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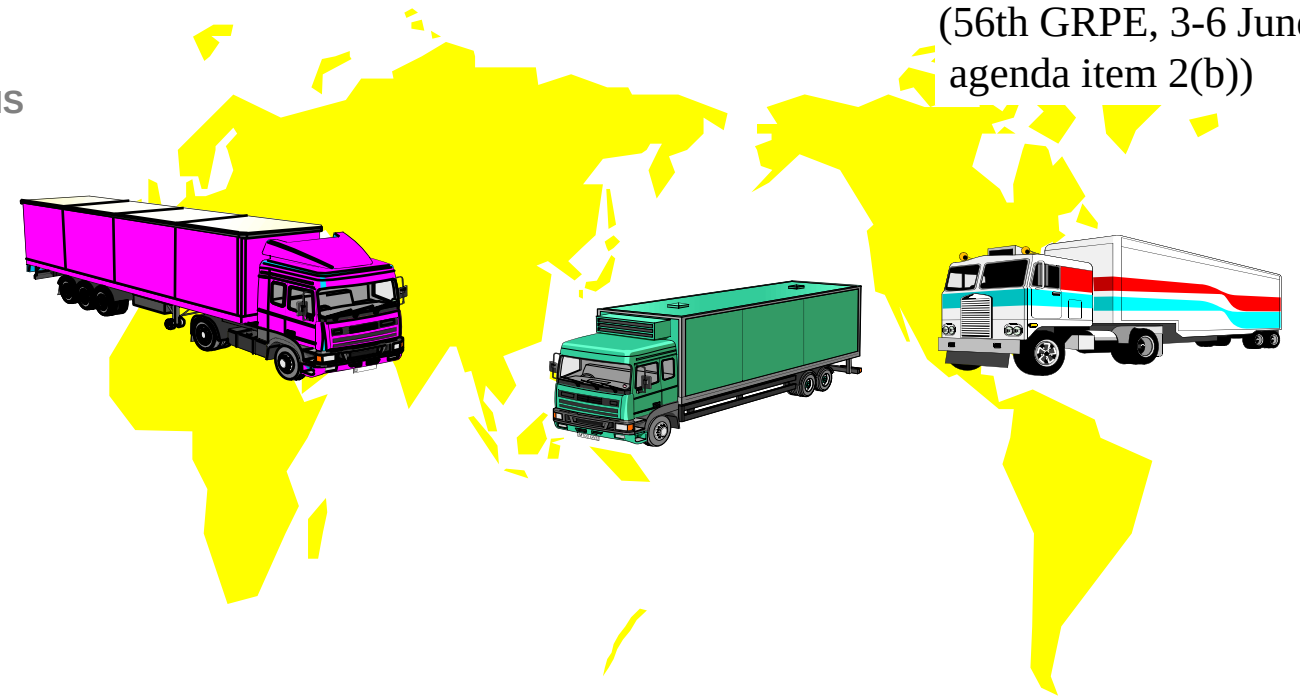
Informal document No. **GRPE-56-22**
(56th GRPE, 3-6 June 2008,
agenda item 2(b))



Worldwide Harmonized Heavy Duty Emissions Certification Procedure

24th WHDC, Geneva, 03 June 2008

Option 1 – Engine Power/Work

- Calculation of brake specific emissions (g/kWh) needs provisions on the use of engine auxiliaries, especially the fan
- WHDC group agreed to completely separate emissions and power measurement and to delete any reference to power regulations from the gtr
- TÜV Nord presented emissions calculations with and w/o fan that demonstrate fan power to reduce engine work by only 1.2 to 3.5 %
- WHDC group agreed to run emissions test w/o fan; test procedure would be in line with ECE R 96 for nonroad engines
- List of auxiliaries will be added to gtr as additional annex

