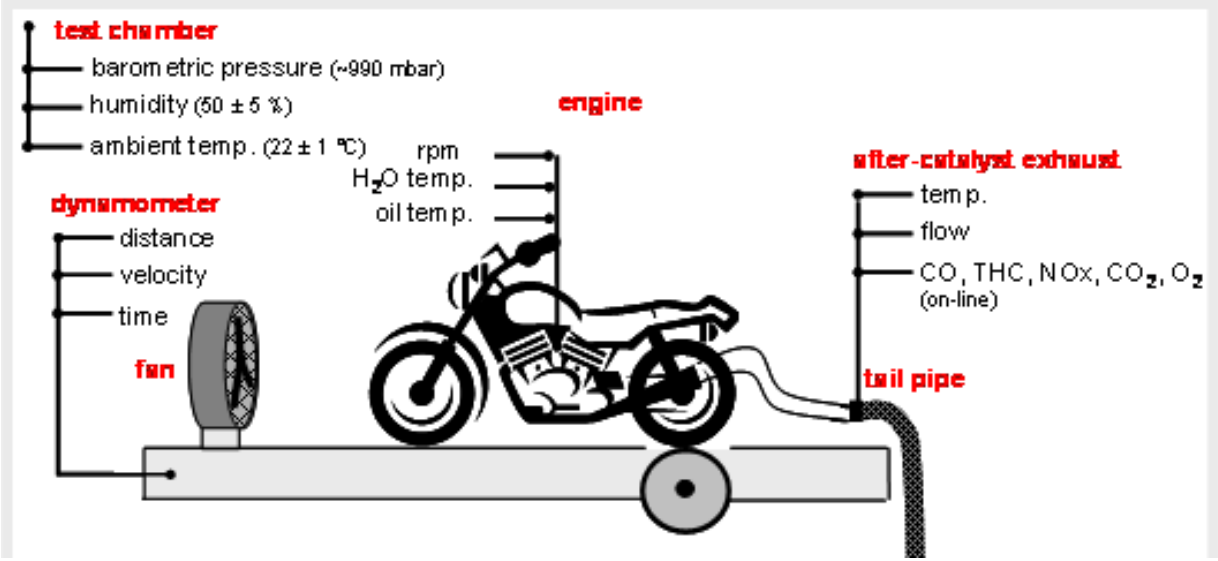
- Vehicle type approval environmental measures for type-approval of <u>new</u> vehicles types:
  - Type approval requirements for energy efficiency: CO_2 emissions (greenhouse gasses), fuel / energy consumption: measurement and reporting, vehicle labelling at a later stage
  - Emission laboratory test cycle
    - Use of the World-harmonised Motorcycle Test Cycle (WMTC) as single emission laboratory test for all L-category vehicle categories proposed as of 2020

Test type I emission laboratory tests

- The exhaust gas will be collected in sample bags and analysed after the test is finished.

- The test result for the constituents THC, CO, NOx and PM is expressed in milligrams per driven kilometre. CO2 in g/km

- This represents the amount in grams of pollutants, emitted in average by the vehicle when driving 1000 m.



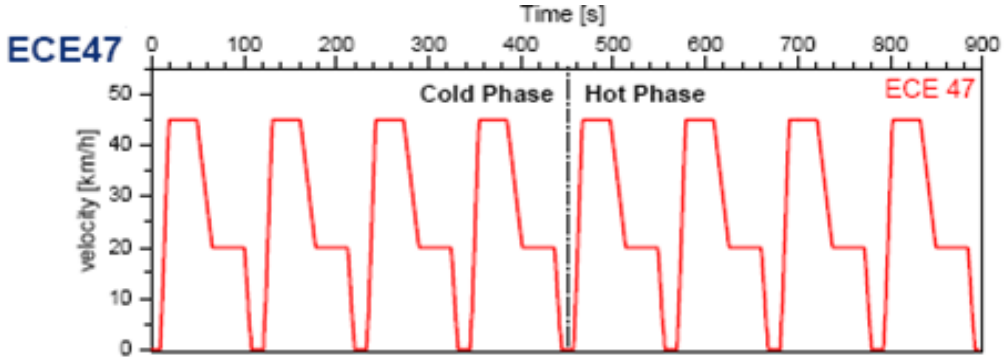
Test type I emission laboratory tests

- 2- and 3-wheel mopeds and light scooters, categories L1e and L2e (test cycle: ECE47)



