Technical support for the impact assessment on Euro 5 step of L-category sound emissions level limits

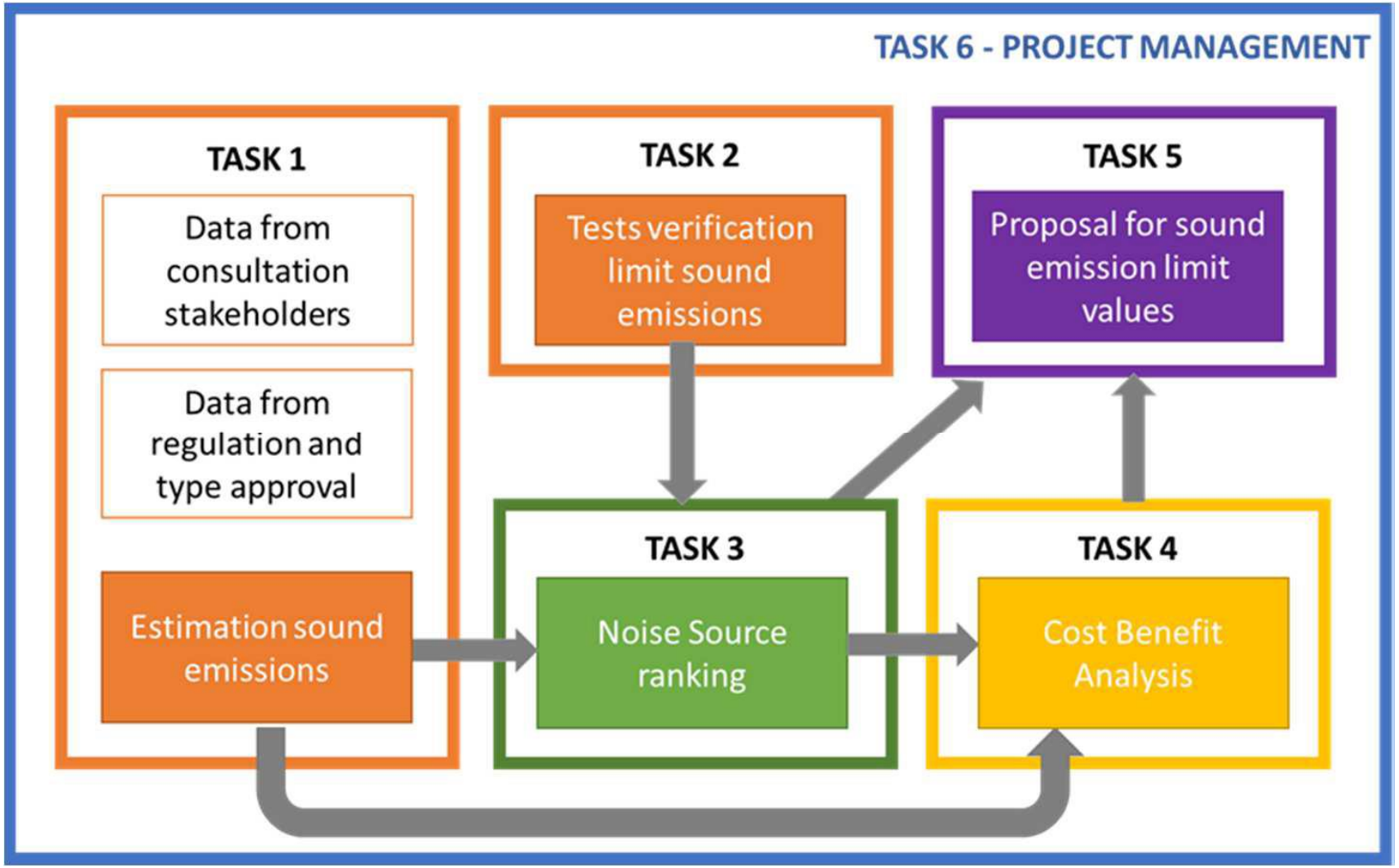
TFSL- 04, 13-14/09/2021

By Applus IDIADA & ACASA, on behalf of the European Commission

Project Tasks

- **Task 1: Estimate of L-category fleet representativeness in sound emissions (IDIADA)**
- **Task 2: Verification of sound level limits (IDIADA)**
- **Task 3: Noise source ranking tests (IDIADA)**
- **Task 4: Cost-benefit analysis (ACASA)**
- **Task 5: Proposal of sound emission limit values and reporting (IDIADA)**
- **Task 6: Project Management (IDIADA)**

