



Newsletter

November - December 2006

INTERNATIONAL REGULATORY DEVELOPMENTS

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EUROPE

European Parliament votes to accept Light-Duty Euro 5 and 6 Compromise

The European Parliament debated the proposed light-duty Euro 5 and Euro 6 emissions Regulation in their plenary session on 12 December and the following day voted to accept compromise proposals developed in discussions with the Council of Ministers and the European Commission.

Key elements of the compromise were:

- Addition of limits for N2 (medium commercial) vehicles of reference mass up to 2610kg.
- Euro 5 to apply from 1.9.2009 for new Type Approvals and 1.1.2011 for all registrations of categories M1 and N1 class I (essentially cars and car-derived vans). The dates will be 1 year later for N1 class II & III and N2 commercial vehicles.
- Euro 6 to apply from 1.9.2014 for new Type Approvals and 1.9.2015 for all registrations. The dates will be 1 year later for vehicles of category N1 class II & III and category N2.
- There are exceptions for vehicles "designed to fulfil specific social needs" but these apply for Euro 5 only. They cover 3 types of vehicle:
 - special purpose vehicles (as defined in the framework directive; i.e. hearses, ambulances etc.) with ref. mass >2000kg;
 - vehicles designed to carry 7 or more including driver and with ref. mass >2000kg excluding (from 01/09/2012) category M1G (off-road vehicles, as defined in the framework directive);
 - vehicles with reference mass >1760kg built for commercial purposes to allow wheelchair use inside the vehicle (e.g. London Taxis).

The Euro 5 tailpipe emissions limits for these vehicles will be the same as for N1 Class III.

- A table of the full Euro 5 limits is shown on the following page. Highlights are:
 - The PM limit is the same for all vehicles classes (5mg/km) and applies to diesel vehicles but also to all direct-injection SI, rather than only lean-burn SI as originally proposed;
 - No change to CO;
 - Both total HC and non-methane HC limits for SI vehicles. This is reportedly to assist natural gas vehicles. The limits will be 100mg/km THC & 68mg/km NMHC. These replace the Commission proposal of 75mg/km HC;
 - SI engine NOx is retained at 60mg/km; CI NOx is reduced to 180mg/km (from Commission

proposal of 200 mg/km), with a similar reduction for HC+NOx.

- Full Euro 6 limits are shown in the second table of the following page. Highlights are:
 - No further change to CO, THC, NMHC;
 - CI engine NOx reduced to 80mg/km and HC+NOx to 170mg/km.
- Incentives for Euro 5 are allowed until the Euro 5 'all registrations' date (1.1.2011 for M1 etc.).
- Incentives for Euro 6 are allowed until the Euro 6 'all registrations' date but in the period when Euro 5 incentives are authorised, it is not permitted to give incentives only for Euro 6; the level of incentives can be different between the two standards.
- Particle number and a revised PM method, based on PMP, are to be introduced no later than Euro 6 through comitology.
- A revised PM limit for the PMP method is to be introduced via comitology with Parliament scrutiny.
- A particle number limit broadly correlating with PM is to be introduced through comitology with Parliament scrutiny.
- The possibility of test-bench ageing is to be included in the Implementing Regulation.
- The Commission must consider limiting methane emissions (with CO₂).
- The Commission has to review low temperature CO & HC emissions and, if appropriate, propose tightening the limits via the co-decision process.
- The Commission must keep additional pollutants under review and if necessary make a proposal through comitology.
- All references to 'catalytic converters' in the original Commission proposal have been changed to 'pollution control devices'.
- National authorities may grant extensions for replacement pollution control devices for previous standards; devices intended for vehicles type approved prior to the adoption of component type approval (1998) are exempt from requirements.
- Before drawing up any future emissions standards, the Commission should study whether mass-neutral emissions limits could be applied.
- The Commission is given the power to establish "specific procedures, tests and requirements for type approval, as well as revised measurement procedures for PM and a particle number (P#) limit value, and to adopt measures concerning defeat devices.....and test cycles used to measure emissions" under the procedure by which Parliament has scrutiny (rather than through co-decision).

ANNEX I – Emission limits

Table 1: Euro 5 Emission Limits

Category	Class	Reference mass (RM) (kg)	Limit values													
			Mass of carbon monoxide (CO)		Mass of total hydrocarbons (THC)		Mass of non-methane hydrocarbons (NMHC)		Mass of oxides of nitrogen (NOx)		Combined mass of total hydrocarbons and oxides of nitrogen (THC + NOx)		Mass of particulate matter (PM)		Number of particles ⁽¹⁾ (P)	
			L ₁ (mg/km)	CI	L ₂ (mg/km)	CI	L ₃ (mg/km)	CI	L ₄ (mg/km)	CI	L ₂ + L ₄ (mg/km)	CI	L ₅ (mg/km)	CI	L ₆ (#/km)	CI
M	—	All	1000	500	100	—	68	—	60	180	—	230	5.0	5.0		
N ₁	I	RM ≤ 1305	1000	500	100	—	68	—	60	180	—	230	5.0	5.0		
	II	1305 < RM ≤ 1760	1810	630	130	—	90	—	75	235	—	295	5.0	5.0		
	III	1760 < RM	2270	740	160	—	108	—	82	280	—	350	5.0	5.0		
N ₂			2270	740	160	—	108	—	82	280	—	350	5.0	5.0		

Key: PI = Positive Ignition, CI = Compression Ignition

(1) A number standard is to be defined as soon as possible and at the latest upon entry into force of Euro 6.

(2) Positive ignition particulate mass standards apply only to vehicles with direct injection engines.

Annex 1 - Emission limits

Table 1a: Euro 6 Emission Limits

Category	Class	Reference mass (RM) (kg)	Limit values													
			Mass of carbon monoxide (CO)		Mass of total hydrocarbons (THC)		Mass of non-methane hydrocarbons (NMHC)		Mass of oxides of nitrogen (NOx)		Combined mass of total hydrocarbons and oxides of nitrogen (THC + NOx)		Mass of particulate matter (PM)		Number of particles ⁽¹⁾ (P)	
			L ₁ (mg/km)	CI	L ₂ (mg/km)	CI	L ₃ (mg/km)	CI	L ₄ (mg/km)	CI	L ₂ + L ₄ (mg/km)	CI	L ₅ (mg/km)	CI	L ₆ (#/km)	CI
M	—	All	1000	500	100	—	68	—	60	80	—	170	5.0	5.0		
N ₁	I	RM ≤ 1305	1000	500	100	—	68	—	60	80	—	170	5.0	5.0		
	II	1305 < RM ≤ 1760	1810	630	130	—	90	—	75	105	—	195	5.0	5.0		
	III	1760 < RM	2270	740	160	—	108	—	82	125	—	215	5.0	5.0		
N ₂			2270	740	160	—	108	—	82	125	—	215	5.0	5.0		

