AECC Newsletter
Association for Emissions Control by Catalyst
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Affiliated to **CEFIC**

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INTERNATIONAL REGULATORY DEVELOPMENTS

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EUROPE

1. 3rd Reading of Motorcycle Directive in Parliament

At the plenary session at the end of May, Parliament endorsed, after conciliation, the directive agreed by Parliament and Council that will reduce pollution from motorcycles and "make new motorcycles as clean as new cars have been since 2000".

The deal agreed in March and now approved is said to meet Parliament's key aim of setting mandatory emission limits from 2006, to follow the first set of compulsory limits, which will be introduced in 2003. Parliament's negotiators had agreed using two test cycles for measuring emissions to be used in parallel, during a transition period, as a basis for the 2006 limit values.

Rapporteur Bernd Lange (PES, D) welcomed the deal on the new directive as "a good compromise, which will improve air quality in Europe". At present, although two and three-wheeled vehicles only make up 2 to 3% of total traffic volume in Europe they produce 15% of transport hydrocarbon emissions, he said. The new legislation also includes measures to prevent tampering with emission control devices, durability criteria and standards for tricycles and quadricycles.

2. Danish Parliament ratifies Kyoto Protocol

The Danish parliament has voted with a large majority to ratify the Kyoto climate treaty, which will oblige the country to sharply cut its emissions of greenhouse gases by 2012. Denmark took over the six-month rotating EU presidency on 1 July.

The Danish vote meant 55 countries had ratified the Kyoto treaty, according to UN data, but the total remains short of the 55% of CO_2 emissions (see Item 4 below).

3. EU reaches CO_2 Stabilisation Target despite recent upturn

The European Union remains on track to achieve its long-standing commitment to stabilise emissions of carbon dioxide (CO_2) - the main "greenhouse" gas responsible for man-made global climate change - at their 1990 level by 2000, despite an emissions upturn in the final year of the period. Total CO_2 emissions from the 15 EU Member States were 0.5% lower in 2000 than 10 years earlier, according to the latest emissions inventory from the European Environment Agency.

However, EU emissions of CO_2 and other greenhouse gases rose between 1999 and 2000, the most recent year for which EU-wide data are available. CO_2 accounts for around 80% of EU total greenhouse gas emissions. CO_2 emissions taken alone increased by 0.5% in 1999-2000, while emissions of CO_2 and the five other gases controlled by the Kyoto climate change Protocol together rose by 0.3%.

Under the Kyoto Protocol the EU is required to cut its combined emissions of the six gases to 8% below their 1990 level by the years 2008-2012. The latest inventory shows that in 2000 total EU greenhouse gas emissions stood 3.5% below their 1990 level.

4. EU ratifies Kyoto Global Warming Protocol

European Union environment ministers had pledged to ratify the Kyoto treaty by the end of May ahead of the summit on sustainable energy to be held in Johannesburg in September. The EU has tried to persuade other industrialised countries such as Russia, Canada and Japan to ratify the treaty since the Unites States pulled out of Kyoto last year.

At a ceremony at UN headquarters in New York, representatives of all 15 EU nations and the European Commission confirmed that their national legislatures had approved the Kyoto protocol. UN Secretary-General Kofi Annan hailed the ratifications as "good news for the entire world" while Margot Wallström, European Commissioner for the Environment called the ceremony "an historic moment for global efforts to combat climate change".

The treaty must be ratified by at least 55 countries representing 55% of developed countries' carbon dioxide (CO_2) emissions to come into force. 70 nations have now ratified, representing 26.6% of developed nations' emissions. Of the 41 nations that have signed but not yet ratified, Japan has given notice it would ratify shortly (see Item 13) and Russia was expected to ratify by the end of the year, which would give the protocol the necessary 55%.

5. AECC Heavy-Duty Diesel Paper at FISITA 2002[1]

A joint AECC/Ricardo paper was presented at the FISITA 2002 – World Automotive Congress meeting in Helsinki in early June.

The paper presented the findings from a heavy-duty diesel demonstration programme. The chosen emission control system (Catalyst Based-Diesel Particulate Filter + Selective Catalyst Reduction + clean-up catalyst) applied to an unmodified heavy-duty Euro III series production engine enabled the 2008 (Euro V) emission limits to be achieved with a margin of more than 50% after 1000 hours ageing, including "mis-fuelling" with high sulphur fuel. Particulate emissions were reduced by about 85% over the European HD test cycles after 1000 hours ageing. Emissions of aldehydes, ammonia and nitro polyaromatic hydrocarbons were down to very low levels.

Copies of the FISITA paper are available from AECC or can be downloaded from the AECC web-site on http://www.aecc.be.

