

An Integrated Approach for CO₂ Emissions

AECC contribution to the
CARS 21 WG4 meeting
26 January 2012



Association for Emissions Control by Catalyst AISBL

Association for Emissions Control by Catalyst (AECC) AISBL

AECC members: European Emissions Control companies



Exhaust emissions control technologies for original equipment, retrofit and aftermarket for all new cars, commercial vehicles, motorcycles and non-road mobile machinery.



AECC's Key Issues for CARS 21

AECC WRITTEN CONTRIBUTION TO THE CARS 21 PROCESS (JUNE 2011)

- Technological neutrality in defining and supporting clean vehicles for the future;
- Ensuring that harmonised test procedures, such as the future WLTP, provide a sound basis for good emissions performance;
- Improving harmonisation without diluting EU performance standards; and
- Type Approval figures reflecting real-life performance, with good market surveillance.

Technological Neutrality

AN INTEGRATED APPROACH ON CO₂ EMISSIONS MUST RETAIN TECHNOLOGICAL NEUTRALITY

- The continued development of Internal Combustion Engines and Emissions Control Systems is essential to maintain the competitiveness of the European Automotive Industry for the foreseeable future.
- IC engines and Emissions Control Systems will be needed for global markets for many years to come.
- IC engines will remain important not only for cars but are and will be used also heavy-duty and non-road applications.
- IC engines must not be excluded from research programs.
- Legislation should not discriminate against IC engines.

Importance of WLTC and RDE

- The new world-harmonised light-duty test cycle (WLTC) needs to adequately represent a broad range of operating conditions to ensure effective control under normal circumstances, both for CO₂ and for pollutant emissions.
 - emissions of different vehicles can vary significantly from each other at any given operating condition.
 - significant emissions levels are seen at points not in the NEDC.
 - key issues are transient conditions, cold starts and max. speed.
- Real Driving Emissions (RDE) tests will complement the test cycle to ensure good control of real-world emissions.
- Type Approval tests must ensure that the propulsion systems that are used in real life are fully evaluated for energy, CO₂ and regulated emissions performance.

Climate Forcing is not only CO₂

- CO₂ is the key 'climate change' emission from transport, but not the only one.
“Reducing atmospheric concentrations of short-lived climate forcers (SLCFs), specifically black carbon, tropospheric ozone and methane, offers a real opportunity to improve public health, reduce crop-yield losses, and slow the rate of near-term climate change, thereby aiding sustainable development.” *UNEP Synthesis Report, November 2011.*
- DG-ENTR proposals to consider methane (as CO₂-equivalent) along with CO₂, rather than as a pollutant reflect the relative importance of the two effects for methane.
- Black Carbon is a significant short-term global warmer.
- Fitment of Particulate Filters provides a major reduction in emissions of Black Carbon and is the 1st of the key abatement measures in the UNEP Report.

Incentives for Clean and Energy-efficient Vehicles

- “...because the majority of incentives put in place recently by Member States are targeted towards CO₂ or energy-efficiency, it seems logical to focus the new guidelines on CO₂ and energy-efficiency.”

CARS 21 Interim Report, page 22.

- “Financial incentives should be technologically neutral and avoid singling out one technology or creating counter-productive environmental effects, instead setting the criteria based on an objective environmental performance criterion.”

CARS 21 Interim Report, Options and recommendations, page 23.

Performance Standards for CO₂ Reduction

The Commission's integrated approach includes tailpipe CO₂ measurement procedures for vehicles, performance standards for light-duty vehicles, a target to reduce the greenhouse gas intensity of fuels, and the reduction of CO₂ from electricity generation.

- Regulations (EC) No 443/2009 and (EU) No 510/2011 set the performance standards for the CO₂ emissions of new passenger cars and LCVs respectively.
- CO₂ measurement requirements are being put in place for heavy-duty engines and L-category vehicles.
- The EU Emissions Trading System is designed to drive down CO₂ emissions from power generation.