Key: PI = Positive Ignition, CI = Compression Ignition

(1) A number standard is to be defined for this stage

(2) Positive ignition particulate mass standards apply only to vehicles with direct injection engines

Motor Industry response to Euro 5/6

ACEA, the European association of automobile manufacturers issued a press release saying that “The stringent limit values for nitrogen oxide and particulate matter set in the Euro 5 and 6 proposals affirmed today in the European Parliament are extremely challenging for the European automotive industry to comply with.” “The European car industry will do its utmost to meet the extremely ambitious targets within the set time frame ... the proposed limit values will not only be extremely difficult to meet, but

will have a significant counter-productive effect on reducing CO₂ emissions from passenger cars. They also pose a serious risk for the market of small diesel cars.”...“The European car industry regrets that the new emission standards have not been based on proper and transparent impact assessments. Amongst other issues, this has led to an underestimation of Euro 5 and 6 related costs by about 33%. The price of diesel cars will rise by up to €900. Furthermore, due to technical requirements and a predicted market shift from diesel to gasoline cars, ACEA expects a significant negative impact of 6% on CO₂ emissions.”

European Commission Impact Assessment for Light-Duty Euro 5 and 6

Ahead of the Parliament's debate on the light-duty Euro 5 and 6 emissions regulation, the European Commission issued an Impact Assessment for Euro 6.

The Commission's press release, which endorsed the proposals for the Euro 6 stage, says that the impact assessment concludes that the price of a diesel car will increase gradually by some €600 up to the year 2015. It also says that the improvement in air quality will result in health benefits that are significantly greater than for Euro 5 alone. In a first phase the costs will go up by €377 up to 2010. The results of the Commission's modelling for Euro 6 suggest the following key aspects:

- There will be an additional 24% reduction in overall NOx emissions from light-duty vehicles in 2020 compared to the introduction of Euro 5 only.
- This reduction in emissions will contribute to light-duty vehicles meeting 26% of the target for NOx reduction contained in the draft European Commission Thematic Strategy for Air Pollution.
- Reductions in emissions will continue to grow after 2020 as older, more polluting vehicles are retired.
- The introduction of Euro 6 will have no significant impact on CO₂ or on sales of diesel vehicles.
- The NOx emissions reduction from Euro 6 will increase the health benefits by approximately 60 – 90% relative to Euro 5.

A table shows the additional costs of Euro 6 relative to Euro 5 for diesel cars to be just over €200 per car. The Impact Assessment is available at:

http://ec.europa.eu/enterprise/automotive/pagesbackground/pollutant_emission/impact_assessment_euro6.pdf

Implementing Measures for Light-Duty Euro 5 and Euro 6

The emissions Regulation for light-duty Euro 5 and 6 will be a 'split level' Regulation. In this process the 'political' elements such as limit values and durability mileage are set through the co-decision process, which requires agreement between the Council of Ministers of the Member States and the European Parliament. The technical content (test methods etc.) will be implemented by a Commission Regulation ('Comitology'), allowing faster updating if needed.

The Commission has now issued its second draft of these proposed implementing measures. This was discussed at a meeting of the EU's Motor Vehicle Emissions Group (MVEG) on 20 December 2006. MVEG brings together representatives of the Member States and the Commission with stakeholders including industry and environmental organisations. The formal proposal for the implementing measures is

expected by Easter 2007. The Comitology Regulation will include test methodology (in many cases by referencing UN-ECE Regulations), deterioration factors for durability, reference fuel specifications, and in-service conformity and OBD requirements. Work on specific sections, including procedures for durability and approval of replacement pollution control devices, is continuing in Working Groups of key stakeholders.

Validation Panel Report on Heavy-Duty Euro VI published

The report of the validation panel which assessed responses to the European Commission's questionnaire on technologies and costs for heavy-duty Euro VI has now been published.

Costs for scenario 5 (0,01g/kWh PM, 0.4g/kWh NOx) range from €3355 for the low estimate for 6 litre engines to €5780 for the high estimate for 13 litre engines, when 100% attributed to Euro VI. If only part of the cost for certain components is attributed to Euro VI (on the basis that the technology will also be used for reasons other than emissions reduction), this changes the costs to a range of €2855 to €5080. For scenario 6 (0.02g/kWh PM, 0.2 g/kWh NOx) the figures were quite similar - €3753 to €5980 for 100% attribution, €3253 to €5280 for the reduced attribution. For comparison, the 'no change' scenario gave costs of €297 to €1287. The report is available at:

http://ec.europa.eu/enterprise/automotive/pagesbackground/pollutant_emission/tno_report_euro_vi.pdf

Directive on Replacement Catalysts for Motorcycles and Three-Wheelers

New Directive 2006/120/EC corrects and amends 2005/30/EC, primarily regarding replacement catalytic converters. The new Directive clarifies that replacement units must comply with the Directive and that sale or installation of non-approved replacement catalytic converters is forbidden after 1 January 2009.

Scenarios for further Engine Emissions Reductions for Recreational Marine Craft

The EU's Directorate-General for Enterprise & Industry has published a study on further emissions reductions for recreational marine craft engines. The report looks at the feasibility and impact of possible scenarios for further emissions reduction measures for these engines, which are covered by Directive 92/25/EC, as amended by 2003/44/EC.

The report notes there are some 6 million recreational marine craft in Europe. Although aggregate emissions are low compared to other sources, they can lead to localised problems at times of peak activity. The study compared four options against a 'No Policy Change'

scenario in which all new marine engines would continue to comply with the existing 'RCD (Recreational Craft Directive) Stage 1' limits. All the options include different limits for SI and CI engines, with the CI limits being further differentiated by power output. The authors make no recommendations as to the selection of the best option, but provide a comparison of each in terms of emissions reduction (PM and HC+NO_x), costs and effects on employment.

Consultants Report for DG Environment on Heavy-Duty Retrofit

A report from Sadler Consultants on the DG Environment sponsored "EU project on supporting technical measures to reduce emissions from existing heavy-duty vehicles" has been published.