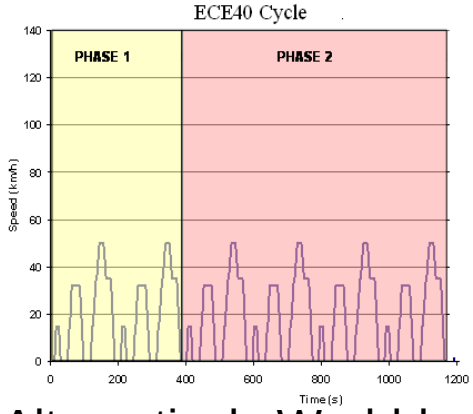
- Light quadricycles, category L6e (test cycle: ECE47)


- L1e, L2e and L6e vehicles are type approved using ECE47 test cycle:

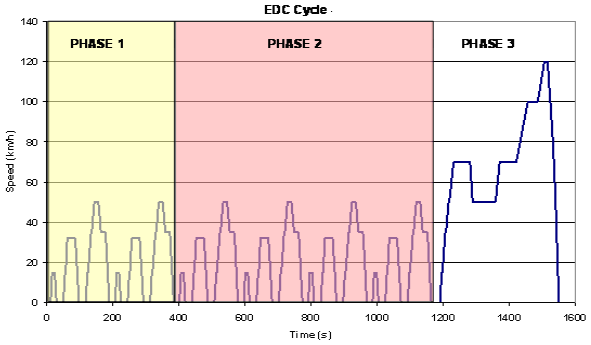


Test type I emission laboratory tests

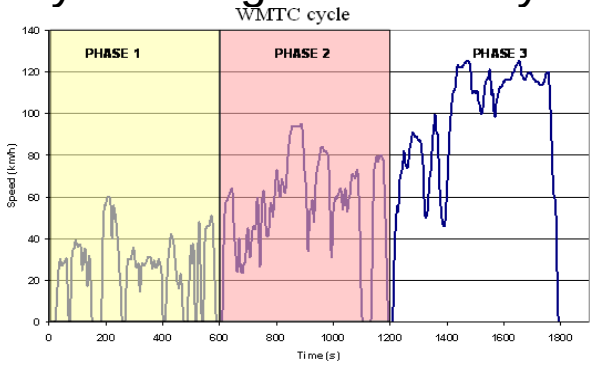
- Current used test cycle for vehicles of categories L3e (motorcycles and scooters)
  - Light L3e & L4e motorcycles (ECE40)



  Heavy L3e & L4e motorcycles(EDC)



  - <u>Alternatively</u> World-harmonised Motorcycle Test Cycle (WMTC), used as test cycle for light and heavy vehicle of categories L3e & L4e

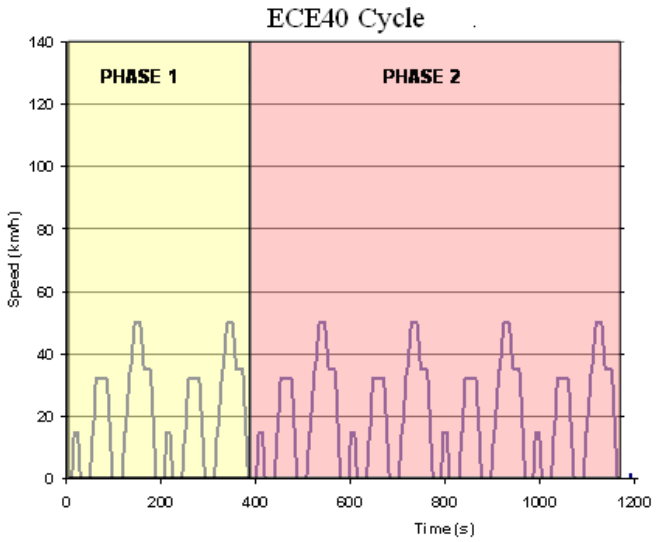


Test type I emission laboratory tests

- Current used test cycle for categories L5e tricycles & L7 heavy quadricycles (ECE40):