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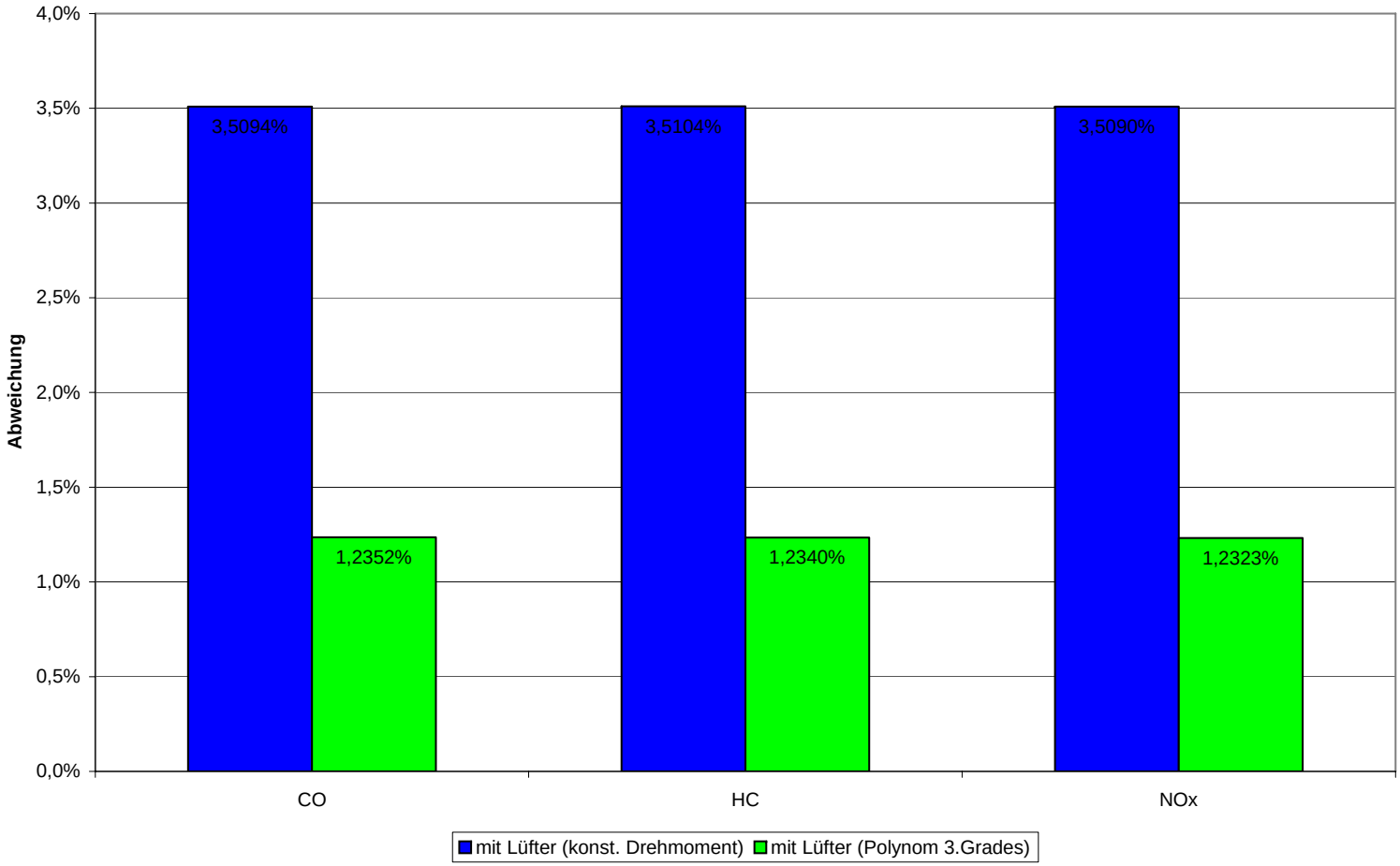
Option 1 – Influence of Fan Power



TÜV Nord Evaluation

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Option 2 - Reference Fuel

- Introduction of average reference fuel that covers national reference fuel specifications is generally supported
- DG-JRC will conduct test program starting in June 2008
- Additional testing at JRC will cover influence of soak time and particle counting (contribution to PMP)
- OICA manufacturers will supply 2 engines (US07 with DPF, Euro V with SCR) for JRC test program and 2 reference fuels (US and EU) for JRC, Japan and EMA test programs
- Testing of B5 diesel fuel will be added to JRC test program (fuel cost to be borne by JRC)
- Japan will run test program with JP05 engine (NSR + DPF)
- EMA will run test program at SwRI with US07 engine

