

# **Type Approval of H2 Engines**

## **Extension of the ECE Regulation 49/07 to include dual-fuel hydrogen engines**

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# MOTIVATION FOR AMENDMENT

- Starting from an ACEA proposal, OICA undertook an initiative at UNECE GRPE to include H2 ICE into UN Reg 49/07; GRPE adopted during the January 2023 session an amendment to include single hydrogen fuel engines in the scopes of above UN Reg.
- In the next future, OICA has the plan for introducing H2 also for dual-fuel engines, as second step (the related internal discussion among members is still ongoing).



# SCOPE OF AMENDMENT

- Today the dual-fuel technology already exist within ECE R49 (and EuVI) for diesel fuel combined with some carbon containing gases (e.g. CNG/LNG)
- The dual-fuel engines are classified in ECE R49 after their gas substitution rates in Type 1A/B, 2A/B and 3B
- Today the Type 1A is also included in the European CO2 regulation and possible to declare in the VECTO tool
- It is today foreseen only to validate with a 'Type 1'\* engine. Further validation with Type 2/3 depending on request and availability of engines and vehicles possible.
- Integration of diluted measurement\*\* possible if measurement systems engines and vehicles are available for validation
- The proposal is to extend the 'lean' update for pure hydrogen ICE (WP-29 agreed 06/2023) to Dual-Fuel 'type1A' hydrogen engines but adding provisions for corrected dry based emission measurements for 'type1A' through measurement of the water content.

\*max 10% energy in a WHTC from the diesel pilot fuel

\*\*including H2O measurement by NDIR or FTIR



# NEXT STEPS

## Next steps

- Adaptation of dual-fuel exhaust emission formulas as described in Annex 15, ECE R49/07 (proposal still to be defined with contribution of OICA/EC/JRC experts)
- Technology verification (with support from JRC, TBC) similar to the work done for single fuel hydrogen engines. A similar set of tests have now been performed on a Dual-Fuel Hydrogen type1A prototype.
- Functional verification of existing test methods regarding determination of exhaust emission
- Functional verification of existing vehicle emission test methods (PEMS) seems not required, as fuel and exhaust composition is between already tested pure H<sub>2</sub> and pure diesel.
- A test package with the EuVI laboratory cycles has recently been performed including recorded EuVI ISC cycles. Evaluation of the data is ongoing.
- Time frame: see next slide



# PROPOSED TIME LINE

Proposed timeline for inclusion of Dual-Fuel Hydrogen engines type 1A (diesel pilot fuel) in ECE Reg49/07

- Status presentation GRPE Jan-2024
- Informal document GRPE May-2024
- Working document GRPE October-2024



Thank you for your attention  
Are there any questions