Task dependencies



Task 1: Estimate of L-categories fleet representativeness in sound emissions

Conclusions

- Questionnaire addressed to 336 stakeholders with a very large spectrum of profiles. 33 received answers with a balanced representation of the different profiles
- Fitting of NORESS and single noise events among others are seen as having a significant impact on the motorcycle noise perception
- L3e are seen as the vehicle category more prone to be tampered
- L3e-A3 are perceived as the sub-category for which is more difficult to comply with the current sound level limits
- Opinions from stakeholders regarding a possible reduction of sound emissions level limits are divided
- In-use controls are understood as an efficient way to lowering effectively the real-world noise emission caused by motorcycles

Task 2: Verification of sound level limits

Conclusions

- The obtained sound level test results for all the 19 tested vehicles are below the existing limits.
- The margin between the actual test results and the existing limits varies depending on the vehicle's subcategory.
- Most of the motorcycles tested according to RD-ASEP provisions give already positive results.

Task 3: Noise source ranking tests

Objective

- To quantify the contribution of the different vehicle noise sources to the overall vehicle noise emissions, by determining tests requirements and by analysing the results of such tests.
- Finished (6 vehicles tested)

Task 3: Conclusions

- The various technologies used for L-vehicles noise control (exhaust, shields, intakes, engine design, gearing) are very much influenced by the type of vehicle under consideration. Available space for component or system modification is a key point for the definition of the most cost-effective strategies for noise control.
- Current results and observations suggest that certain technology refinements applied to silencers, shields, packaging, engine block vibration, gearing or valve design can provide noise reductions.
- However, very different CBA results can be expected depending on the actions taken. This will be a decision driver.
- The feasibility of an eventual noise values reduction and its corresponding CBA is under study.
- The expected noise reduction based on reasonable design modification of L-vehicle components seems to be quite low.

Task 4: Cost Benefit Analysis

Objectives

- To assess the feasibility of the sound emission levels proposed by means of a Cost Benefit Analysis (CBA).
- It will identify the main benefits associated to a certain noise reduction and the cost of implementing measures, related to vehicles sound emissions improvement, to achieve such reduction.
- Preliminary results suggest a strong positive impact of increased enforcement of current limits on noise reduction and associated social benefits.

Gantt chart

07/09/2020

Task nº	Title	Start	End
1	Estimate of L-categories fleet representativeness in sound emissions	1	2
1.1	Feedback gathering	1	2
1.2	Literature review	1	2
2	Verification of sound level limit	2	5
2.1	Vehicle selection	2	3
2.2	Vehicle testing	3	5
3	Noise Source Ranking tests	5	6
4	Cost-benefit analysis	7	12
5	Proposal for sound emission limit values and reporting	8	13
6	Project management	1	14

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Background information

Task 1: Estimate of L-categories fleet representativeness in sound emissions

Objectives

- Determine a quantitative picture of the noise level emission of the current fleet.
- The potential new technologies that can enable a noise emission improvement in current vehicles and in the mid and long term.
- A high-level proposal of potential of new noise emission thresholds including a timeframe for implementation.

Sub-tasks

- Task 1.1: Feedback gathering
- Task 1.2: Literature review

Task 1: Estimate of L-categories fleet representativeness in sound emissions

Task 1-1:Feed-back gathering: questionnaire topics (30 questions)

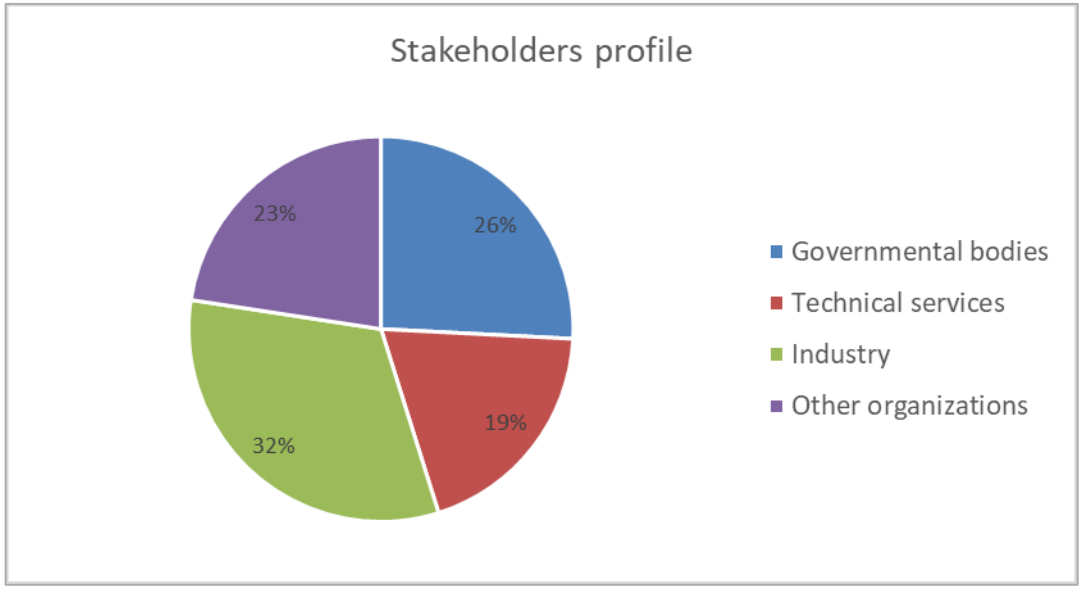
- Effect of noise
- Effectiveness of regulation
- Tampering
- Driver’s behavior
- Evaluation of fleet
- Noise sources
- Technological limitations
- Sound limits
- Cost benefit
- Time to market
- In-use control