  - Tricycles, category L5e

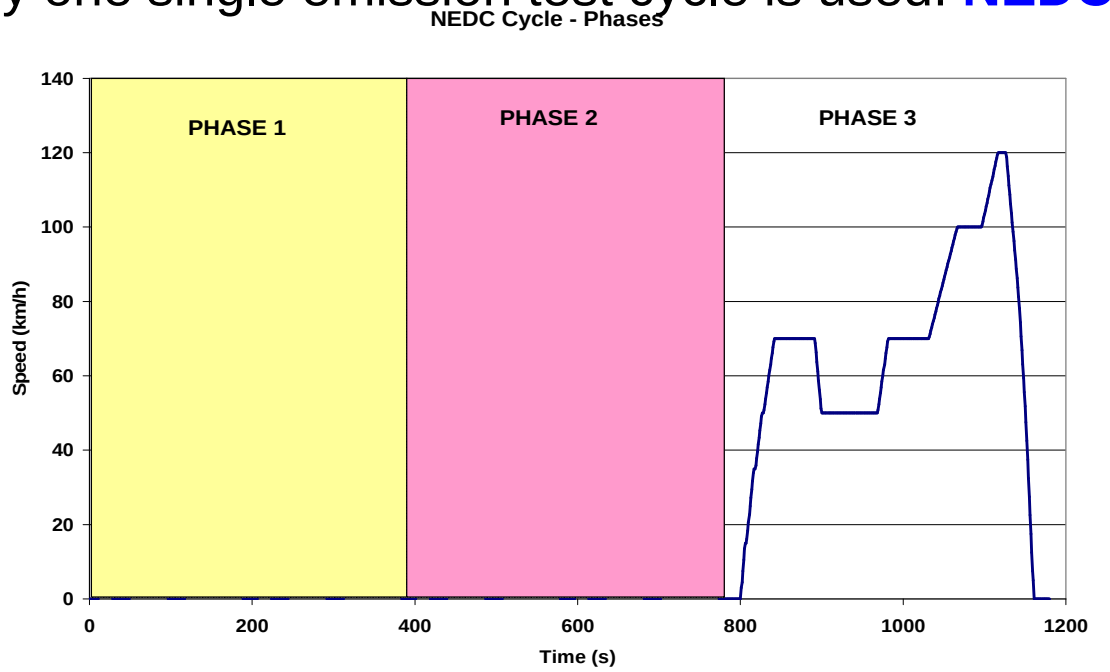

  - Heavy Quadricycles, category L7e

Test type I emission laboratory tests

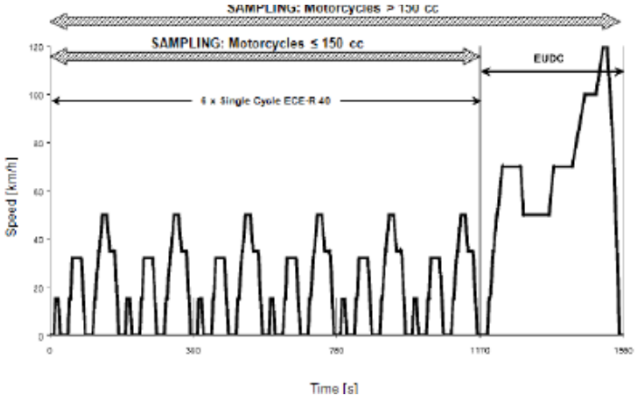
- Current used test cycle for passenger cars, categories M1, M2, M3 and utility vehicles N1, N2, N3

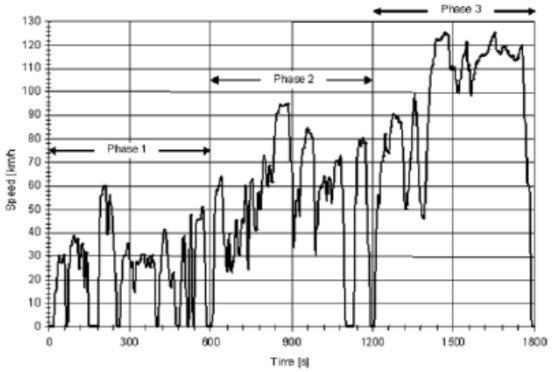
- From the smallest to the biggest model passenger car and utility vehicles, only one single emission test cycle is used: **NEDC**



