

GRPE Informal Group on Heavy Duty Hybrids

5th HDH, Ann Arbor, 16 to 18 March 2011



Contents

- HILS and WHDC
- Report from 4th HDH meeting
- Framework of hybrid emissions certification
- Roadmap & project planning



Relation between HILS and WHDC

- Development of WHTC (universal engine cycle)
 - Tasks 1 to 5 resulted in the universal WHDC vehicle cycle (WHVC), which is the basis for the engine cycles WHTC and WHSC
 - Under task 6, the WHVC was transformed into an engine cycle on the basis of a standardized drivetrain and vehicle model
 - Under task 7, the resulting engine cycle was finalized into the reference transient cycle WHTC by regression analysis
- Development of HILS/WHDC (individual engine cycle)
 - WHDC tasks 6 and 7 are replaced by HILS on the basis of an individual (hybrid) drivetrain and vehicle model
 - As a result, individual engine reference cycles will be established
 - Since only the engine is tested, the test cell and data evaluation procedures of gtr n°4 can be applied w/o major modification
 - A new annex on the HILS procedure need to be added to the gtr



Report 4th HDH Meeting / GRPE 61

- The results of the 4th meeting are as follows:
 - Amendment to gtr 4 as first option, as proposed by the Chairman, has been agreed; development of a separate gtr will be re-assessed and the conclusions reported back to GRPE at a later stage
 - Roadmap and project planning as presented by the Secretary have been agreed with minor modifications
 - The open source model provided by Japan will be evaluated
 - 4 research institutes expressed interest in conducting the work program, and will be asked for quotes
 - OICA will provide 200 t€budget, COM contribution is pending

GRPE has

- Approved the roadmap and project planning
- Approved extension of the mandate to the assessment of powerpack testing
- Approved the 6th HDH meeting on 06 June 2011 at 14:30



Framework of Hybrid Certification

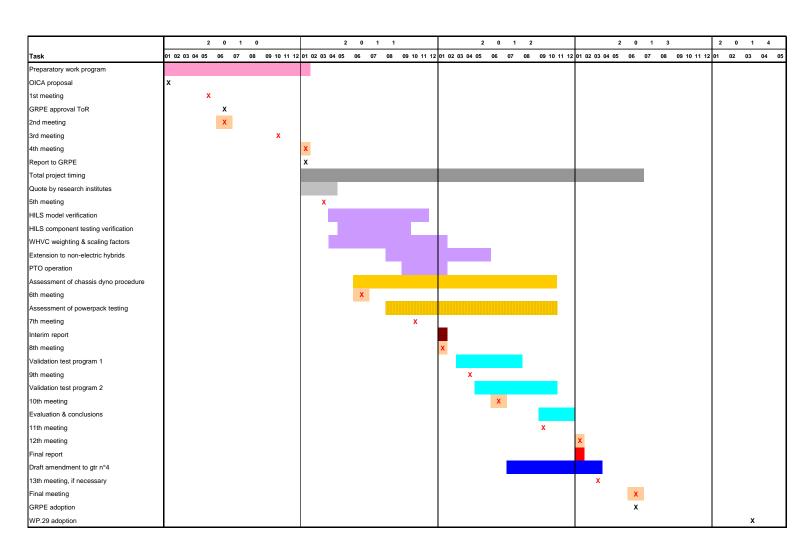
- As a result of the discussion within the HDH group, hybrid emissions certification must
 - cover a wide range of RESS (battery, capacitor, hydraulic accumulator, kinetic storage device, flywheel capacitor, fuel cell)
 - account for RESS and engine power
 - allow for technology development
 - include provisions for transmission, gearing and rear axle ratio
 - account for benefits of hybrid PTO operation
 - account for vehicle regenerative energy gained or lost during testing
 - minimize discrepancy between certification and real world CO2 and criteria emissions

UNITED NATIONS Task List for HDH Research Program

- ➤ To accomodate with its mandate, HDH will conduct a research program on the major elements of the HILS method. The research program covers the following five tasks:
 - Task 1: Investigation and modification, if applicable, of the Japanese HILS model and interface including a proposal for a verification method w/o vehicle testing
 - Task 2: Investigation and modification, if applicable, of the HILS component testing
 - Task 3: Extension of HILS to non-electrical hybrids, which are currently not covered by the Japanese test procedure
 - Task 4: Inclusion of PTO operation, which normally takes place outside the test cycle
 - Task 5: Development of WHVC weighting/scaling factors to represent real world vehicle operation



Roadmap & Project Planning





Quotes on Research Program

- A request for quote on the five tasks was sent to the following research institutes on 16/02/2011:
 - Graz University of Technology (Austria), Prof. Hausberger
 - Chalmers University of Technology (Sweden), Prof. Sjöberg
 - Vienna University of Technology (Austria), Prof. Geringer
 - University Institute of Automobile Research (Spain), Dr. López
- Offers were received by
 - TU Graz / TU Vienna (joint program) on 04/03/2011
 - Chalmers University on 07/03/2011, modified on 14/03/2011



Quotes on Research Program

General Overview

- Earliest completion date of any task is November 2011, which basically determines date of 7th HDH meeting
 - Task 1 and 2: November 2011
 - Task 3: May 2012 (Chalmers only)
 - Task 4 and 5: January 2012
- On Task 1, Chalmers University will partly use results from an earlier project
- TU Graz/Vienna do not quote on Task 3
- Chalmers price only valid for complete package
- TU Graz/Vienna offer gives more detailed information about the work packages
- TU Graz is also involved in the EU CO2 project, which creates significant synergies with HDH



Cost Comparison

Task	Chalmers	TU Graz / TU Wien
1	15 k€	55 k€
2	30 k€	45 k€
3	30 k€	_
4	20 k€	28 k€
5	30 k€	41 k€
Travel	20 k€	25 k€
TOTAL	145 k€	194 k€