

STUDY ON EURO 5 SOUND LEVEL LIMITS OF L-CATEGORY VEHICLES

65th GRB meeting



Data Analysis
and
Consultancy



On behalf of the European Commission



GENERAL INFORMATION

› **Tender ID:**

- › Title: Study on Euro 5 sound level limits of L-category vehicles
- › Tender No: 524/PP/GRO/IMA/16/1131/9316
- › Contract No: SI2.736346 of the Consortium with the European Commission - DG-GROW

› **Consortium performing the work:**

- › EMISIA - Greece
- › TNO - The Netherlands
- › Ricardo Deutschland GmbH - Germany
- › Heinz Steven Data Analysis and Consultancy (HSDAC) - Germany



BACKGROUND

- › L-category vehicles continue to be source of **complaints** with respect to their (excessive) levels of sound emissions, often perceived as disturbing **noise**
 - › Excessive noise levels constitute a major **nuisance** for many European cities, contribute in quality of life **degradation**, and may be **harmful** for public health
 - › Recent **advances** in regulatory front (UN Regs. Nos. 9, 41, 63, 92 acceded - or to be acceded - by the EU Regulatory context) focused on improvements in the **testing** procedure and provisions for better market **surveillance**, **enforcement**, **anti-tampering** measures, and **replacement** silencers
- › Current (**Euro 4**) sound level limits have been basically transferred from limits already applicable since the **1990's** (Directive **97/24/EC** chapter 9) and remain (almost) **unchanged** for ~20 years



PROJECT OBJECTIVES

› **Investigate** the potential for new sound limits of L-category vehicles at Euro 5 step and make a justified **proposal**, taking into account:



› the citizen's needs and opinions of interested stakeholders
(feedback gathering)



› the evolution of sound levels of approved vehicle types
(actual vehicle testing)



› the technical and economic feasibility in the medium term range
(cost-benefit analysis)

› The new sound limits will be accompanied by an appropriate application **timeframe**

› The ultimate objective is to **protect** the **environment** and human **health**, by providing an improved sound level range for L-category vehicles, and contribute in the reduction of the so-called '**noise pollution**'



PROJECT TASKS AND TIME PLAN

- 1. Task 1: Estimate of sound level limits for all L-categories (Oct.'16 – Jan.'17)**
 - a) Feedback gathering – stakeholder survey
 - b) Literature review
- 2. Task 2: Verification of sound level limits (Jan.'17 – Apr.'17)**
 - a) Actual vehicle testing – sound measurements
 - b) Processing of results
- 3. Task 3: Cost-benefit analysis (Mar.'17 – Aug.'17)**
 - a) Input data, scenarios, first results
 - b) Improvements, final CBA results
- 4. Task 4: Validation tests (Mar.'17 – Jun.'17)**
 - a) Additional vehicle testing – sound measurements
 - b) Noise Source Ranking (NSR)
- 5. Task 5: Proposal for limit values and reporting (Jul.'17 – Oct.'17)**

Final sound limits proposed by the study and recommendations



TASK 1: ESTIMATE OF SOUND LEVEL LIMITS FOR ALL L-CATEGORIES

INDICATIVE RESULTS AND FINDINGS FROM THE FEEDBACK GATHERING



OVERVIEW OF THE SURVEY

Objectives

- › In-depth understanding of the **wishes**, **demands**, and **requirements** of stakeholders directly involved in the implementation of (possible) new sound limits (manufacturers, authorities, etc.)
- › Take into account the opinion of the **recipients** of possible **benefits** from improved sound limits (concerned citizens, municipalities, associations, environmental organizations, etc.)