The study concludes that "diesel particulate filters (DPF) for reducing particulate emissions and selective catalytic reduction (SCR) for NO_x, stood out in terms of cost effectiveness. In terms of support for these technical measures, there is a clear and urgent need for the Commission to take action to help support the use of retrofits through a common EU-wide certification scheme... It would enable Low Emission Zones (LEZs) to use retrofits without risking falling foul of the EU freedom of movement issue. It would also allow LEZ emissions standards or emissions variable road tolling schemes to require, for example, Euro 'X' plus 90% emissions reduction – giving clear incentives for retrofits and cost effective emissions reductions. The EU-wide certification scheme could, depending on state aid reviews, also enable financial incentives to be streamlined through the notification process, give reassurance for those member states not yet using retrofits that they are robust technology and could act as Best Available Technology (BAT) references for retrofits." The report is available at: <http://www.airqualitypolicy.co.uk/content/view/19/49/>

Germany agrees DPF Incentives

The German Cabinet has agreed tax incentives for fitting particle filters to existing diesel cars. Retrofitting a DPF will give a vehicle tax credit, but non-equipped vehicles will pay an extra €1.20 per 100cc engine displacement until the end of 2011. Filters must cut emissions to 5mg/km. The law will enter force in April 2007 after parliamentary approval.

Any light-duty diesel vehicle first registered on or before 31 December 2006 will have a one-time credit of €330 on their vehicle licence fee on the day its owner proves to the authorities that a DPF was retrofitted between 1 January 2006 and 31 December 2009. For qualifying retrofits fitted before the law goes into effect, the credit becomes effective on the day that the law comes into force.

Commission authorises Italian Aid for Fitment of Particulate Filters to Buses

The European Commission has approved aid to alleviate the cost of retrofitting Italian passenger buses with particulate filters. The Italian State aid will cover up to 30% of the additional costs of retrofitting Italian registered buses with particulate filters.

Italy Incentivises scrapping Old Vehicles

Italy has announced proposed incentives for scrapping older vehicles and buying new ones meeting the latest emissions limits.

Scrapping a Euro 0 or Euro 1 car and buying a new one meeting Euro 4 or Euro 5 will result in a €800 bonus and a 2-year exemption from annual circulation tax (3 years for cars of less than 1300 cc). Shredding a Euro 0 or 1 car without replacement will give a bonus of €200; a one-year free public transport subscription will be granted. Similar incentives will also apply for scrapping Euro 0 and Euro 1 motorcycles. If a Euro 3 motorcycle is bought between 1 December 2006 and 31 December 2007, a tax exemption will apply for 5 years. A €2000 bonus will apply for buying a new truck of less than 3.5 tonnes and scrapping an old one. The incentive will be extended to trucks fuelled (exclusively or not) with methane, LPG, electricity or hydrogen if CO₂ emissions are below 120g/km. Above this limit, the incentive will be €1500.

Emissions of NO_x, CO and NMVOC continue to fall in EU-15

The European Environment Agency has recently published the European Community LRTAP (Long-Range Transboundary Air Pollution) Convention Inventory. This document shows the emissions trends of a broad spectrum of air pollutants in a number of sectors in all the EU Member States, presenting data for the years 1990 to 2004 for the EU.

The results show that, in relative terms, NO_x emissions dropped by 31% between 1990 and 2004. The report also indicates that at EU-15 level, emissions reductions were recorded for carbon monoxide (-50%) and non methane volatile organic compounds (NMVOC) (-45%). According to the report, road transportation was the largest key source for NO_x, CO and NMVOC emissions in the period. Emissions reductions took place in most of the sectors contributing to the emission of airborne pollutants including transport, energy, agriculture and waste, although some countries have reported increasing emissions from some source categories.

NORTH AMERICA

EPA issues Draft Guidance on SCR

The US Environmental Protection Agency (EPA) has released draft guidance on "Certification Procedure for Light-Duty and Heavy-Duty Diesel Vehicles Using Selective Catalyst Reduction (SCR) Technologies."

The EPA guidelines address the issues of vehicle compliance (to ensure that vehicles are not operated without urea) and of urea availability. The vehicle compliance criteria include a dashboard indicator such as a warning light, as well as an audible alarm, which are activated 1500 miles prior to the urea tank becoming empty, and gradually escalate the warning intensity as the urea tank approaches empty level. There must be a 'driver inducement' system to ensure urea tanks are refilled. EPA offers a number of options for this, including limiting the number of restarts once urea reaches a certain minimum level or preventing refuelling if the urea tank is empty. A tamper-resistant urea sensor or NOx emissions sensor must be used to ensure the correct urea solution is used and the dosing system must also be tamper-resistant. To address urea availability, EPA requires that it be available through dealerships and truck stops. There must be a back-up plan, including toll-free phone numbers to help locate urea. Manufacturers must ensure that the urea is at proper use temperature within a reasonable length of time, such as 20 minutes. This can be accomplished by heating the tank and lines or using a reagent that is not affected by low temperatures. The document also covers certification requirements such as urea quality, reagent refilling intervals, freezing protection, labelling, and education and training.

California updates Emissions Requirements for Fork Lift Trucks

The California Air Resources Board (ARB) has issued modifications to their proposals for new emissions standards, fleet requirements and test procedures for forklifts and other industrial equipment. The changes clarify the engine size categories, emissions standards and testing requirements. They also define the applicability of the proposed regulations to certain types of agricultural equipment, airport ground support equipment and military tactical support equipment.

In general, from 1 January 2007, the requirements for off-road large spark-ignition engines will apply to engines above 19kW and to all equipment and vehicles that use such engines other than off-highway recreational vehicles. Key requirements shown in the ARB documents and measured using the EPA transient test cycle, are given below.

For 2007 to 2009 model years:

- an HC+NOx limit of 9.0g/bhp-hr (12.0g/kWh) and CO limit of 410g/bhp-hr (549g/kWh) for engines ≤1.0 litre displacement;
- an HC+NOx limit of 2.0g/bhp-hr (2.7g/kWh) and a CO limit of 3.3g/bhp-hr (4.4g/kWh) for engines >1.0 litre displacement. *Note: originally the current 37.0g/bhp-hr CO standard was to be retained.*

From 2010 model year:

- no change for engines ≤1.0 litre displacement;
- limits of 0.6g/bhp-hr (0.8g/kWh) HC+NOx and 15.4g/bhp-hr (20.6g/kWh) CO for engines >1 litre.

There are optional standards and various application details which must be examined to determine whether particular applications fall within the scope.

California to limit Lawnmower Emissions

The EPA waiver to allow California to reduce emissions from small, off-road spark-ignited engines has now been approved. California's Tier 3 standards cover engines up to 25hp. Such engines are primarily used for lawnmowers and machines such as pressure washers and small generators. The regulations were passed 3 years ago but have since been subject to court action. They will now be effective from 1 January 2007 and are expected to require catalysts on many applications. Engines under 50hp account for 7% of smog emissions in California from mobile sources, the equivalent of about 3 million cars.