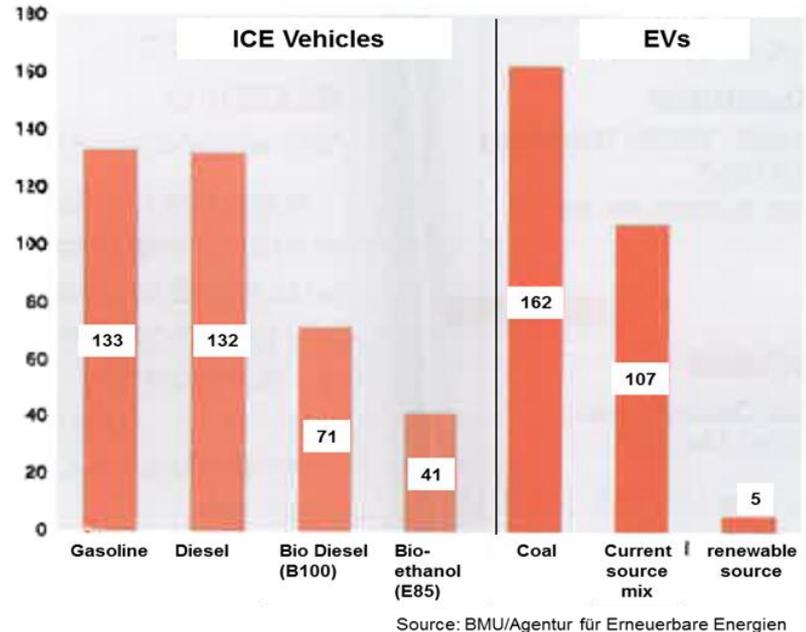
BUT the electrical power (Wh/km) used for vehicles charging is not linked to the vehicle's CO₂ values...

Vehicle CO₂ Emissions

CO₂ EMISSIONS ARE A GLOBAL ISSUE OF VEHICLE USE

- Production of electric power for the propulsion of vehicles still involves CO₂ emissions at the power generating plant.
- Life-cycle CO₂ for various propulsion systems (see graph) is complex.
- Life Cycle Analysis also shows the additional NO_x emissions from power production are more than the emissions saved by the lower use of IC-engined vehicles.

g/km CO₂ emission based on various motive power sources
*Including CO₂ emission from base material supply, manufacturing, transportation etc.



Vehicle CO₂ Emissions (2)

CARS 21 Interim Report Conclusion on LCA:

- “Although well-to-wheel performance is an important consideration for assessing the overall transport system, in order to avoid displacement of emissions, it is neither a convenient nor a suitable measure for the performance of the vehicle with respect to CO₂ efficiency.”

CARS 21 Interim Report Recommendation:

- “The CO₂ figure from type-approval seems for light-duty vehicles currently the most appropriate measure of performance to be used for granting financial incentives.”

This approach is not technology neutral and does not represent the real global CO₂ emissions from vehicle use.

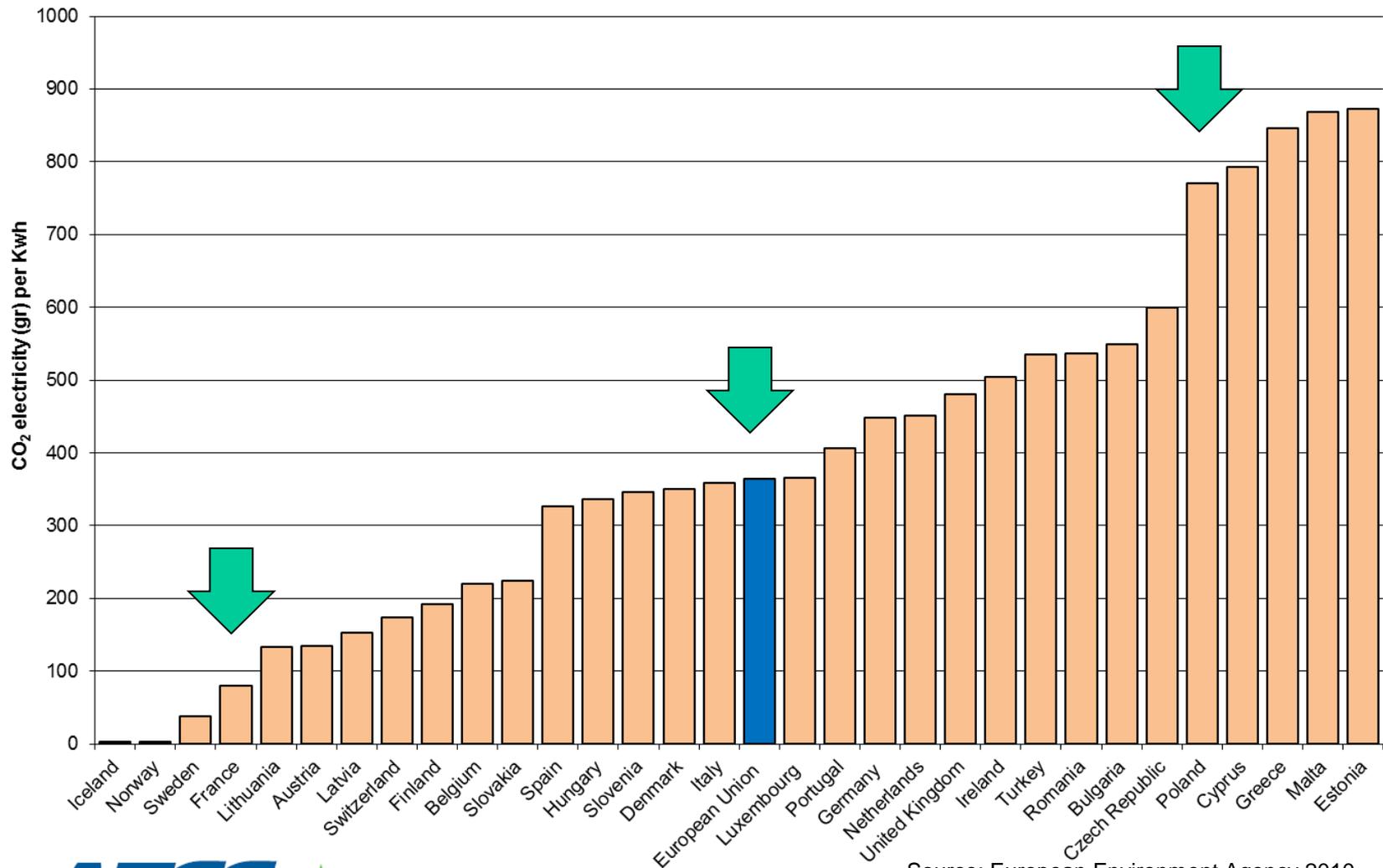
Data is already available to permit calculation of the CO₂ produced from vehicle use to provide information to users.