Approach

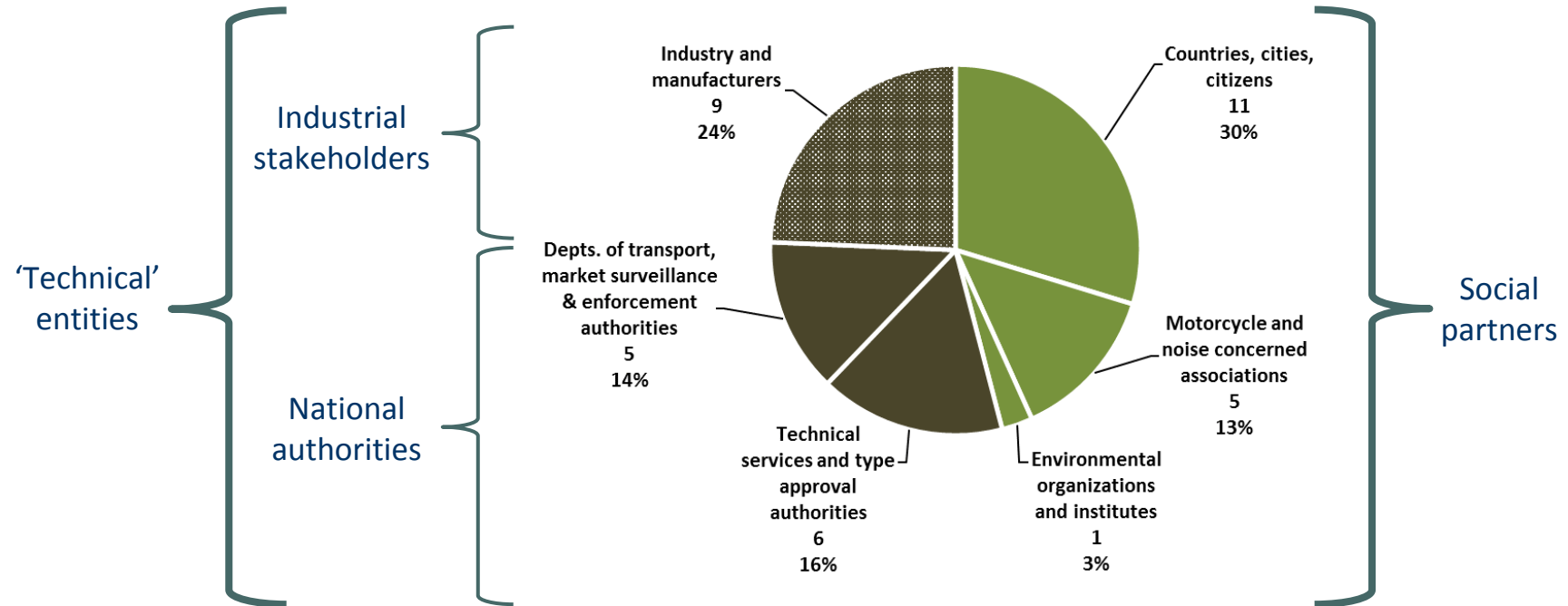
- › Technical **questionnaire** sent to a large number of various stakeholder groups
- › **Collection** of responses, **processing** of questionnaires, **analysis** and main findings

Structure of questionnaire

- › **Section 1:** Technical issues related to sound limits
 - › Current status (Euro 4), improved (Euro 5) sound limits, absorbent fibrous materials, ASEP
- › **Section 2:** Contribution of L-category vehicle components to sound emissions
- › **Section 3:** Cost/benefit impact from the expected sound emissions reduction
 - › New vehicles, existing fleet



POSITIVE RESPONSES – FILLED IN QUESTIONNAIRES



- › **37 positive responses** (satisfactory feedback, considering the technical nature of questionnaire)
- › Most responses (**54%**) are from **'technical'** entities; this enhances the **validity** of results regarding their technical content
- › On the other hand, **'social'** partners showed their interest despite the technical nature of questions (**46%** of responses); this shows the continuous interest and necessity to **further decrease** sound emissions