California launches Off-Road Diesel Emissions Control Showcase Project

In spring 2007, the California Air Resources Board (ARB) will consider a regulation that would require existing diesel-powered off-road equipment to be retrofitted with systems to control particulate matter (PM) and/or NOx emissions. To stimulate additional verified diesel emission control strategies (DECS) for this off-road equipment, ARB has announced an Off-Road Diesel Emissions Control Showcase project.

The goals of the Showcase project are to generate useful operational data from retrofitted off-road equipment which will enable device manufacturers to verify their devices in California and to achieve early reductions in off-road equipment emissions. Funding will be made available to qualifying manufacturers to provide DECS for specific off-road diesel equipment and vehicles. ARB is proposing that manufacturers who have existing verifications from ARB, the US EPA Voluntary Retrofit Program or the Swiss VERT programme are candidates for participation. Manufacturers that can achieve at least an 85% PM reduction, or who have technologies that can control NOx as well as PM, are being encouraged to apply.

California Ports Emission Reduction Plan

A five-year plan has been approved to reduce emissions from all vehicles that serve the ports of Long Beach and Los Angeles, including ships, trucks, trains, and cargo-handling equipment. The plan will use measures such as replacing or retrofitting old diesel engines, pollution-based impact fees and expanding shore-side electricity availability. It is intended to reduce diesel NO_x by over 45%, particulate emissions by over 47%, and SO₂ by 52%.

Environment Canada finalises Motorcycle Emissions Standards

Environment Canada has published final regulatory amendments to further align Canada's standards for emissions from on-road motorcycles with the US. The regulatory changes also expand the scope of emissions standards to include small-displacement motorcycles such as mopeds and scooters.

The amendments to the On-Road Vehicle and Engine Emission Regulations, issued under the Canadian Environmental Protection Act, also promote alignment with US standards by permitting corporate fleet averaging and providing small-volume manufacturers with greater flexibility in meeting emissions standards. The effective date of provisions affecting motorcycles with engine displacement of less than 50cc - including mopeds and scooters - was extended to 1 December 2006, from the original proposal of 1 July 2006.

The regulatory amendments are expected to reduce motorcycle emissions of NO_x by 59% and HC by 45% by 2020. The focus is on limiting emissions of smog-forming pollutants, but some of the technologies that are expected to be used will also produce collateral improvements in fuel efficiency and, in turn, minor reductions in greenhouse gas emissions.

Canadian Consultation on Marine Engine and Recreational Vehicle Emissions

On 30 December 2006 Environment Canada opened a consultation on Marine Spark-Ignition Engine and Off-Road Recreational Vehicle Emission Regulations. The consultation closes on 28 February 2007.

The proposed Regulations would introduce standards for marine spark-ignition engines (i.e. outboard motors and personal watercraft) and off-road recreational vehicles including snowmobiles, off-road motorcycles, all-terrain vehicles and utility vehicles. They would apply to engines and vehicles of the 2008 and later model years that are manufactured on or after 1 January 2008. The standards and test procedures would align with those of the US Environmental Protection Agency (EPA).

HC+NO_x emission standards for marine spark-ignition engines

	HC+NO _x Emission Standard (g/kW-h)	
Model Year	$P < 4.3$ kW	$P \geq 4.3$ kW
2008 & Later	81.00	$0.250 \times \left(151 + \frac{557}{P^{0.9}} \right) + 6.00$

^a P = sales-weighted average power of the engine family in kilowatts

Emission standards for off-road recreational vehicles

Phase/Model Year	Emission Standards			Maximum Allowable Family Emission Limits		
	HC	HC+NO _x	CO	HC	HC+NO _x	CO
Snowmobiles (g/kW-h)						
Phase 1 (2008-2009)	100	—	275	—	—	—
Phase 2 (2010 and 2011)	75	—	275	—	—	—
Phase 3 (2012 and later)	75 ^a	—	^{a, b}	150 ^a	—	400 ^a
Off-Road Motorcycles (g/km) ^c						
Phase 1 (2008 and later)	—	2.0	25	—	20.0	50
All-Terrain Vehicles (g/km) ^c						
Phase 1 (2008 and later)	—	1.5	35	—	20.0	—

^a The US Phase 3 standards for snowmobiles are currently undergoing review by the EPA. An amendment is expected.

^b The CO standard is based on a formula given in the US standard.

^c Optional standards exist for off-road motorcycles and ATVs with small displacement engines. There are temporary engine-based standards for 2008 model year ATVs.

The useful life for which the requirements apply varies depending on the size of engine and the application. There are also requirements for fuel tank and fuel line permeation and for crankcase emissions. The Impact Analysis and proposed regulatory text are at <http://canadagazette.gc.ca/part1/2006/20061230/html/regle1-e.html>

Canada to require Renewable Fuels

Canada's Department of the Environment has announced that the Government intends to develop and implement a federal regulation requiring renewable fuels. The regulation would require fuel producers and importers to have an average annual renewable fuel content of at least 5% of the volume of gasoline that they produce or import, starting in 2010.

In addition, there will be a requirement for an average 2% renewable fuel content in diesel fuel and heating oil, upon successful demonstration of renewable diesel fuel use under the range of Canadian conditions. This is intended to come into effect by no later than 2012. This requirement is approximately equivalent to a renewable fuel content requirement for 5% of on-road diesel.

Canadian Air Quality worsened in 2004

The 2nd annual Canadian Environmental Sustainability Indicators report says that smog and greenhouse gases increased in 2004 compared with 2003.

From 2000 to 2004, the highest levels of PM_{2.5} were reported in southern Ontario, which holds nearly one-third of the country's population, with parts of eastern Ontario and southern Quebec also showing high levels. For ozone there was an average increase of 0.9% per year. Southern Ontario also reported the highest ozone levels in the country in 2004 and the most rapid increase since 1990. The report says that human activities, including use of motor vehicles and other fossil-fuel combustion, contributed to the majority of the air pollution.

Texas proposes New Controls on NOx

The Texas Commission on Environmental Quality (TCEQ) is proposing to amend the State Implementation Plan for ozone in order to enable the Dallas-Fort Worth and Houston-Galveston regions to comply with the new federal 8-hour ozone standard. The plan was due to go for approval before the end of 2006. The new controls will reduce NO_x and VOC emissions from a variety of major sources and a number of minor sources such as boilers and stationary diesel engines.

