

# Acid News



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EUROPE

## The situation laid bare

EVEN IF THE BEST available technology were applied at every emission source in Europe, acidification would still remain a serious problem in Poland, the Czech Republic, parts of Germany, and southern Norway. So it is said in a working paper that the European Commission presented to the EU environment ministers on December 18.

Of the acidifying fallout over the EU member countries, about three-quarters are reported to issue from within the Union. Only 11-12 per cent of the sulphur and nitrogen oxides comes in from countries outside, while 11-14 per cent comes from shipping in international trade plus undetermined sources. Considerable amounts of pollutants are on the other hand transported across national borders, although the pro-

portion of the resulting deposition varies, in the case of sulphur from 14 per cent in Great Britain to 93 per cent in Austria.

The burning of fossil fuels is the main cause of the emissions both of sulphur and nitrogen oxides in the European Union. Sixty per cent of the sulphur emissions comes from the burning of solid fuels (mostly coal), and 20 per cent from heavy fuel oils. When emissions are considered by sector, combustion plants overwhelmingly lead, being responsible for 87 per cent of all the sulphur emitted to the atmosphere in the Union. Sixty-three per cent of the nitrogen oxides comes from transportation (road 51 per cent, other modes 12 per cent), and 34 per cent from combustion plants. The third acidifying substance dealt with in

the report is ammonia, of which 94 per cent is traceable to agriculture.

Referring to the long term aim of the EU as regards acidification, as set down in its Fifth Environmental Action Programme – there should be no exceeding ever of critical loads and levels – the Commission notes that achievement will take time. In some areas with sensitive ecosystems the acid fallout is now 10, 20, and in one case as much as 60 times higher than the critical load – the limit of nature's ability to consistently neutralize the effect of pollutants.

While it is difficult in the case of ecosystems to estimate the effects of acidification in terms of money, there are areas where the costs can be estimated. The report quotes a recent study putting the cost of damage to

*Continued on page 4*

# Acid News

is a newsletter from the Swedish NGO Secretariat on Acid Rain, whose aim is to provide information on the subjects of acid rain and the acidification of the environment.

Anyone interested in these problems is invited to contact the secretariat. All requests for information or material will be dealt with to the best of our ability. Acid News is distributed free of charge.

In order to fulfill the purpose of Acid News, we need information from everywhere – so if you have read or heard about something that might be of general interest, please write or send a copy to:

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## THE SECRETARIAT

The Swedish NGO Secretariat on Acid Rain was formed in 1982 with a board now comprising one representative from each of the following organizations: Friends of the Earth Sweden, the Swedish Anglers' National Association, the Swedish Society for Nature Conservation, the Swedish Youth Association for Environmental Studies and Conservation, and the World Wide Fund for Nature Sweden.

The essential aim of the secretariat is to promote awareness of the problems associated with air pollution, and thus, in part as a result of public pressure, to bring about the required reduction of the emissions of air pollutants. The eventual aim is to have those emissions brought down to levels – the so-called critical loads – that the environment can tolerate without suffering damage.

In furtherance of these aims, the secretariat operates as follows, by

- Keeping under observation political trends and scientific developments.
- Acting as an information centre, primarily for European environmentalist organizations, but also for the media, authorities, and researchers.
- Producing and distributing information material.
- Supporting environmentalist bodies in other countries by various means, both financial and other, in their work towards common ends.
- Acting as coordinator of the international activities, including lobbying, of European environmentalist organizations, as for instance in connection with the meetings of the bodies responsible for international conventions, such as the United Nations Convention on Long Range Transboundary Air Pollution.
- Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.

## EDITORIAL

# Worse than we thought

SMALL PARTICLES can be lethal, and often are. Emissions from millions of exhaust pipes and chimneys lead, directly or indirectly, to concentrations that kill many and hurt the well-being of still more. Most at risk are asthmatics and others with respiratory troubles.

Although the precise relation between particles and health disturbances still remains to be established, it is quite evident that high concentrations do affect the incidence of disease and mortality (see p.10).

It is the very small particles that have the most serious effects. They can enter deep into the lungs, and are especially insidious because of their tendency to remain floating in the air over long periods – from a week to as much as a month. Consequently they can penetrate almost everywhere, so that people can be exposed to them continuously and even indoors. Concentrations can moreover pile up on windless days and during inversions.

Unfortunately the present ways of measuring particle levels fail to show the actual health risks – since they take all kinds of particles, large and small, in a single sweep. To concentrate on PM<sub>10</sub>, those with a diameter of less than 10 micrometres, as is being considered in Europe, would be an improvement but would not go far enough.

Meantime a report has come from within the US Environmental Protection Agency pinning down the very smallest particles (known as PM<sub>2.5</sub>, of less than 2.5 micrometres in diameter) as having the most adverse effects on health – naming premature mortality as well as increased morbidity in children and other sensitive groups.