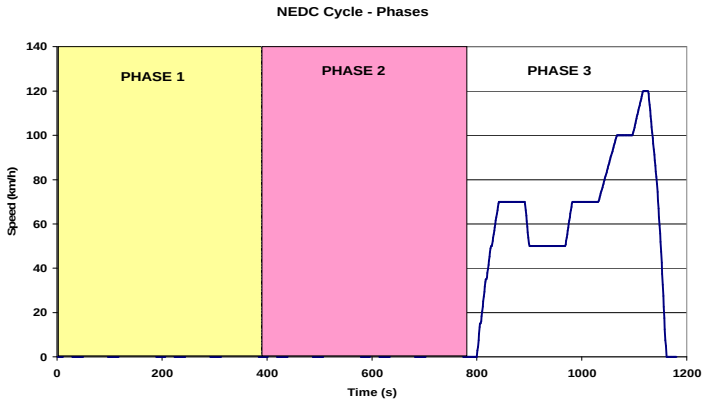
Test type I emission laboratory tests

- Good correlation proven between current used L-category vehicle test cycles **EDC** or **WMTC**





and passenger car test cycle (**NEDC**)

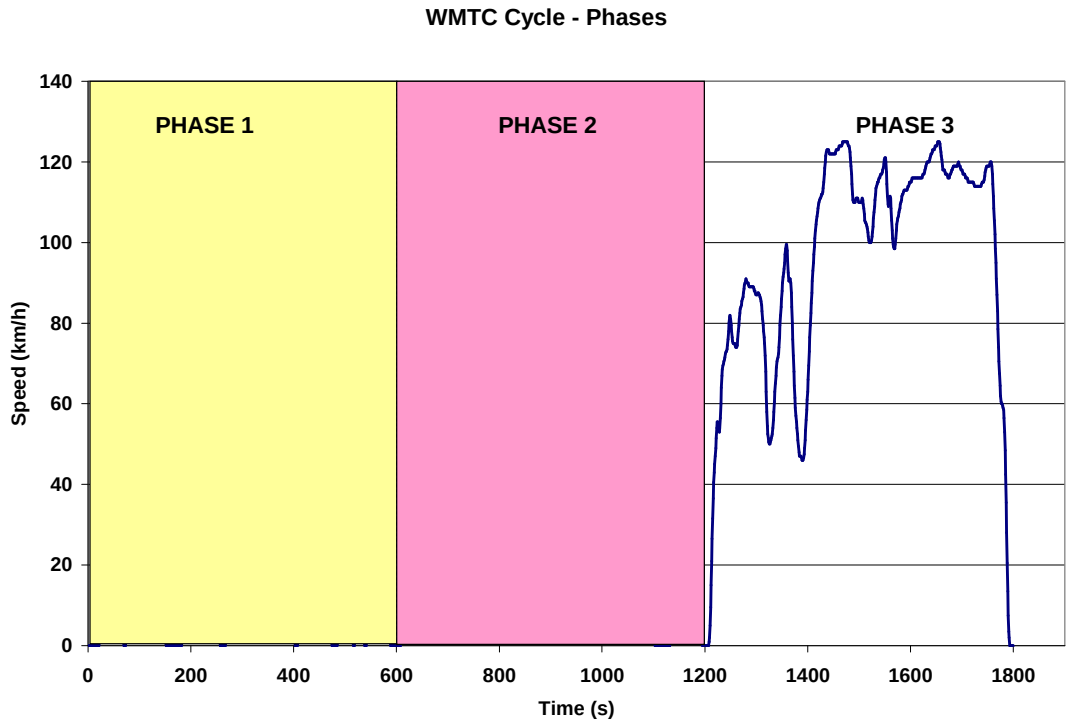


Test type I emission laboratory tests

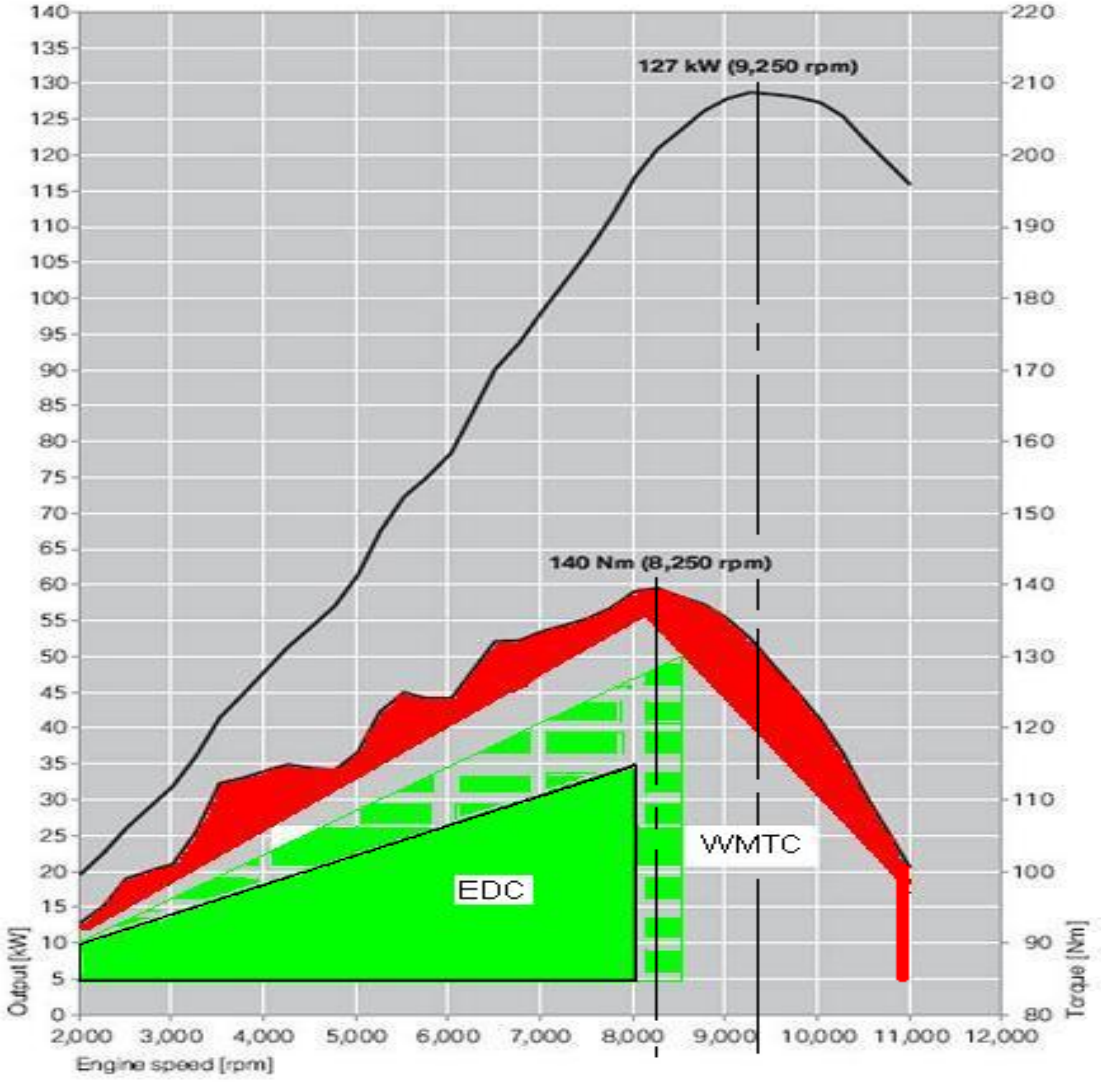
- Consequently:
  - The actual emission performance as measured in the different test cycles of both L-category vehicles and passenger cars can be directly compared in terms of order of magnitude.
  - Current and future proposed L-category vehicle emission limits were expressed in the Impact Assessment report (before drafting Regulation 168/2013) as percentage of Euro 5 passenger car emission limits.

Test type I emission laboratory tests

- **NEW:** Every L-category vehicle type to be approved in the EU using **only <u>one single</u> world harmonised test cycle** starting from 2020 / 2021: **WMTC**



Test type I emission laboratory tests



- **Test type I emission laboratory tests**

  - **Impact on L-category vehicle manufacturers:**

    - L-category vehicle manufacturers to start optimising vehicle emissions by using a new test cycle and abandon the traditional test cycles

  - **EC proposes:**

    - **<u>Over 7 years</u>** of lead-time (3.5 times the conventional lead-time) to mitigate this transition.

    - **<u>In addition:</u>** an environmental effect study to be executed in the 2015 – 2016 timeframe, with input from the supplier and manufacturing industry, to further justify moving to one single test cycle, before making the WMTC mandatory for all L-category vehicles in 2021.