Texas calls for NOx Reduction Proposals for Diesel Tugs and Tow Boats

The Texas Environmental Research Consortium has issued a grant application for projects to develop NO_x reduction technologies for diesel tugs and tow boats. The technologies are expected to include exhaust gas recirculation (EGR), electronically controlled fuel injection, water injection; and selective catalytic reduction (SCR). Special consideration will be given to projects that will also reduce emissions of PM, hydrocarbons, and CO.

The grants will contribute to the development and verification of technologies giving a 25% or more reduction in NO_x emissions. Texas expects that the 500 such vessels currently operating in Texas waterways will, by 2009, account for 29% of total NO_x marine emissions in the Houston-Galveston area, amounting to some 12.5 tons per day.

Proposal for Texas to adopt California Light-Duty Vehicle Emissions Standards

Draft legislation filed by a Texas Senator would require all new cars sold in the state after 2008 to meet California's Low-Emission Vehicle programme requirements and introduce limits for greenhouse gas

emissions. If Texas were to adopt California's rules, more than half of the country's population would be subject to the regulations.

Report on Health Risks of Construction Pollution in California

A new report from the Union of Concerned Scientists estimates that in 2005 pollution from construction equipment in California was responsible for about 1132 premature deaths, 1086 hospitalisations and nearly 183 000 lost work days.

The study, "Digging up Trouble: The Health Risks of Construction Pollution in California" includes analyses in the five areas most affected by construction pollution. According to the report, construction equipment is one of the largest sources of diesel pollution in the state, due to the long life of such equipment and emissions standards which apply later than those for on-road vehicles. The authors say that phasing out the oldest equipment, installing new engines, and retrofitting others with clean technologies could significantly reduce emissions.

EPA Proposes On-Board Diagnostic Systems for Trucks and Buses

The US Environmental Protection Agency (EPA) is proposing to require the emissions control systems of large diesel and gasoline highway trucks and buses to be monitored by On-Board Diagnostic (OBD) systems. The proposal also makes changes to certain existing OBD requirements for smaller highway diesel trucks. The proposed requirements are part of the Clean Diesel Truck and Bus Programme.

The proposal sets monitoring requirements and relevant pollutant thresholds for diesel oxidation catalysts, NO_x catalysts, particulate filters, air-fuel sensors and NO_x sensors. Manufacturers will have to certify one engine family per year to the proposed OBD requirements starting in 2010, with all highway engines be certified by 2013.

EPA revises Fuel Economy Procedures

The US Environmental Protection Agency (EPA) has issued revised methods to determine the fuel consumption estimates that appear on new vehicle window stickers. The new standards will take effect for model year 2008 vehicles. EPA claims the new methods will bring estimates closer to consumers' actual fuel use, by including factors such as high speeds, aggressive accelerations, air conditioning use and driving in cold temperatures. For the first time, EPA will also be requiring fuel economy labelling of medium-duty vehicles, including large sport-utility vehicles and vans, from the 2011 model year.

SOUTH AMERICA

First Integrated Ethanol-Biodiesel Plant is inaugurated in Brazil

The first integrated biofuels plant has been inaugurated by Brazilian President Luiz Inacio Lula da Silva. The Barralcool plant in Barra do Bugres, Mato Grosso, is designed for multi-feedstock inputs. It will primarily use soybeans grown by Barralcool for biodiesel, with sugarcane used for ethanol production.

ASIA-PACIFIC

Air Pollution in Delhi increasing with Rapid Growth in Diesel Cars

A new assessment by India's Centre for Science and Environment (CSE) has found that pollution in winter has begun to rise once again, despite a decrease until 2003. CSE analysed the trends in peak pollution levels in Delhi during winter months since 1998. They attribute the rising pollution to the rapid growth in cars - especially diesel cars - in the city.

Over the last 10 years, total personal vehicle registration has increased by 105%; cars alone have increased by 157% and diesel cars have increased by 425%. Diesel cars in 2006 represent nearly 20% of new car registrations in Delhi, up from 4% in 1999. While gasoline cars have increased at 8.5% annually, diesel cars have maintained a growth rate of 16.6%. The cumulative effect is, says CSE, overwhelming the emissions benefits gained by the city's earlier phase-out of its 12 000 diesel buses. CSE is urging that Delhi take measures this winter to mitigate pollution, including stringent on-road checks for smoky vehicles, supportive measures to intensify use of public transport, and encouragement of alternative-fuelled cars while discouraging polluting cars.

India plans increased Levels of Biofuels

India plans to introduce the mandatory blending of 10% ethanol into gasoline across the entire country from June 2007. India also plans to replace around 5% of its annual diesel consumption with jatropa biodiesel within about five years, as it tries to limit oil imports that account for 70% of its needs.

ICCT Report on Fuel Desulfurisation Benefits for China

A new report from the International Council on Clean Transportation and Tsinghua University in cooperation with the China's State Environmental Protection Administration examines the cost-benefit analysis of cleaner fuels and improved vehicle standards.

Low fuel sulfur levels which are a critical part of European vehicle emissions programmes are not yet in place in China. Advanced emissions control technologies that are needed to meet the future Chinese standards require the use of cleaner (especially lower sulfur) fuels. Under current policies, in-use fuel sulfur levels in China will start to diverge from certification fuel sulfur levels starting in 2008.

The report finds that China could avoid some 370 000 premature deaths by 2030 at an incremental cost of 1 to 3% of the retail cost of desulfurised diesel and gasoline - an average increase of ¥1 to ¥3 in the weekly cost of driving. This is in addition to the 1.1 million premature deaths that will be avoided due to recently adopted cleaner fuel and vehicle standards. The study found that meeting light-duty Euro 4 standards would add about \$800, while Euro 5 would add about \$1150. For Euro IV heavy-duty diesel standards, vehicle costs would rise by about \$4000, while Euro V would add about \$5000 per vehicle.

"Costs and Benefits of Reduced Sulfur Fuels in China" is available at <http://www.theicct.org/>.

Study on Pollution in Ho Chi Minh City

The Asian Development Bank has launched a 30-month study into the impacts of air pollution in the Vietnamese commercial capital, Ho Chi Minh City. The study will examine the effect of air pollution on children and families to determine whether the consequences of sub-standard air quality are more pronounced in poor communities. It will be conducted with the support of the local government and the Health Effects Institute.

Korean Plan to improve Air Quality in Metropolitan Areas

The Korean government has unveiled an eight-year plan to control particulate pollution in Seoul and surrounding areas, including Incheon and Gyeonggi Province. The Ministry of Environment said it will implement measures from 2007 to 2014 to control all significant sources of airborne particles.