Option 3 – Hot Soak Period

- History of 20 minutes soak period in the USA not traceable
- 5 minutes soak period representative for EU conditions
- 10 minutes (EU-COM proposal) could be compromise solution
- US EPA insists that soak period must not affect level of stringency of US 2010 emission limits
- JAMA/NTSEL test results showed NOx increase with longer soak period and higher influence on NOx level for SCR than for NSR technology
- USA EPA submitted proposal for validation that seriously jeopardizes the WHDC time line as agreed by GRPE
  - goes far beyond soak time influence
  - intended to completely elaborate stringency of WHTC vs. FTP for potential US 2010 engine technologies for a range of engine sizes
  - not feasible within WHDC time line and beyond WHDC budget

Influence of Hot Soak Period

Engine	Device	Cold	Soak Period		
			5 min	10 min	20 min
H.D.	SCR	3.41		0.97	1.52
H.D.	SCR	2.68	1.59	1.88	2.01
L.D.	NSR	1.259	0.886	0.887	0.899

JAMA Evaluation

Unit; g/kwh

WHTC test cycle

Option 4 – Cold Start Weighting

- Only limited field data with cold start statistics available
- WHDC members will look for in-use data, mainly from engine manufacturers and field operators
- JAMA presented data from national surveillance statistical report and JCAP research program
  - based on equivalent cold start ratio
  - would result in cold start weighting factor of 0.09 for JE05 cycle
- TÜV Nord and WHDC secretary will elaborate statistical methods for determining the cold start weighting factor incl. the method presented by JAMA
- Discussion of in-use data will be resumed at October WHDC meeting

Option 5 – PM Measurement

- Test program at TÜV Nord will be funded by OICA members with a total cost of 100.000 €
- Test fuel: Euro V reference fuel
- Two engines will be supplied by OICA members
  - one EEV engine with SCR and DPF
  - one Euro V engine with SCR (tuned for low NOx emissions)
- Anticipated start: June 2008
- Additional investigations within the program.
  - determination of NOx measurement accuracy at very low levels
  - measurement of particle number according to PMP protocol

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Extension of Scope to Gasoline Engines

- Broad consensus to extend the scope to gasoline engines, as proposed by China; some reservation by EPA
- Test cycles applied for testing of gasoline engines
  - Russia: ECE R 49
  - Japan and China: JE05 cycle
- EU emission regulation will require testing of gasoline engines for vehicles > 2,610 kg reference mass
- Russian measurement results show that WHTC cycle statistics cannot be met by the gasoline engines tested
- China made proposal for testing gasoline engines over both WHTC and JE05 cycles at CATARC
- EMA will check application of WHDC cycles with US gasoline engine manufacturers

Alignment with Nonroad gtr

- First draft of NRMM gtr, which is largely based on US EPA Part 1065 regulation, was presented at 55th GRPE
- WHDC and NRMM secretaries will put together differences between NRMM and WHDC gtr's
- Solution will be presented at January 2009 GRPE meeting when both draft gtr's are due for GRPE consideration
- Major problem for alignment:
  - Part 1065 is a constantly changing document that does not seem to reach a stable condition, which would be the prerequisite for WHDC adopting Part 1065 elements
  - Part 1065 includes many minor details that are not covered within WHDC gtr

Next Meetings

- 25th meeting: 15 to 17 October 2008, China asked to host
- 26th meeting: January 2009, Geneva (submission of first draft)
- 27th meeting: March 2009, Hungary offered to host
- 28th meeting: June 2009, Geneva (GRPE approval)

Summary

- Four test programs at JRC, TÜV Nord, NTSEL, SwRI are defined and funded
- Test programs are slightly behind schedule, but test results likely to be available and discussed at October 2008 meeting
- Option 3 test program proposed by EPA requires additional WHDC validation and is not feasible within WHDC time line
- Extension of scope to gasoline engines broadly supported; China and Russia will assist with technical test programs, EMA will apply engineering analysis
- Editorial and technical comments to gtr n°4 by GRPE members to be submitted to secretary by December 2008
- gtr time line is confirmed and WP.29 adoption in November 2009 not in jeopardy (except options 3 and 4)
- Solution of options 3 and 4 expected to become difficult and only possible, if USA supports a compromise

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Moving Forward to Harmony