Test type I emission laboratory tests

- **Advantages of using a single type I test cycle:**
  - Vehicles move especially under urban traffic conditions in the same dynamic way (urban traffic flow of stop and go) and can therefore be tested on representative manoeuvres in the emission laboratory
  - Measurement of poisonous emissions (HC, CO, NOx and PM) in test cycle better representative for real-world emission performance of vehicles
  - Precision of modelling to anticipate future contribution of road traffic emissions is much better feasible, as there is one common base to test the vehicles (same test distance, same simulation of traffic manoeuvres etc.)

Test type I emission laboratory tests

- **Advantages of using a single type I test cycle continued:**

  - Being able to compare poisonous emissions between substituting modes of transport. Also non-experts will build up a reference if a vehicle is polluting or environmentally friendly, which in the future may help consumers to purchase less-polluting and better fuel efficient vehicles

  - Being able to compare non-poisonous Green House Gas emissions (CO_2) between substituting modes of transport. Also non-experts / consumers will build up a reference base if a vehicle is a high CO_2 emitter or not

Test type I emission laboratory tests

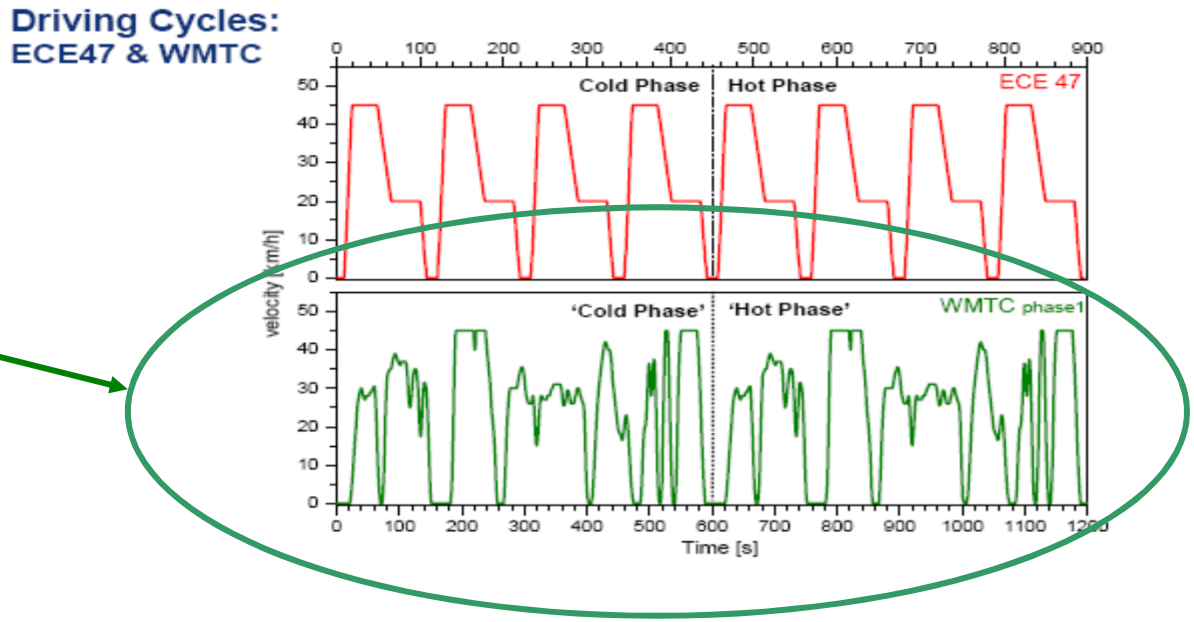
- **Advantages of using a single type I test cycle continued:**

  - Better correlation possible between real-world fuel / energy consumption figure as experienced by the rider / driver and fuel consumption / energy consumption measured in emission laboratory test cycle
  - The chances that a new product will be technically accepted by UN contracting parties when type-approved / self-certified using a world harmonised test cycle like the WMTC are much better, than when only type-approved with a regionally accepted type-approval test cycle
  - ‘Cycle beating’ / use of defeat devices will become technically more complex and consequently more expensive

Test type I emission laboratory tests

- Replace conventional ECE47 test cycle used to type approve L1e (mopeds and light scooters), L2 (three-wheel mopeds) and L6e (light quadricycles) with a new test cycle based on urban, low vehicle speed, part 1 of WMTC test cycle.