Under the plan, the government will seek to reduce the particulate level to 40µg/m³ from the current 58µg/m³. Officials said that the primary cause of pollution in the metropolitan area comes from windblown particles from car exhausts and factories. To cope with the emissions of nitrogen dioxide, environmental ministry officials said they are tightening regulations and monitoring procedures for car exhaust and construction sites. The plan aims to reduce NO₂ from 34ppb to 22ppb. A budget of more than 4.8 trillion won (about 5 billion US dollars), will be allocated to the environmental plan.

Kia Initiative in New Zealand

Kia has launched a novel initiative in New Zealand. The company says that every time a customer buys a new Kia passenger car it will pay to scrap an old, polluting vehicle. Kia New Zealand will accept one trade-in per new vehicle sold irrespective of age and condition to get that vehicle off the road. If the vehicle is deemed too good to scrap, Kia will pay for the scrapping of another vehicle.

Singapore changes Diesel Smoke Test

Singapore's National Environment Agency (NEA) has announced the introduction of a stricter emissions testing system for diesel vehicles. From 1 January 2007, the existing 'free acceleration smoke test' for new diesel vehicles will be replaced with a 'chassis dynamometer smoke test' which can exercise a diesel vehicle with a simulated load and allow authorities to test emissions under actual driving conditions. The new requirement comes shortly after the NEA introduced Euro IV emissions standards and mandated the use of ultra-low sulfur fuel for diesel vehicles.

New Zealand Business Council says New Car Incentives are better than Scrapping

Paying cash grants to buyers of low-emission vehicles will clean up the nation's dirty car fleet faster than paying money to scrap old cars.

The New Zealand Business Council for Sustainable Development says the country will get more immediate benefits by using a cash incentive to create a major, quick, switch to fuel efficient, low emission newer cars than by paying money for scrapping old cars, as has been proposed in United Future's environment policy. The Business Council says that paying up to \$3000 to buyers of low emission, fuel efficient cars would see more than 400000 cars enter the fleet over five years. New Zealand is one of the few countries in the world to be mass importing pre-2000 cars from Japan.

Proposals to link Emissions to Registration Fees in Sydney

Under a new proposal aimed at reducing Sydney's smog, drivers whose vehicles fail a pollution test will face higher registration fees. A State parliamentary committee has recommended that all vehicles over five years old undergo annual emissions tests.

During hearings, health chiefs admitted that the city's air pollution is so bad it contributed to the deaths of up to 1400 people a year. The committee found that despite an improvement in air quality there remained

"significant challenges" in reducing smog and particle pollution due to the growing population and the expansion of those urban areas already considered air pollution hot spots. Environment officials, however, pointed out that this testing cannot be done for ultra-fine particles. The New South Wales' Asthma Foundation chief executive claimed that new, more efficient engines emit smaller particles.

The committee said Sydney's growing network of tunnels should be made more pollution-free and the sale of unflued gas heaters, which create elevated levels of nitrogen dioxide in homes, banned. The committee also urged incentives to encourage more fuel-efficient vehicles, hybrids and alternative fuels.

UNITED NATIONS

World-Harmonised Heavy-Duty OBD and Emissions Procedures agreed

The Global Technical Regulations for the world-harmonised heavy-duty engine emissions test procedure (WHDC), covering transient and steady-state cycles, and for the world-harmonised requirements for heavy-duty On-Board Diagnostics (WWH-OBD) were both agreed at the United Nations' meetings held in Geneva during November. The two new GTRs to the 1998 Global Agreement will now go forward for publication and will be respectively numbered as GTR N° 4 and N° 5.

The GTR on WWH-OBD also includes requirements to standardise the communication of on-board information to off-board devices, which may facilitate the future use of OBD for roadworthiness purposes. The WHDC GTR has still some open issues that will have to be solved by GRPE over the next 2 years. These include options on soak time between the cold and hot transient tests (WHTC) and the weighting factors for the emissions calculations.

The relevant UN-ECE Regulation N° 49 of the 1958 Agreement has also been amended to make reference to the GTRs, paving the way for European adoption for the heavy-duty Euro VI Regulation.

Proposal to amend UN-ECE Regulation 83 to include New Particulate Procedures

The UK (as leader of the UN-ECE PMP group developing improved procedures for particulate measurement) has submitted an informal document of amendments to ECE Regulation 83 (light-duty vehicle emissions) for discussion in GRPE in January 2007. This document would introduce the revised mass and new particle number measurement procedures for new approvals as from 1 September 2009. The text does not contain any limit values for particle number

but requires the measurement to be made (at type approval and for conformity of production, but not for In Service Conformity) for diesel and direct injection petrol engined vehicles. The UK has also released a draft calibration procedure for the volatile particle remover (VPR) used in the PMP particle number measurement system.

UN-ECE Regulation 96 on Mobile Machinery and Tractor Emissions revised

Revision 1 of ECE Regulation 96 (Emissions from Compression Ignition engines for agricultural and forestry tractors and Non-Road Mobile Machinery) was published on 2 November 2006.

The regulation sets emissions limits for CO, HC, NO_x and PM emissions for engines from 18 to 560kW in four power bands. The limit values for the 8-mode test cycle, which are equivalent to EU stage II, are shown in the table below.

Power band	Net power (P) (kW)	Carbon monoxide (CO) (g/kWh)	Hydrocarbons (HC) (g/kWh)	Oxides of nitrogen (NO _x) (g/kWh)	Particulates (PT) (g/kWh)
E	130 ≤ P ≤ 560	3.5	1.0	6.0	0.2
F	75 ≤ P < 130	5.0	1.0	6.0	0.3
G	37 ≤ P < 75	5.0	1.3	7.0	0.4
D	18 ≤ P < 37	5.5	1.5	8.0	0.8

GENERAL

Update of World Bank Environmental Guidelines

The International Finance Corporation (IFC), which is the private sector arm of the World Bank, is currently undertaking a comprehensive review and update of their Environmental, Health and Safety (EHS) Guidelines. The update will be in the form of a General Guideline to cover cross-cutting issues applicable to a broad spectrum of industry sectors, and 62 individual industry sector guidelines.

The proposed general section includes guidance on control of emissions from point and fugitive sources, the former including small combustion sources. There are tables of applicable control technologies for PM, NO_x and SO₂. The section on land-based mobile sources recommends that operators with fleets of 120 or more units of heavy-duty vehicles (buses and trucks), or 540 or more light-duty vehicles (cars and light trucks) within an airshed, should consider additional ways to reduce potential impacts including replacing older vehicles with newer, more fuel efficient alternatives, converting high-use vehicles to cleaner fuels and installing and maintaining control devices, such as catalytic converters. There are specific sections on roads, railways, ports, airports and

shipping each of which include specific guidance on emissions control of mobile sources.