Use of UN Regulation N°. 101

- UN Regulation N°. 101 sets uniform provisions for the measurement of CO₂ emissions, Fuel Consumption and/or electric energy consumption.
- It covers light-duty vehicles (M1 and N1) powered by IC engine only, hybrid electric powertrain, plug-in hybrid powertrain, or electric powertrain only.
- It requires the measurement of FC (for various fuels) and CO₂ where an IC engine is used and electric energy consumption (as Wh/km) where off-vehicle electric charging is used.
- Thus data is available on electric power usage during the Type Approval test and can be used for a technology-neutral comparison of real CO₂ values.

CO₂ from Electricity Generation

National & EU data (2008) is available on CO₂ emissions from power generation



Source: European Environment Agency 2010



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Creating the Link for Consumers

- Type Approval data provides figures for CO₂ emissions from the vehicle coming from the IC engine.
- Type Approval data provides electrical power consumption data (Wh/km) for electric vehicles and plug-in hybrids.
- National and EU-mix data on the CO₂ emissions from electricity production is available.
- The latter can be used to provide the consumer with better data on the CO₂ emissions produced as a result of the use of the vehicle: Total CO₂ emissions (g/km) = a) + b)
 - a) CO₂ from usage of combustion engine over the test cycle (g/km)
 - b) CO₂ from mains electrical power used over the cycle (g/km)
= g CO₂/Wh × Wh/km

Examples on 2 Current Vehicle Types

Vehicle 1 (Plug-in Hybrid)