COMPLETED QUESTIONNAIRES RECEIVED FROM

- › **National responses** (TSs, TAAs, transport departments, market surveillance, enforcement):
 - › DE (2), ES (2), NL, SE, IE, CH (2)
 - › Outside Europe: CN (2)
- › **Industry & manufacturers:**
 - › ACEM, ATVEA
 - › From IT: Piaggio, ANCMA, Arrow, LeoVince, Termignoni, MIVV, Lafranconi Silenziatori
- › **Cities & organizations** (environmental, noise concerned, motorcycle, consumer, other):
 - › Budapest, Madrid, Rotterdam (2)
 - › ANEC, FEMA, FIA
 - › From DE: › UBA
 - › MOTORRADLAERM.DE - BUND für Umwelt und Naturschutz Deutschland
 - › Anwohnerinitiative gegen Verkehrslärm in Hattingen
 - › ALD (DE) - Arbeitsring Laerm der DEGA (Deutsche Gesellschaft für Akustik e.V.)
 - › Anonymous responses: DE (2), FR (2), NL
 - › 1 individual response



MAIN CONCLUSIONS FROM THE SURVEY

Social partners

The majority of social partners (~**94%**), especially non-bikers and environmental organizations, want a **significant** decrease in sound limits. However, this percentage is interpreted as a general requirement to reduce the excessive sound emissions (noise) produced by the **inappropriate** usage of vehicles and rider **behaviour** (i.e. illegal aftermarket exhaust, tampering, etc.).

Industrial stakeholders

Manufacturers have significant **concerns** about lowering sound limits, as this measure alone is **not** considered sufficient, if not combined with better **enforcement** of regulations, **anti-tampering** measures, and improvements in the **test** procedures. Furthermore, it entails the **risk** to drive even more customers to purchase illegal aftermarket systems.

National technical authorities

They express an intermediate position (in-between social partners and industry), suggesting a **moderate** reduction in sound limits, depending on the vehicle type and (possibly) **excluding** some categories. This reduction should be combined with specific technical **improvements** in the test procedure (**ASEP**) in order to be more representative of real-driving conditions.

Lowering the type approval sound limits is **not** the **only** problem that needs to be addressed



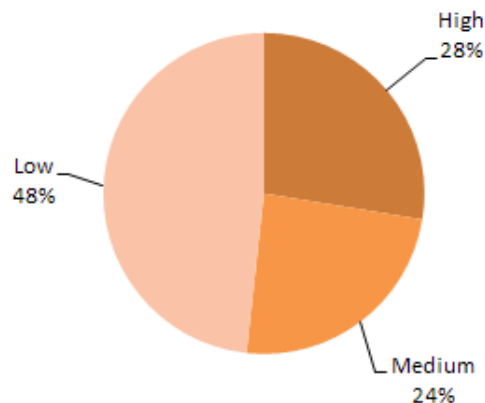
TECHNICAL FEASIBILITY FOR LOWER LIMITS

- › Current (**Euro 4**) sound limits remain (almost) **unchanged** for ~20 years
- › Technical knowledge is **available** and existing technology is mature enough, so that Euro 4 limits are quite easily **achievable** for most of the L-categories
- › **Additional** technology (possibly) required to achieve lower (Euro 5) limits:
 - › **Bigger silencers** (with potential impact on vehicle package and, perhaps, a problem for small vehicles)
 - › Better **shielding** and **covering** by silencing foam, new **absorber** material, modifications of the **inlet** and **exhaust** systems
 - › Better **engine** design and **optimization** for noise and vibration, optimization of **combustion** process, specific **ECU** software
- › Concerns that **specific** vehicle categories (super-sport, off-road trial and enduro motorcycles, ATVs) may have **additional** technical difficulties
- › **Economic** issues: very uncertain parameter
 - › Opinion 1: Additional technological improvements may increase the vehicle cost
 - › Opinion 2: Currently, a lot of money and effort is spent in sound design; no indication that designing for lower limits is necessarily more costly



