Annex 49: COMVEC – Fuel and Technology Alternatives for Commercial Vehicles

Project Duration	July 2013–October 2016
Participants	
Task Sharing	Canada, Chile, China, Denmark, Finland, Japan, Korea, Sweden, Thailand
Cost Sharing	None
Total Budget	~€900,000 ($1,000,000 US)
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Purpose, Objectives, and Key Question

Commercial goods vehicles — light-, medium- and heavy-duty vehicles — represent about 25% of the total energy used in transport and are the second largest segment after passenger cars. Therefore, this vehicle category is important, not only for its contribution to economic activities, but also for its share of energy use and emissions.

The goals of the “COMVEC” project (Fuel and Technology Alternatives for Commercial Vehicles) were twofold:

1. To agree upon common test procedures for testing and comparing different types of commercial vehicles; and
2. To generate performance data specific to commercial vehicles (goods vehicles), thus adding to the information on alternative fuels and vehicle technologies generated in previous AMF activities (Annex 37 on buses, Annexes 38 and 39 on trucks, and Annex 43 on passenger cars).

With data covering all road vehicle classes, it will eventually be possible to evaluate the best fit for alternative fuels and new vehicle technologies for road transport, thereby resulting in a more effective way of allocating alternative technologies.

Activities

The project focused on three main activities:

- Development of common test procedures and protocols,
- Vehicle testing (carried out in chassis dynamometers), and
- Full fuel-cycle evaluation.

In the “COMVEC” project, eight partners from three continents teamed up to generate performance data (energy efficiency, exhaust emissions) for commercial vehicles. As for the test program and testing parameters, most of the tests were carried out using one specific test cycle (World Harmonized Vehicle Cycle [WHVC]), 50% load, and normal ambient temperature (25 ±5°C). Altogether, 35 different vehicles, ranging from light commercial vehicles (vans) to heavy-duty vehicles for trailer combinations, were tested on chassis dynamometers. In addition, one engine, installed on an engine dynamometer, was tested. The test program covered several fuel options — diesel, diesel substitute fuels, natural gas, ethanol, and even electricity, in the category of light commercial vehicles. The emission certification classes covered were Euro 4, Euro 5, and Tier 2 for light-duty commercial vehicles, and Euro III, Euro IV, Euro V, Euro VI, and US 2010 for the heavier vehicles (see Figure 1).

Key Findings

Key findings from the project can be summarized as follows:

- Euro VI vehicles perform extremely well.
- Going from Euro III to Euro IV or Euro V vehicles does not necessarily deliver real emission benefits; one should leapfrog directly to Euro VI or to US 2010 regulations to obtain real-life low emissions.
  - This has implications for those regions that are contemplating more stringent emission regulations, as well as for the tendering of transport services.
- The regulated emissions of a vehicle are, first and foremost, determined by the emission control technology and not the fuel.
- The response to substitute fuels (fuels that can replace conventional diesel in existing vehicles) varies from vehicle to vehicle, as well as by vehicle category (light-duty vehicles vs. heavy-duty vehicles).
  - Heavy-duty Euro VI engines are so clean that any effect of the fuel will be negligible.
- The carbon intensity of the fuel or the energy carrier is decisive for well-to-wheel (WTW) carbon dioxide (CO_2) emissions, not vehicle technology.
- CO_2 assessment should be carried out on a WTW basis and not only assess tailpipe CO_2 emissions.
- Electrification, with low-carbon electricity, is a good option for local emissions as well as WTW CO_2 emissions.
  - One should keep in mind that not all applications are suitable for electrification.
- Euro VI (alternatively US 2010), in combination with a renewable fuel, is a good option for the local environment as well as the climate.

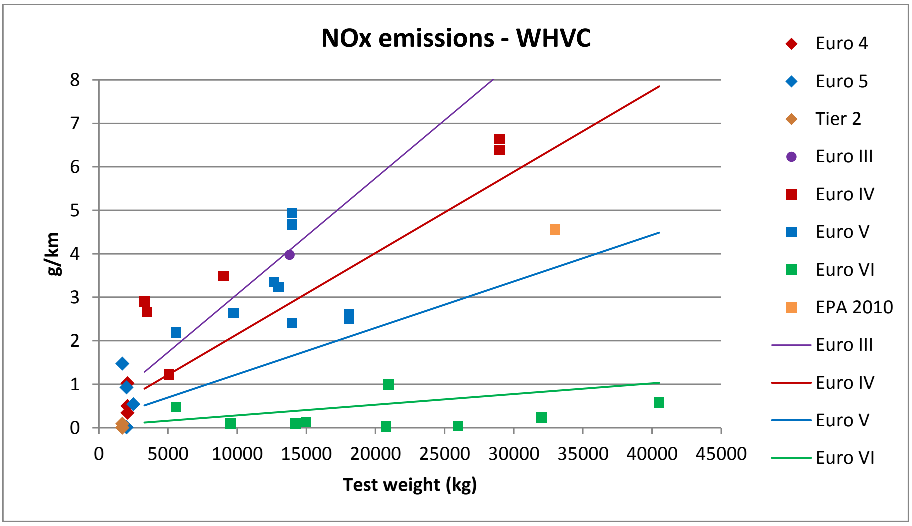

Fig 1 NO_x Emissions by Emission Class (identified by color) (The solid lines depict the expected performance of various emission classes. For each color, dots below the solid lines represent compliance; dots above the lines represent non-compliance.)

Main Conclusions

There is a clear need to reduce regulated emissions, as well as greenhouse gas (GHG) emissions, from commercial vehicles that will be dependent on internal combustion engines for many years to come. Measurements within COMVEC show that the latest generation of vehicles (Euro VI) have significantly reduced regulated emissions, including during testing under conditions that correspond to real-life operation. These findings should be used as a guide in countries with less stringent emission regulations and also for procuring transport services. The recommendation is to leapfrog directly from less sophisticated technologies to Euro VI. Advanced renewable fuels will help to reduce GHG emissions in applications for which electrification is feasible.

Publications

Nylund, N-O. (ed.), 2016, *Annex 49, Fuel and Technology Alternatives for Commercial Vehicles, A Report from the IEA Advanced Motor Fuels Technology Collaboration Programme*, October, http://www.iea-amf.org/app/webroot/files/file/Annex%20Reports/AMF_Annex_49.pdf.