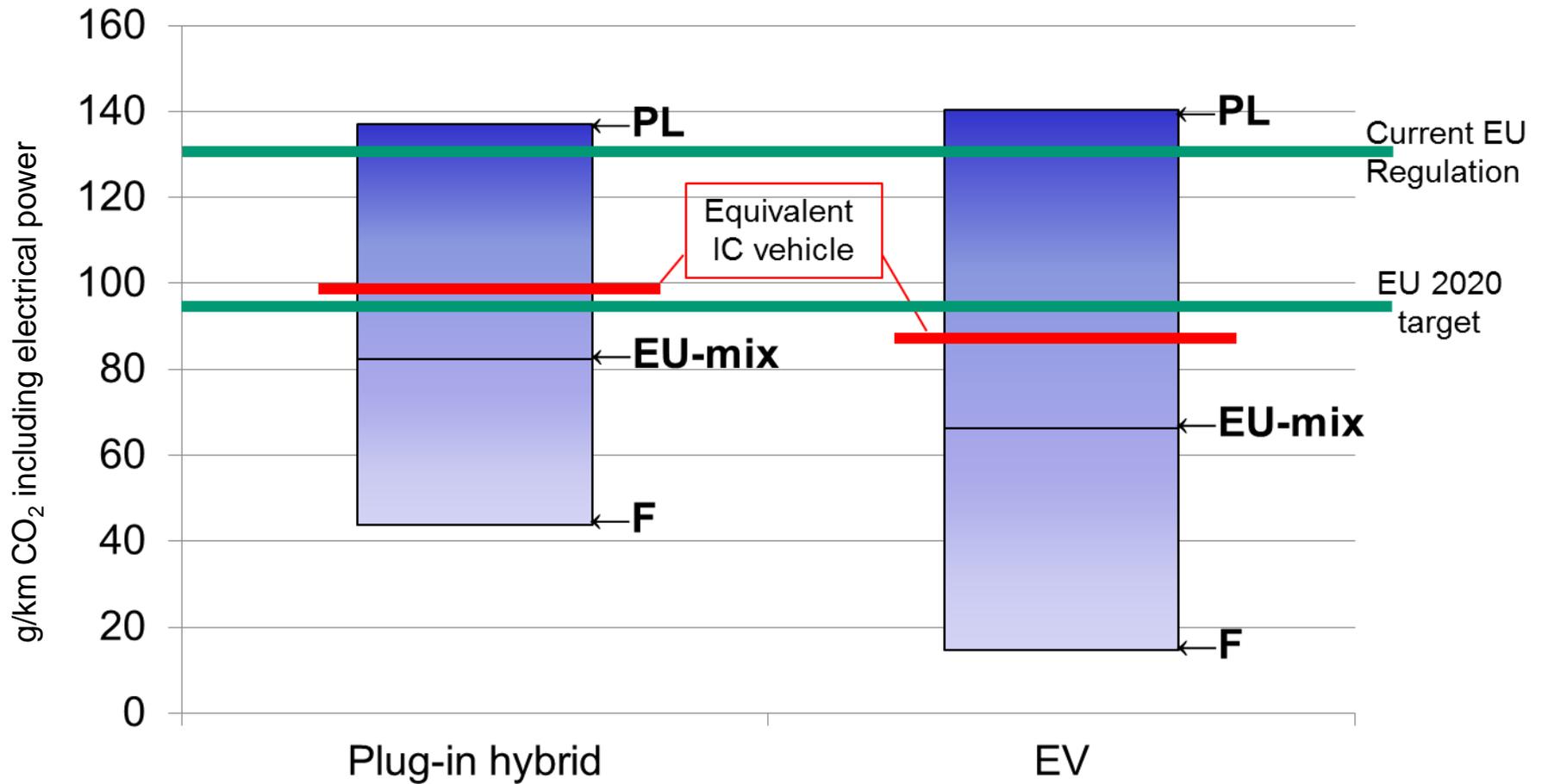
CO ₂ emissions (g/km)	33		
Electrical energy (Wh/km)	135		
	France	Poland	EU-mix
Electric power g CO ₂ /Wh	0.080	0.771	0.365
CO ₂ from electricity (g/km)	10.8	104.1	49.2
Total CO₂ emissions	43.8	137.1	82.2

Vehicle 2 (Electric Vehicle)

CO ₂ emissions (g/km)	0		
Electrical energy (Wh/km)	182		
	France	Poland	EU-mix
Electric power g CO ₂ /Wh	0.080	0.771	0.365
CO ₂ from electricity (g/km)	14.6	140.3	66.3
Total CO₂ emissions	14.6	140.3	66.3

Vehicle data from KBA, December 2011; Electricity data EEA 2010 (2008 data)

Variation in Vehicle CO₂



Conclusions

- CO₂ is a global, not just a tailpipe issue.
- CO₂ values need to be technology neutral.
- Consumer information needs to provide the appropriate CO₂ data.
- Vehicle incentives should be based on CO₂ values which include electric power generation.
- The continued viability of Internal Combustion Engines is essential for the sustainability and the competitiveness of the European Automotive Industry.



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Who are AECC and what do we do ?

AECC is an international non-profit scientific association of European companies making technologies for engine exhaust emissions control.

The members of **AECC** are companies operating worldwide in the research, development, testing and manufacture of key technologies for emissions control.

Their products are the ceramic and metallic substrates for catalysts and filters; autocatalysts (substrates with catalytic materials incorporated or

What are the emission control technologies?

Exhaust gas contains carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx) and particulate matter (PM). The main technologies used to treat exhaust to remove harmful gases and particles are:

- autocatalysts
- adsorbers (traps)
- filters

There are more details on

Thank you for your attention
More information is available from www.aecc.eu

cars and over 85% of all new cars produced worldwide are equipped with autocatalysts. Catalytic converters and filters are also fitted to heavy-duty vehicles, motorcycles and non-road engines and vehicles.