6. New Swedish Study highlights benefits of PM Filters[2]

The transport sector contributes significantly to air pollution and light-duty vehicles have been under scrutiny regarding particulate emissions from diesel-fuelled cars. Since the market penetration of diesel cars has been increasing in most markets in Europe (over 30% in EU in 2001), this issue has become more important. In Sweden however market penetration has been slowly decreasing during the last 3 years and now it seems to have stabilised at slightly above 5%. In order for the vehicle manufacturers to meet their agreement to reduce CO_2 emissions in the future, increased market share for diesel cars is a possible route.

As there are relatively few data on unregulated emissions from modern diesel cars, it was of particular interest to generate such data. It was also considered important to compare these data with data on modern petrol-fuelled cars.

Four cars were selected for the investigation:

- Diesel-fuelled Peugeot 307 2.0 HDi FAP (with particulate filter)
- Diesel-fuelled VW Golf 1.9 TDI

[1] "Investigation of the Feasibility of Achieving Euro V Heavy-Duty Diesel Emission Limits with Advanced Emission Control Systems", R.A. Searles, D. Bosteels, C.H. Such, A.J. Nicol, J.D. Andersson, C.A. Jemma, FISITA Paper F02E310 (Helsinki 2002)

[2] "Environmental and Health Impact from Modern Cars: A comparison between two petrol and two diesel cars with varying emission control technology", A report for the Swedish National Road Administration Ecotraffic ERD3 AB, Peter Ahlvik

(without particulate filter)

- Petrol-fuelled Peugeot 307 with 1.6 litre engine
- Petrol-fuelled VW Golf with 1.6 litre engine

The cars were tested according to the NEDC cycle at ambient temperatures of +22°C and -7°C. In addition, the US06 cycle, having a more aggressive driving pattern than the NEDC driving cycle was also used. Finally, overtaking of a lorry was simulated to generate data on full load operation. Measurements of regulated and several unregulated emission components were carried out, including air toxics and particle size distribution.

The results for HC emissions show that the level was generally significantly higher for the petrol cars than for their diesel counterparts. Moreover, HC emissions from petrol cars were more influenced by the ambient temperature than are diesel cars. The use of advanced technology for reducing cold start emissions in general could reduce HC levels considerably in the future. The lower HC emission level for the diesel cars generally also indicates lower levels of toxic volatile organic compounds.

The results on NOx emissions - generally considered as a main problem for diesel cars – confirmed expectations of a higher level for diesel cars. Petrol cars exploit reduction of the NOx emissions in a three-way catalyst (TWC), while the oxidation catalysts on diesel cars have very little influence on the NOx emissions. The report found considerably higher NOx levels at the lower ambient temperature for diesel cars.

As anticipated, the particulate level was highest for the diesel car without a particulate filter, although the level for this car was lower than the Euro IV limit. The particulate emissions were generally lower for the diesel car with a particulate filter than for the petrol cars. The petrol cars had a higher particulate level at the low ambient temperature than at the "normal" test temperature. However, the level at the low temperature was significantly lower than in previous results in the literature, indicating a considerable improvement in this area.

The particle number and particle size distribution was measured with an electrical low pressure impactor (ELPI). This instrument measures particle number at 12 stages for an aerodynamic particle size between 7 nm and 6 μm and can measure the particle emissions in real-time.

The particle number in NEDC was highest for the diesel car without a particulate filter. The two petrol cars had a level that was roughly two orders of magnitude lower. The diesel car achieved the lowest level with a particulate filter, i.e. about one order of magnitude lower than for the petrol cars.

In the US06 cycle, the particle number compared with the results in NEDC increased considerably for the petrol cars to roughly the same level as for the diesel car without a particle filter. The level during overtaking was lower for the petrol cars than in the US06. In both tests, the diesel car with a particulate filter had very low total number of particles, i.e. several orders of magnitude lower than the other cars.

The ozone formation potential was generally lower for diesel cars than their petrol counterparts, primarily due to their significantly lower HC emissions.

The results for the cancer risk index show that the level for the cars tested in this study was significantly lower than for the old cars. For diesel cars without particulate filters, particulate emissions contributed most to the cancer risk. The virtual elimination of the particulate emissions by using a particulate

filter had a considerable impact on the cancer risk index.

NORTH AMERICA

7. EPA's Diesel Emission Standards upheld

A US Federal appeals court has unanimously upheld a Clinton administration regulation requiring a speedy and dramatic reduction in pollution from large trucks and buses, whose emissions have been implicated in thousands of premature deaths and illnesses. The Bush administration had strongly supported the toughened rules.

The regulations will require refiners to produce virtually sulphur-free diesel fuel beginning in 2006. In 2007, half of new trucks will have to meet stricter emission control standards. All new diesel engines will be covered by 2010.