Task 1: Estimate of L-categories fleet representativeness in sound emissions

Task 1-1. Feed-back gathering: Contacts

- Industrial stakeholders
- Technical services and type approval authorities
- Department of transport, market surveillance and enforcement authorities
- Countries, cities and citizens
- Motorcycle and noise concerned associations
- Environmental organisations and institutes

Contacts: 336
Replies: 33



Task 1: Estimate of L-categories fleet representativeness in sound emissions

Task 1.2. Literature review: Topics

- Vehicle life expectancy
- Available technologies to reduce sound levels in L-category vehicles
- Vehicle average mileage
- EU sales of replacement exhausts
- Registration per country and per vehicle category
- EU countries with technical inspection of L-category vehicles
- Urban noise levels
- Extra urban noise levels
- Average speed in EU cities
- Number of EU cities with low-speed areas
- Health issues related to noise
- Environmental impact of road traffic noise
- Average approval sound level values found in ETAES

Task 2: Verification of sound level limit

Objectives

- Verification of the sound levels of vehicles of different technologies available in the market ,by means of real tests performed according to the procedures defined in the current regulatory framework.
- Comparison of the obtained results with the sound level limits estimated by means of the survey and literature analysis of task 1.

Sub tasks

- Task 2.1: Vehicle selection
- Task 2.2: Vehicle testing

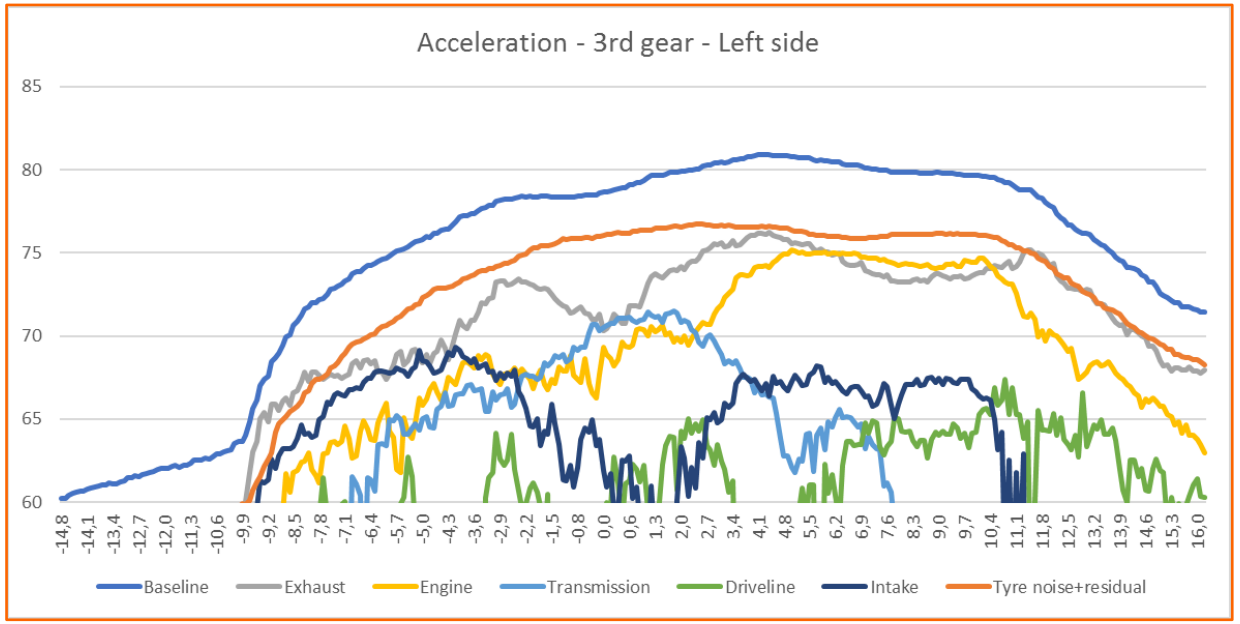
Task 2 & 3: Vehicles tested

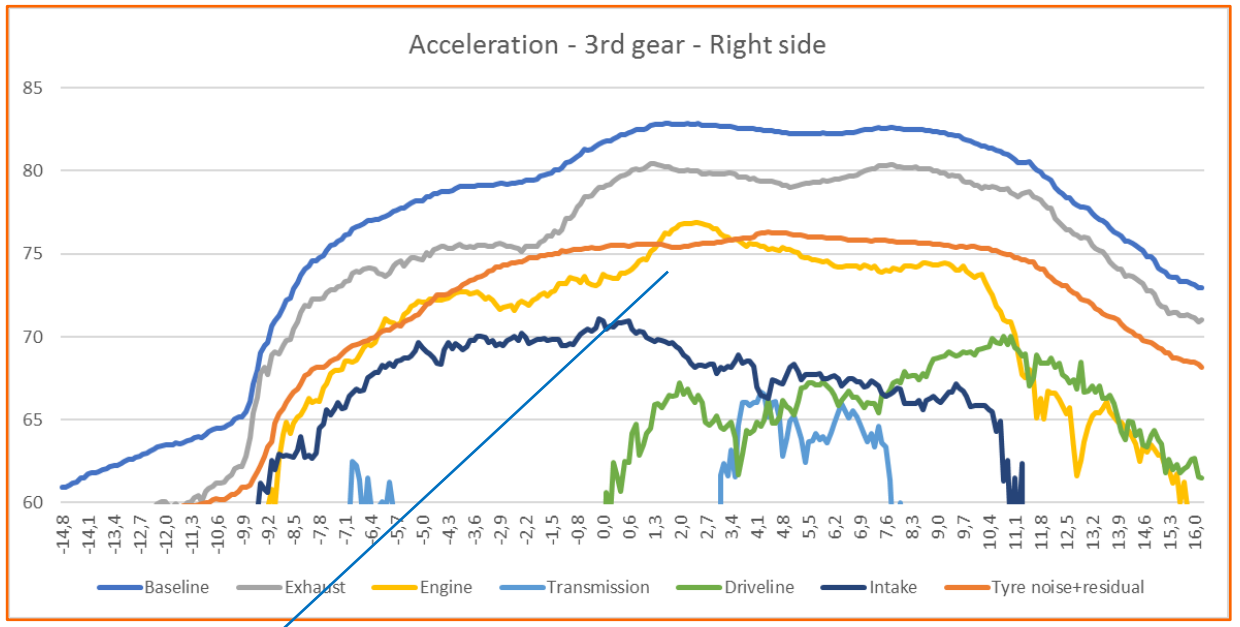
Task 2: Verification of Sound level limits (18 vehicles)

UN-Regulation	PMR	Category / Sub-category	Engine type	Gear / Transmission	Target specifications
R.41.04	25 < PMR ≤ 50	L3e-A1	PI	Locked / Manual	Enduro
		L3e-A1	PI	Non-locked / CVT	Urban Scooter
		L3e-A1	PI	Locked / Manual	Sport
		L3e-A2T	PI	Locked / Manual	Sport TRIAL
	PMR > 50	L3e-A3	PI	Locked / Manual	Sport Naked
		L3e-A3	PI	Locked / Manual	Sport TRAIL
		L3e-A3	PI	Locked / Manual	Sport
		L3e-A3	PI	Non-locked / Automatic	Sport TRAIL
		L3e-A3	PI	Locked / Manual	Sport TRAIL
		L3e-A3	PI	Locked / Manual	Sport TRAIL
		L3e-A3	PI	Locked / Manual	Sport Naked
		L3e-A3	PI	Non-locked / CVT	Urban Scooter
		L3e-A3	PI	Locked / Manual	Touring
		L3e-A3	PI	Locked / Manual	Custom
R.09.08	PMR ≤ 50	L5e-B	PI	Locked / Manual	Bodied Tricycle
	PMR > 50	L5e-A	PI	Non-locked / CVT	Unbodied
	PMR ≤ 50	L6e-BP	PI	Non-locked / CVT	Bodied
	PMR > 50 (With ASEP)	L7e-B1	PI	Non-locked / CVT	ATV

Task 3: Noise source ranking (6 vehicles tested)

Task 3: Noise source ranking tests: Example





Example: Noise source contribution

Source	Noise Level (dBA)
Exhaust	79,9
Engine	76,7
Transmission	-
Driveline	64,7
Intake	68,3
Tyre noise*	67,3
Residual noises	75,0
TOTAL	**82,8**