New test cycle (bottom) based on urban (low vehicle speed) fraction of **WMTC** test cycle replacing traditional **ECE47** cycle (top)



Test type I emission laboratory tests

- Same single disadvantage and multiple advantages are applicable for this new designated WMTC derivative test cycle for mopeds and light scooters as listed before for all other L-category vehicles
- Further advantages:
  - the high level of severity of the conventional ECE47 test cycle is maintained in the new WMTC based test cycle, as the wide open throttle phases at constant 45 km/h remain.
  - create a level playing field for manufacturers world-wide independent if a low-end motorcycle is referred to as motorcycle or as a moped. Owing to its simple outdated definition the ECE47 test cycle is extremely prone to cycle beating and invites unserious manufacturers to easily circumnavigate environmental requirements.

Test type I emission laboratory tests

- **Conclusion:**
  - The advantages of moving to one single test cycle for L-category vehicles outweigh by far its single disadvantage. This single disadvantage is mitigated by an extremely long transition time.

Structure EU Regulation on Environmental and Propulsion Performance Requirements (REPPR)

- Annexes II and V of Regulation 168/2013 propose structure and provide the general framework

1. Environmental performance test procedures related to e.g. measurement of exhaust emissions, evaporative emissions, greenhouse gas emissions, fuel or energy consumption, electric range etc.;

2. Test procedures maximum design vehicle speed, maximum torque, maximum continuous rated and net power;

Draft EU Regulation on Environmental and Propulsion Performance Requirements (REPPR) - Chapter II - environmental test requirements

- **Test type** **Test description**

I	Tailpipe emissions test after cold start;
II	Tailpipe emissions test at (increased) idle / free acceleration test;
III	Emission test of crankcase gases;
IV	Evaporative emissions test;
V	Durability testing of pollution control devices;

Draft EU Regulation on Environmental and Propulsion Performance Requirements (REPPR) - Chapter II - environmental test requirements

- **Test type** **Test description**

VI	Test type not attributed;
VII	Measurement of CO_2 emissions, fuel consumption, electric energy consumption and electric range determination;
VIII	On-board diagnostics test (only environmental part of OBD, functional part in RVCR);
IX	Sound level tests.

Draft EU Regulation on Environmental and Propulsion Performance Requirements (REPPR) - Chapter II - propulsion performance test requirements:

- Annex IX: Testing procedures and technical requirements regarding maximum design engine speed, torque, maximum continuous rated and maximum net propulsion power.

- Base: EU Directive 95/1/EC on the maximum design speed, maximum torque and maximum net engine power of L-category vehicles with conventional (combustion engine) propulsion.

- UN R85 proposed for determination of maximum continuous rated power of pure electric propulsion.

- Issue: propulsion performance of hybrid-electric propelled vehicles and alternative propulsions.

Availability of UN Regulations or GTRs regarding environmental and propulsion performance requirements

- **Simplification**: explicit EU goal to refer as much as possible directly to UN Regulations and to replace REPPR text in the future with direct references to UN Regulations;

- Availability of UN Regulations is not a given today and existing Regulations or GTR No 2 require update;

- Measurement technology requirement principles for vehicles equipped with combustion engines, pure electric or hybrid-electric propulsion should be coherent and made common to the largest extend possible, independent if fitted on a L-, M- or N-category vehicle.

- Many developments in M- and N- category measurement technology requirements (WLTP ?) may also be applicable for L-category vehicles.

Availability of UN Regulations or GTRs regarding environmental and propulsion performance requirements

- Alternatively L-EPPR group may assess “mirror” UN Regulation(s) of upgraded GTR No 2 / multiple GTRs
- Developed simplified draft road map for consideration of L-EPPR group and GRPE
- Started two-year study to investigate how the goal can be accomplished of direct reference to UN Regulations and replacing EU REPPR text as much as possible by direct references to UN Regulations

Conclusion

- The EU welcomes collaboration with UN contracting parties and international stakeholders in order to improve international L-category vehicle environmental and propulsion performance requirements to the benefit of globally operating manufacturers and facilitating international trade

- L-category vehicle's inherent advantage (light) over other means of road transport can be used to its full potential once the emission concerns are addressed. Developing world-wide harmonised environmental test procedures are key to achieve the objectives to which the L-EPPR group can make an important contribution

Thank you for your attention

Further information:

http://ec.europa.eu/enterprise/sectors/automotive

Status of EU legislation, links to Directives, Regulations and other useful information.

http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29age.html

Status of UNECE Regulations and GTRs, proposals, working documents and working groups.