8. Report on Health Effects of PM emissions in Los Angeles

An estimated 3500 people a year die in Los Angeles County from the effects of inhaling fine particles, claims a report by the Environmental Working Group. The county's economy also loses 1.7 million sick days a year and suffers 217 000 asthma attacks annually in the county, according to the report.

9. Cleaner Off-Road Diesel Vehicles may save 8500 Lives

The Bush administration should adopt tough federal pollution emission standards for bulldozers, farm tractors and other off-road diesel vehicles to prevent 8500 premature deaths and 180 000 asthma attacks each year, according to a new report, prepared for the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials.

The report urged the US Environmental Protection Agency (EPA) to cut emissions from off-road vehicles by more than 90%.

EPA and the Office of Management Budget have announced that they would work together to develop rules for cutting emissions from diesel-powered, off-road vehicles. Both agencies said reducing pollution from such vehicles was a "top environmental priority" of the administration and said the proposal being developed "will evaluate not only new emission control devices that would be required for new engines, but also the reductions in sulphur levels that are likely to be needed to enable the control systems to operate effectively".

10. EPA Report concludes that Engine Makers and Refiners can meet US Diesel Rule

US diesel engine manufacturers and petroleum refiners should be able to meet the 2006/2007 federal standards to reduce the amount of sulphur in diesel fuel, according to a new EPA report. The US oil industry has complained it would have a tough time complying with EPA's goal of cutting the sulphur level in diesel fuel by 97% to 15 ppm.

Refiners must begin producing the cleaner diesel by 2006. Large trucks, buses and other heavy duty vehicles must be on the market by 2007 with engines that need ultra low sulphur fuel and achieve very stringent PM requirements; by 2010 NOx emissions levels must be even further reduced.

Separately, the EPA said engine makers plan to use technology that already exists to build engines with special filters requiring the cleaner diesel fuel. "Although it is still early in the process, every major engine manufacturer that we visited told us that they expect to have emission-compliant

products in 2007," EPA said.

11. CARB passes stronger Particulate Matter Air Quality Standards

The California Air Resources Board (CARB) passed new, stricter standards for particulate matter (PM) that represent a danger to human health.

"This is an important step because these particles seriously impact human health, particularly infants, children, the elderly and those with existing heart or lung problems," said CARB Chairman Dr. Alan Lloyd.

CARB calculations show that the new standards would reduce premature deaths by approximately 6500 per year.

The changes in the new PM air quality standards are:

- Annual-average not to be exceeded standard for PM10 is lowered from 30 micrograms per cubic meter ($\mu g/m^3$) to 20 $\mu g/m^3$.
- New annual-average not to be exceeded standard is established for PM 2.5 at 12 $\mu g/m^3$.

The potential health impacts from exposure to particulate matter are significant, especially to sensitive populations. The health effects associated with PM exposure include: premature mortality, increased hospital admissions for cardiopulmonary causes, acute and chronic bronchitis.

The new clean air goals will go into effect late this year or early next year, after going through California's review process for new regulations.

ASIA PACIFIC

12. Japanese Government pledges to buy Fuel Cell Vehicles

Japan's government has pledged to buy fuel cell vehicles from next year in an effort to promote the new technology according to Prime Minister Junichiro Koizumi at a news conference to mark his first year in power.

Fuel cell vehicles, using hydrogen to make electricity, emit only water from the "exhaust" but have high costs and there is a lack of industry consensus on how to transport or store a hydrogen fuel as well as on the development of a hydrogen supply infrastructure. Major automakers are set to put the first vehicles on the market by 2003 and 2004 but costs are too high for the ordinary consumer and the cars are not expected to go mainstream for possibly a couple of decades.

13. Japan ratifies Kyoto Protocol and urges others to follow; Australia says "No"

Japan ratified the Kyoto protocol on global warming that it signed at a United Nations climate conference in 1997 and said it would urge other countries including Russia and the United States to do the same. Japan has pledged to cut its output by 6%.

In a related development, Australia has indicated that it will not ratify the treaty.

14. Beijing to adopt Euro 2 Standards one year early

China's capital city will impose Euro 2 automobile emissions standards beginning 1 January 2003, a year earlier than they are due to be implemented nationwide. In 2001, the city's air pollution exceeded World Health Organisation standards for safe breathing on more than half the days of the year, and automobile exhaust contributed substantially to the problem, supplying two-thirds of the nitrogen dioxide and hydrocarbons in Beijing's air, according to the official *China Daily*.

Beijing has 1.7 million cars, and that number will rise to 3 million by the time

Beijing hosts the Olympics, the newspaper said. Chinese officials announced in 2001 that they would begin imposing Euro 2 standards nationwide in 2004. In November, China began extending tax rebates for automobile manufacturers whose cars already met the standards.