The draft guidelines are available at:

http://www.ifc.org/ifcext/policyreview.nsf/Content/EHSGuidelinesUpdate_Comments

Quantifying the Effect of Urban Air Pollution on Cancer

A new study¹ has reviewed the epidemiological evidence linking exposure to pollutants with a risk of cancer, and has provided a quantitative estimate of the cancer that pollutants may cause in Europe. The author considered a variety of non-occupational exposures including residence near major industrial emission sources, other outdoor exposure, asbestos, passive smoking, other sources of indoor air pollution, dioxins and electromagnetic fields.

The risk of lung cancer attributable to air pollution, in particular to PM_{2.5} has been estimated to be 10.7% in Europe. This figure corresponds to 1.9% of all cancers in men and 0.7% in women. The author calls for great caution when interpreting the available evidence, though, due to different uncertainties in the components of the quantifications. For example, it is unknown whether PM_{2.5} represents the measure of air pollution relevant to its carcinogenic potential. The figures should be considered indicators of the possible order of magnitude of the risk based on current knowledge. The results from this study highlight that air pollution continues to be a serious problem in Europe despite policy efforts.

¹ Paolo Boffetta, Human cancer from environmental pollutants: The epidemiological evidence; Mutation Research/Genetic Toxicology & Environmental Mutagenesis, 608(2): 157-162 (2006)

Health Effects of Traffic-Related Air Pollutants on Street Vendors

A study² in Thailand has evaluated the health effects of traffic-related air pollutants on street vendors. Data on the daily concentration of air pollutants and the daily percentage of respiratory and other health symptoms reported was collected over 61 days. An adjusted odds ratio was used to estimate the risk of developing respiratory and other adverse health symptoms for street vendors exposed to multiple air pollutants, fine particulate (PM_{2.5}), nitrogen dioxide (NO₂), ozone (O₃), carbon monoxide (CO) and total volatile organic chemicals (VOCs), after controlling for confounding factors. In the first model, significant associations were found for eye irritation and dizziness for PM_{2.5}. The adjusted odds ratio of total VOCs was 1.381 for phlegm, 4.840 for chest tightness and 1.429 for upper respiratory symptoms, and the adjusted odds ratio for CO was 1.748 for a sore throat and 1.880 for a cold and 1.655 for a cough. In the

second model, the effect of PM_{2.5}, total VOCs and CO gave a slightly lower effect with the symptoms. The authors say that the results clearly show the health effects of traffic-related air pollutants on street vendors.

² Kongtip et al, Health effects of metropolitan traffic-related air pollutants on street vendors; Atmospheric Environment, Volume 40, Issue 37, December 2006, Pages 7138-7145

Traffic-related Particulate Air Pollution Exposure in Urban Areas

Portuguese researchers at the University of Aveiro, and the Polytechnic Institute of Leiria are developing methodology for the determination of accumulated human exposure to particulate matter in urban areas. They have recently published³ a paper on work combining information on concentrations at different micro-environments with population time-activity pattern data. A link between a mesoscale meteorological and dispersion model and a local-scale air quality model was developed to define the boundary conditions for the local-scale application. The time-activity pattern of the population was derived from statistical information for different sub-population groups and linked to digital city maps. Finally, the hourly PM₁₀ concentrations for indoor and outdoor micro-environments were estimated for the Lisbon city centre, which was chosen as the case study, based on the local-scale air quality model application for a selected period. The results obtained reveal that in Lisbon city centre a large number of persons are exposed to PM levels exceeding the legislated limit value.

³ Borrego et al, Traffic-related particulate air pollution exposure in urban areas; Atmospheric Environment Volume 40, Issue 37, December 2006, Pages 7205-7214

Modelling of instantaneous Road Traffic Emissions

A new paper⁴ from the Flemish Institute for Technological Research in Mol, Belgium and the Institute for Transport Studies at the University of Leeds, UK, considers the effect of active speed management on traffic emissions. In particular, the traffic emissions caused by acceleration and deceleration of vehicles have been modelled based on an instantaneous emission model integrated with a microscopic traffic simulation model.

The emission model is based on empirical measurements which relate vehicle emissions to the type, the instantaneous speed and acceleration of the vehicle. The traffic model captures the second-by-second speed and acceleration of individual vehicles travelling in a road network based on their individual driving style, the vehicle mechanics, and their

interaction with other traffic and with traffic control in the network. The effect of new technologies to actively manage the driving speed of the vehicles is assessed to give an indication of the relative effectiveness of the different technological designs and different levels of driver responses. The results show that, while active speed management has effectively reduced the average speed of the traffic, it has had no significant impact on pollutant emissions because of the effect of frequent accelerations and decelerations.

⁴ Luc Int Panis et al, Modelling instantaneous traffic emission and the influence of traffic speed limits; Science of The Total Environment Vol. 371, Iss. 1-3, December 2006, Pages 270-285

Canadian Paper on Fine Particles

A paper from Environment Canada and Natural Resources Canada⁵ examines the fraction of fine particle organic carbon (OC) at a number of locations attributable to primary particles in exhaust.

Vehicle emissions and ambient particle concentrations under a variety of situations were studied in Toronto and Vancouver. Petroleum biomarkers were used to determine the fraction of fine particle organic carbon (OC) attributed to primary particles in exhaust. Source profiles obtained from a tunnel and from direct tailpipe emissions were applied to ambient measurements at locations ranging from rush hour traffic to a regional background site. The greatest amount of motor vehicle OC ($4.0\mu\text{gC}/\text{m}^3$ out of $9.1\mu\text{gC}/\text{m}^3$, or 43%), was observed 75 metres from a commuter highway during a period that included morning rush hour.

Monthly estimates of motor vehicle organic carbon were determined for a downtown Toronto monitoring site for 2 years. Total OC concentrations were greater in the summer, due to secondary OC, but the amount of motor vehicle OC did not exhibit a strong seasonal pattern. However, on a percentage basis, motor vehicle contributions to primary OC emissions were greatest in the winter (15–20%) and smallest in the summer (10–15%) with a two-year average of 14% of the OC or about 5% of the PM_{2.5}.