ENVIRONMENTAL IMPACT FROM LOWER LIMITS

According to your opinion, the contribution of lower Euro 5 sound limits in protecting the environment and human health would be:
(All responses)



- › All participants agree that there will be **no** environmental benefit, if lower limits will not be combined with:
 - › Better **enforcement**, effective market **surveillance**, **road-side** checks and periodical **inspections**, etc.
 - › **Anti-tampering** measures, i.e., making **manipulations** more difficult, forbidding certain **illegal** replacement silencers, etc. More environmentally friendly rider **behaviour**
 - › **Improvements** in the **test** procedures in order to be more **representative** of real-driving conditions, sound emissions outside **ASEP** area, incorporation of ASEP into type-approval procedure (not self-certification), etc.
- › If the above items will not be in a **package** together with lower limits, the **gap** between real-world and type-approval sound emissions will not close

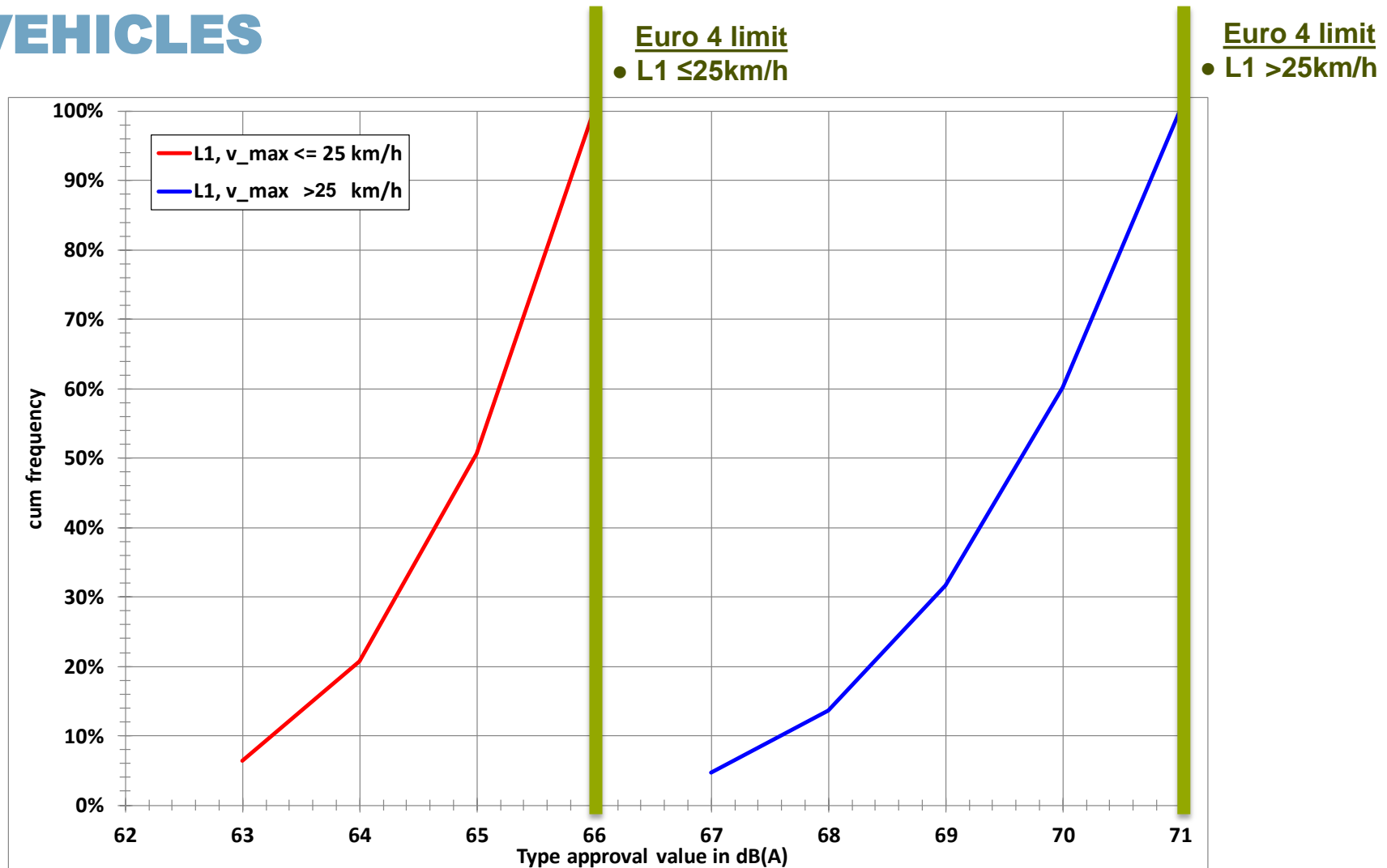


TASK 1: ESTIMATE OF SOUND LEVEL LIMITS FOR ALL L-CATEGORIES

LITERATURE REVIEW – RESULTS FROM THE ANALYSIS OF KBA DATABASE



DISTRIBUTION OF TYPE APPROVAL SOUND LEVELS L1 VEHICLES





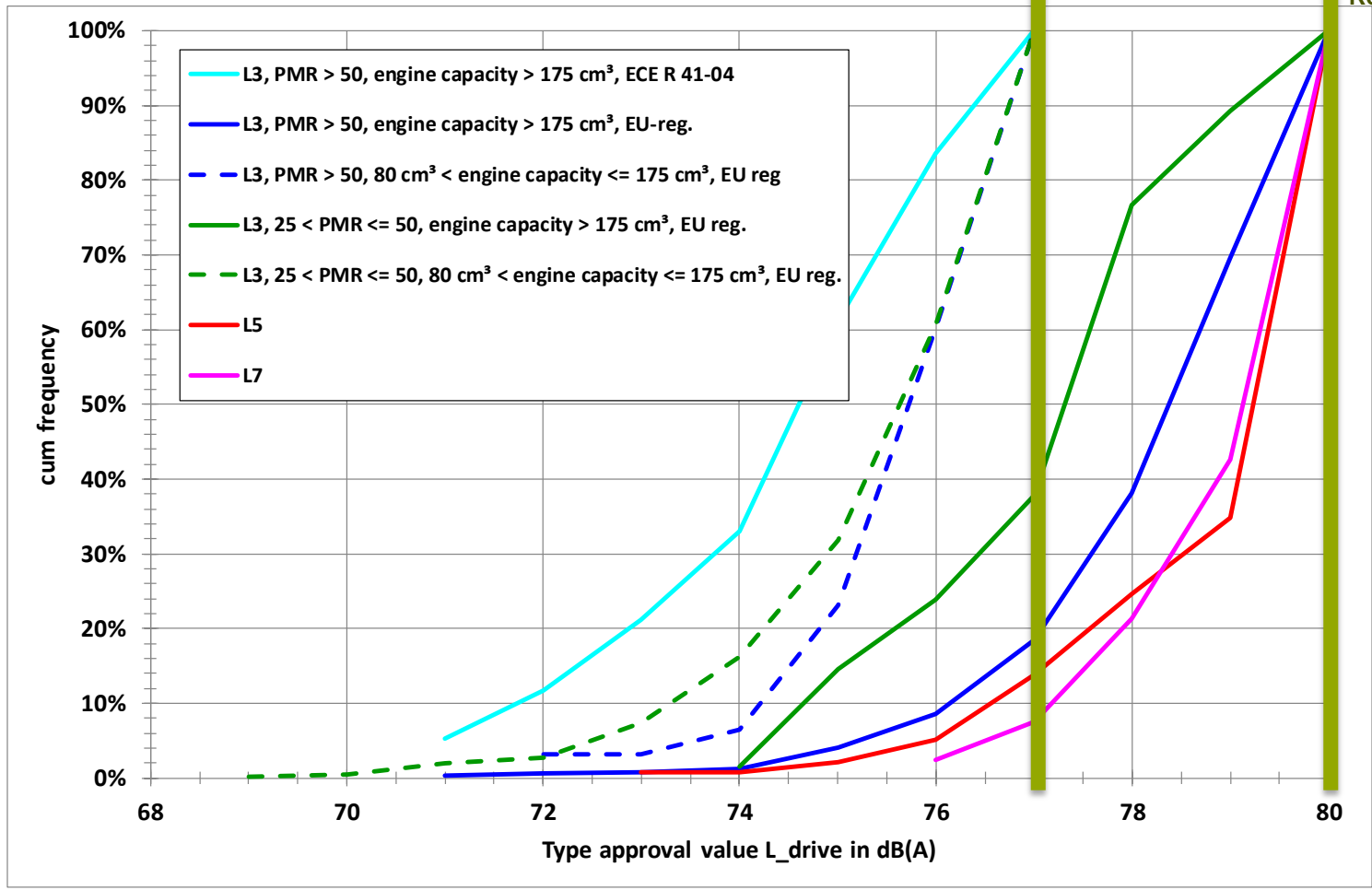