AFRICA

15. Action Plan developed for the Phase-out of Leaded Petrol in East Africa

91 participants representing governments, the private sector and civil society, met in Nairobi, Kenya, from 5 to 7 June 2002 to develop an action plan for the phase-out of leaded petrol in East Africa.

The participants recommended actions to be taken urgently to prepare for and execute the phasing out of leaded petrol.

To monitor progress in implementing this Action Plan, a review, organised by UNEP, will take place during the second half of 2003 (or first half of 2004) in connection with the meeting of the African Ministers of Environment.

GENERAL

16. Revision to Worldwide Fuel Charter to Focus on Elimination of Lead

On behalf of automobile and engine manufacturers from around the world, the World-Wide Fuel Charter Committee has developed the latest draft edition of the World-Wide Fuel Charter. The Charter was first established in 1998 to promote greater understanding of the fuel quality needs of motor vehicle technologies and to harmonise fuel quality worldwide in accordance with vehicle needs.

Regions of Asia, Europe and North America have been adopting and continue to explore stringent new requirements for lowering vehicle emissions and the opportunity for reducing fuel consumption. To cope with these emerging needs, automobile and engine manufacturers have concluded from existing research that the sulphur levels of both petrol and diesel fuel must be dramatically lowered to enable advanced and future motor vehicle technologies to meet these new requirements. The most stringent of these requirements led to the recommendation for sulphur-free fuels in Category 4, which the Committee adopted in 2000.

While many countries around the world have begun taking steps to reduce the sulphur content in petrol and diesel fuel there are still more than 100 countries around the globe that continue to allow the use of lead in petrol. Leaded petrol poses a serious, direct threat to public health and is a barrier to the introduction of automotive emission control systems that can reduce exhaust emissions by 90% or more over uncontrolled levels. It also impedes global harmonisation of vehicle technology. Automakers, engine manufacturers and the emissions control industry around the world support efforts to end the use of lead in petrol. The key change in this 3rd edition of the Fuel Charter is the elimination of any allowance for lead use anywhere in the world.

Some areas that are reducing the use of lead may be using metallic or ash-forming substitutes that also may harm emission control systems. This Charter revision recommends against the use of any metal-based additives replacing lead in commercial fuels to avoid health risks and damage to catalysts.

FORTHCOMING CONFERENCES

Automotive & Transportation Technology Congress

9-11 July 2002, Paris

Details from http://www.attce.com/

6th International ETH Conference on Nanoparticle Measurement

19-21 August 2002, Zurich

Details from: ttm.a.mayer@bluewin.ch

Conference covers characterisation of combustion-emitted Nanoparticles with special focus on the speciation of solid particles and volatiles, including technologies to reduce Nanoparticle emissions.

28th International Scientific Conference on Internal Combustion Engines

8-11 September 2002, Jurata, Poland

http://www.ilot.edu.pl/STRANG/KONES.htm

Conference will cover achievements in research, development and design of compression-ignition and spark-ignition as well as other combustion engines.

AECC will present a paper on emission control technologies.

Fuel Cells: Science and Technology 2002

25-26 September 2002, London

Details from:
http://www.fuelcelladvance.com

From the organisers of the Grove Fuel Cell Symposium

11th Aachen Colloquium, Automobile and Engine Technology

7-9 October 2002, Aachen, Germany

Details on: http://www.rwth-aachen.de/ac-kolloquium/index.html

The congress will provide a wide range of technical presentations addressing the current challenges of the vehicle and powertrain industry.

Ricardo and AECC joint paper 'Particle Emissions from a EU3 HD Diesel Engine with Catalyst-based Diesel Particulate Filter and Selective Catalytic Reduction System: Size, Number, Mass & Chemistry' will be presented on 8 October.

BAQ 2002 – "Better Air Quality in Asian and Pacific Rim Cities"

16-18 December 2002, Hong Kong

http://www.cse.polyu.edu.hk/~activi/BAQ2002/Index.htm.

Organised by Hong Kong Polytechnic University and will cover technical, policy and institutional aspects related to air quality and its management and control techniques.

SIAT 2003

15-18 January 2003, Pune, India

Details from ARAI website:
http://www.araiindia.com

Call for papers. Programme includes exhaust emission control techniques including durability aspect for Euro III and beyond.

AVL Commercial Powertrain conference

03-04 April 2003, Graz, Austria

Details from http://www.avl.com/icpc

The conference will focus on exploring the similarities and synergies between three different markets: commercial vehicles, agricultural tractors and construction equipment.

Joint JSAE/SAE International Fuels and Lubricants Symposium

19-22 May 2003, Yokohama, Japan

Details from: http://jsae.or.jp/intconf/

With the participation of European industry. Programme includes Combustion, Emissions, Lubricants and Fuels. Abstracts for papers required by 30 September 2002.