⁵ Brook et al; Investigation of the motor vehicle exhaust contribution to primary fine particle organic carbon in urban air; Atmospheric Environment Vol. 41, Issue 1, Jan. 2007, Pp 119-135

FORTHCOMING CONFERENCES

Symposium on International Automotive Technology (SIAT2007)

17-20 January 2007, Pune, India

Details at: <http://www.araiindia.com/html/SIAT2007.jsp>

Topics include engine and powertrain, emissions (Euro 3 and beyond), emissions inventory and ambient air quality, inspection and maintenance programmes and global harmonisation of standards.

SAE Fuels and Emissions Conference

23-25 January 2007, Cape Town, South Africa

Details at <http://www.sae.org/events/sfl/cfp.htm>

5th International CTI Forum Exhaust Systems

29-31 January 2007, Nürtingen, Germany

Details at www.abgastechnik-forum.com

The forum will cover exhaust aftertreatment for diesel engines and spark ignition, future emissions legislation, liquid and solid urea SCR-systems, diesel particulate filters, in-engine emissions reduction and particulate and soot measurement.

MinNOx - Minimization of NOx Emissions through Exhaust Aftertreatment

1-2 February 2007, Berlin, Germany

Details at

http://www.iav.de/eng/4_events/iav_conferences.php

A significant reduction in NOx emissions from light- and heavy-duty diesel engines will be mandatory as a result of upcoming emissions limits in Europe, the US and Japan. The conference committee calls for papers focused on SCR for passenger cars and heavy-duty, Lean NOx traps; Diagnostics and Simulation of DeNOx systems.

Clean Ships: Advanced Technology for Clean Air

7-9 February 2007, San Diego, California, USA

Details at <http://www.cleanshipsconference.com>

The goal of this conference is to encourage a positive dialogue among maritime industry executives and professionals and air quality, port, and other regulators about new technological strategies to meet clean air goals. It aims to help them understand the features and requirements of available and emerging emissions control technologies, current and upcoming regulations and port policies, and the environmental initiatives

8th International Congress on Engine Combustion Process

15-16 March 2007, Munich, Germany

Topics include HCCI, innovative engine combustion concepts, injection systems, alternative engine concepts, fuels and exhaust gas aftertreatment plus topics in modern experimental techniques and simulation.

Exhaust Emissions from Non-Road Mobile Machinery

15-16 March 2007, Essen, Germany

In the future, the applicable limits of exhaust emissions of internal combustion engines for use in mobile equipment within the EU will be further restricted. It is the goal of the conference that

representatives of the industry as well as legislators will have the opportunity to address their expression of the existing regulations and directives as well as the possibilities for their transposition.

Details at www.hdt-essen.de

International Conference on Transport and Environment: a global challenge, Technological and Policy Solutions

19-21 March 2007, Milan, Italy

First announcement of a conference that DG JRC and Regione Lombardia are jointly organising, on the issue of Transport and Environment and as a follow-up of the successful Euro 5 Conference, which took place in Milan in December 2003. Themes that will be treated relate to environmental impact of transport, such as the Euro 5 and Euro VI emissions standards for LD and HD vehicles, the new Directives on fuels and air quality standards, the biofuels promotion strategy.

6th International Conference on Urban Air Quality

27-29 March 2007, Limassol, Cyprus

Details at www.urbanairquality.org

Deadline for papers extended to 9 February 2007.

The conference is being organised by the University of Hertfordshire and the University of Cyprus jointly with ACCENT, COST 728, Cyprus International Institute for the Environment and Public Health in Association with Harvard School of Public Health.

VDA Technical Congress 2007

28-29 March 2007, Sindelfingen, Germany

The congress will deal with the topics of 'Environment and Energy' and 'Vehicle Safety & Electronics'.

FINE! Dust-free into the future: International Final Congress on the EU-LIFE-Environment Project KAPA GS

29-30 March 2007, Klagenfurt am Wörthersee, Austria

More info from <http://www.feinstaubfrei.at>

KAPA GS is a PM10 Action Programme co-financed by the EU. Initiatives to reduce particulate emissions at a local level are simulated in a computer model, tested on site and then adapted for permanent application. Measures that have been evaluated in the course of the project will be presented.

SAE 2007 World Congress

16-19 April 2007, Detroit, Michigan, USA

Details at

<http://www.sae.org/congress/techprogram/cfp.htm>

Additives 2007: Applications for Future Transport

17-19 April 2007, London, UK

Details at

<http://www.rsc.org/ConferencesAndEvents/RSCConferences/Additives2007/index.asp>

Targets for exhaust emissions, fuel economy and vehicle recyclability have to be accompanied by increased engine durability, extended lubricant drain intervals and improvements in vehicle performance and refinement. This conference will focus on the developments of fuel and lubricant additive technology in meeting these challenges.

DustConf 2007, How to improve air quality

23-24 April 2007, Maastricht, the Netherlands

The conference will address practical approaches to tackle emissions of particulate matter from industrial, agricultural and domestic stationary sources. DustConf 2007 focuses on reduction technologies and practical reduction policies and EU-directive implementation methods for stationary sources in industry and agriculture. The conference will primarily focus on PM10/2.5 or the respiratory aerosols. It will aim at providing information about practical approaches to tackle emissions of fine particles to improve local air quality.

28. Internationales Wiener Motorensymposium

26-27 April 2007, Vienna, Austria

World Refining Fuels Conference, Europe

8-10 May 2007, Brussels, Belgium

4th AVL International Commercial Powertrain Conference

9-10 May 2007, Graz, Austria

The conference programme includes a technical session on Exhaust Gas Aftertreatment.

EAEC 2007: 11th European Automotive Congress

30 May - 1 June 2007, Budapest, Hungary

Details at <http://www.diamond-congress.hu/eaec2007/>

The conference will include themes on powertrain technology, vehicle and laboratory procedures, homologation and regulation and harmonisation in Europe.

9th VDI International Forum Trucks and Buses: Solutions of Transport Efficiency, Reliability and Sustainable Environment

14-15 June 2007, Munich, Germany

Details at: www.vdi.de/trucks-buses

GPC 2007 World Powertrain Expo and Congress

17-19 June 2007, Berlin, Germany

Details at <http://www.gpc-icpem.org>

JSAE / SAE Fuels and Lubricants meeting

23-27 July 2007, Kyoto, Japan

Details at <http://www.jsae.or.jp/2007fl/>

Sessions are planned on combustion, emissions, fuels, lubricants, and measurements and testing.

14th Asia Pacific Automotive Engineering Conference

5-8 August 2007, Hollywood, California, USA

Areas will include powertrain technology, vehicle design and manufacturing, and transportation challenges in emerging markets.

11th ETH Particles Conference

12-15 August 2007, Zurich, Switzerland