DISTRIBUTION OF TYPE APPROVAL SOUND LEVELS L3, L5, L7 VEHICLES

Euro 4 limit

- L3 80 < eng. cap. ≤ 175 cm³ (EU Reg. 168/2013)
- L3 PMR > 50 (UN Reg. 41.04)

Euro 4 limit

- L4, L5, L6, L7
- L3 > 175 cm³ (EU Reg. 168/2013)





UNDER TASKS 2 AND 4: ACTUAL VEHICLE TESTING – SOUND MEASUREMENTS



OBJECTIVES – SELECTION OF VEHICLES

- › **The objective of including testing of sound levels in the study:**
 - › To establish **current** sound levels of state of the art vehicle
 - › Assess the **contributions** to the sound level of the different sources – vehicle components

- › Vehicles have been selected with achieved levels **under or on** the current limit and with **recent** homologation certificates (no more than 2-3 years)
- › Vehicles are tested in **production** configuration
- › In the validation tests (Task 4), a **Noise Source Ranking** (NSR) study (successive physical masking of the different sound level sources) is scheduled to identify and quantify the technical possibilities for sound level reduction on two different L3 vehicles (scooter, motorcycle) and one L7 vehicle (quadricycle)



L1-VEHICLE CATEGORY TESTING

- › 3 different vehicles tested according to UN R63
 - › L1eB-LS: Scooter 50cc (CVT) with physical restriction to 25km/h (MOFA)
 - › L1eB-HS: Scooter 50cc (not restricted)
 - › L1eB-HS: Manual 50cc
 - › Approval levels are in the process of **verification**

Acceleration Test



Standing Test





TASK 3: COST-BENEFIT ANALYSIS

PLAN FOR THE CBA MODEL



SOME KEY POINTS ON CBA TO BE PERFORMED

- › The main objective is to assess the technical and economic **feasibility** of lower (Euro 5) limits in the medium term range
- › **Input** from Task 1 (feedback gathering and literature review) and Tasks 2 and 4 (actual vehicle testing – sound measurements) will be used
- › Different **scenarios** will be examined (i.e. no change to limits, moderate reduction, ambitious limits), fleet projections (baseline, low/high market growth), urban/non-urban areas
- › Focus on **single** or individual **special** noise events, e.g. noisy pass-by vehicles in villages and **quiet** rural areas, noisy events at **night** or during weekends/holidays
- › CBA consistent with **EU policy** of sound emissions control at the source



NEXT STEPS – PROJECT MILESTONES

› April 2017

Processed results from vehicle testing

CBA input data and methodology finalized

› June 2017

All vehicle testing results finalized

First results from CBA

› September 2017

Final limit values proposed by the study and their justification

THANK YOU FOR
YOUR ATTENTION



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