

RESEARCH PROGRAM ON AN EMISSIONS TEST PROCEDURE FOR HEAVY DUTY HYBRIDS (HDH)

While emission test procedures for light duty hybrid vehicles (HV) are laid down in ECE R 83, such provisions do not exist today for heavy duty commercial vehicles in the context of the UN ECE (Economic Commission for Europe).

The ECE working group GRPE has therefore established an informal group to develop an emissions and CO₂ test procedure for Heavy Duty Hybrids (HDH). The test procedure should be based on the HILS (Hardware-in-the-Loop Simulation) principle applied in Japan for type approval of HV's. The Terms of Reference of the informal group are laid down in Informal Document GRPE-60-11 (attached).

HILS is described in Kokujikan No.281 of 16 March 2007 "Measurement Procedure for Fuel Consumption Rate and Exhaust emissions of Heavy-Duty hybrid Electric Vehicles using Hardware-In-he-Loop-Simulator System" (attached). The major elements of the HILS procedure are

- Chapter 1: HILS models and interface
- Chapter 2: Hardware (engine, electric motor, storage device) test methods
- Chapter 4: Emissions test procedure
- Chapter 5: Verification of HILS system

The vehicle speed pattern of the World Harmonized Vehicle Cycle (WHVC) developed under the WHDC mandate will be used as the starting point for the test procedure. In order to take specific vehicle operation into account, modifications to the WHVC with respect to using subsets of the cycle (urban, rural, motorway) in combination with appropriate weighting or scaling factors should be investigated.

To accommodate with its mandate, the informal group would like to conduct a research program on the major elements of the HILS method. The research program covers the following five tasks:

1. Investigation and modification, if applicable, of the HILS model and interface (chapter 1); this should include a proposal for a verification method (chapter 5) w/o vehicle testing.
2. Investigation and modification, if applicable, of the HILS component testing (chapter 2).
3. Extension of HILS to non-electrical hybrids, which are currently not covered by Kokujikan No.281.
4. Inclusion of PTO operation, which normally takes place outside the test cycle
5. Development of WHVC weighting/scaling factors to represent real world vehicle operation.

According to the project plan of the informal group (attached), research on tasks 1 and 2 should be finished by November 2011. Research on task 3 should be finished by May 2012. Research on task 4 and 5 should be finished by January 2012.

In case of interest in the research program, you are kindly asked to submit the following information by 4 March 2011:

- a short summary of your experience with HV research and testing
- description of your expertise with one or more of the five tasks
- indication if the timing of the project plan is feasible
- separate quote on each of the five tasks (cost, timing) you are interested in