



UNITED NATIONS

GRPE/HDH-04-02



GRPE Informal Group on Heavy Duty Hybrids

4th HDH, Geneva, 10 January 2011



UNITED NATIONS

ECE - GRPE

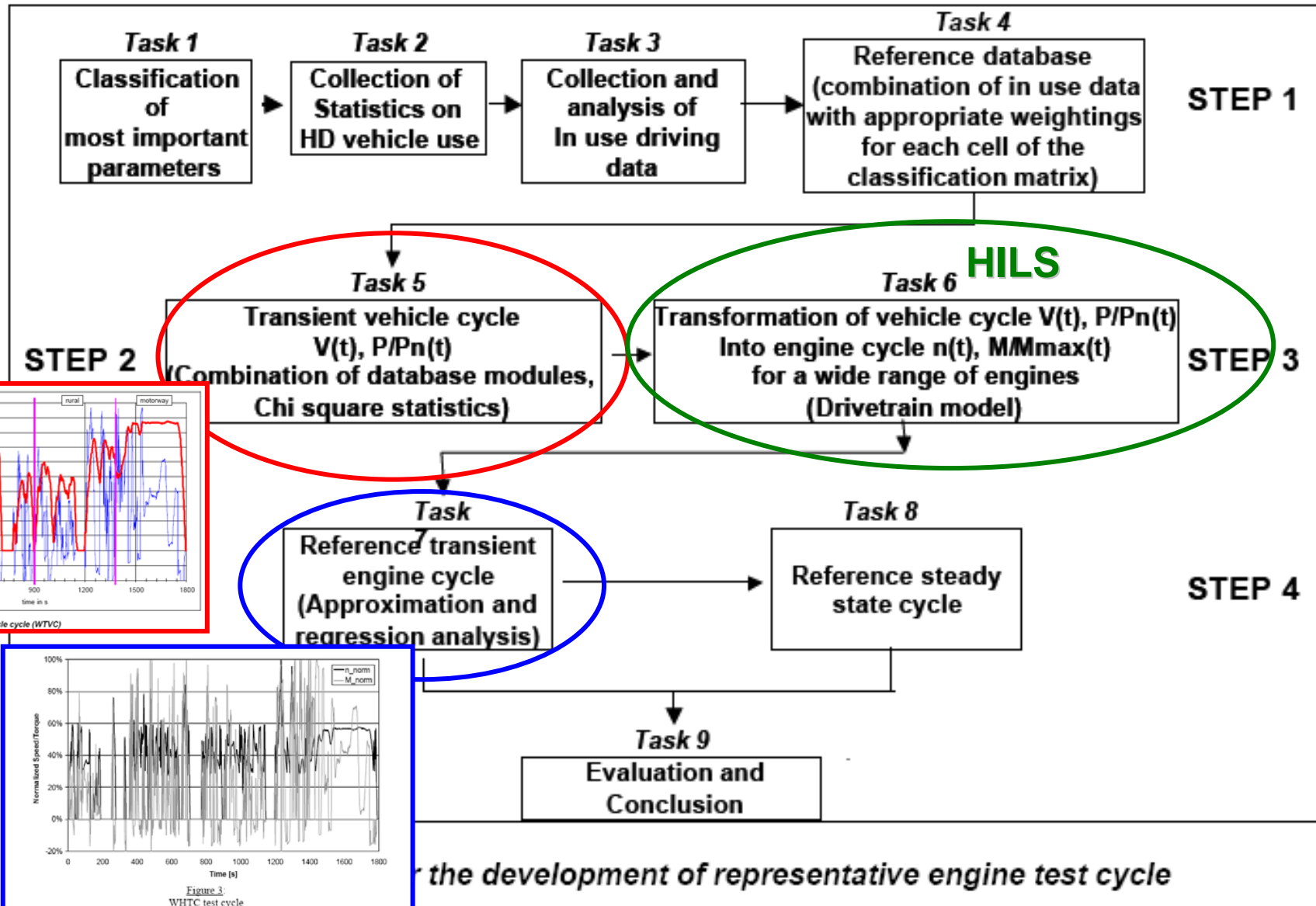
HDH

Contents

- **HILS and WHDC**
- **Conclusions from 3rd HDH meeting**
- **Framework of hybrid emissions certification**
- **Roadmap & project planning**



UNITED NATIONS Development of WHDC Engine cycles





UNITED NATIONS

ECE - GRPE

HDH

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**



UNITED NATIONS

ECE - GRPE

HDH

Conclusions from 3rd HDH Meeting

- **The conclusions were summarized by the Chair as follows:**
 - **The terms of reference and proposal was confirmed (GRPE /60/11 and GRPE/60/12)**
 - **The first step is to investigate the HILS approach and develop the methodology**
 - **The methodology should make sure that no “back sliding” of emissions compared to conventional vehicles can occur**
 - **It is crucial that the procedures are robust and transparent enough for a regulation that may be used by different contracting parties and approval authorities with consistent results**
 - **Keeping the uncertainties in mind the group should be open to investigate other possibilities such as power pack testing even though this is not included in the current mandate**
 - **Feasibility of chassidyno testing should be done and reported to GRPE. Some investigations can possibly be done in parallel**



UNITED NATIONS

ECE - GRPE

HDH

Framework of Hybrid Certification

- **As a result of these conclusions, 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**