The EPA points to the risk, if only PM<sub>10</sub> is measured, of action becoming concentrated on the larger, less dangerous, particles. It would therefore be advisable to also include limits for PM<sub>2.5</sub> in the new standards for air quality that are now being negotiated within the European Union.

Where controls will have to be applied, in order to bring down particle levels, will vary from place to place and from season to season. Danger-

ously high concentrations occur primarily in urban surroundings – with road vehicles and especially diesels as the main source, although notable additions can come from combustion in stationary plants.

There is also the considerable formation of secondary particles (aerosols), especially from sulphur dioxide, nitrogen oxides, and ammonia, which convert in the air to sulphuric acid, ammonium bisulphate, and nitric acid. Depending on weather, these last can take the form of small droplets or crystals, which can be carried away over long distances. High concentrations of ozone will also hasten the formation of aerosols, especially in summer.

The problem therefore need attacking on several fronts.

The reduction of primary emissions will require stricter control of particles from diesel-powered vehicles and other main sources.

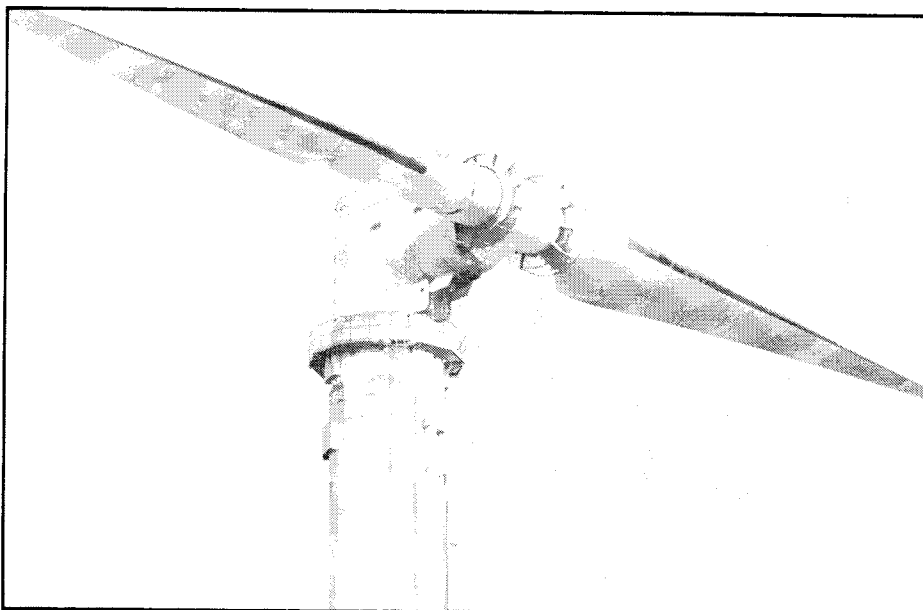
To deal with secondary formations there will have to be stricter requirements as regards emissions of sulphur dioxide and nitrogen oxides from combustion plants (the hundred worst offenders are responsible for almost half of the emissions of sulphur dioxide in Europe), as well as stricter controls on the emissions of nitrogen oxides from mobile sources, and measures to curb the emissions of ammonia from farming.

The requirements should aim at bringing about the results that can be achieved through the application of the best available technology, including switching of fuel.

The tightening of EU air-quality standards would bolster political support for measures to clear the air over our cities. Clean air is a right to be enjoyed by one and all.

Measures to lessen the formation of secondary particles would result in a healthier atmosphere in other respects, too, having many favourable effects such as less acidification, less eutrophication, and less forming of ground-level ozone.

PER ELVINGSON



WINDPOWER

## Now spreading worldwide

IN 1994 there was a net increase of 22 per cent in worldwide generating capacity for wind power. The addition of 660 megawatts represents a record for the industry. More than 25,000 wind turbines are now connected into ordinary power systems in various parts of the world.

The predominant actor in 1994 was Germany, with additions to capacity of about 300 megawatts. Another 100 MW were added in other parts of Europe, and several countries are preparing to follow in Germany's footsteps. Spain is planning to install 900 MW in its northwestern province of Galicia alone, with a likelihood of rapid growth generally during the next few years. Another European country with a large potential for wind energy is Greece, where recent policy changes also suggest rapid development. In Scotland and Wales the average cost of electricity from new wind projects is the equivalent of just 6 cent per kWh – which is less than from coal and on a par with gas.

In total wind generation Europe has probably now surpassed North America. In the United States the wind industry has been in the doldrums in the nineties. The chaos arising from restructuring of the nation's power industry had lessened the utility companies' interest in new technologies. Wind projects are nevertheless being developed in sev-

eral states. Some 2,600 megawatts of wind capacity have been identified by the Electric Power Research Institute as now being planned.

In India a wind boom started in 1994, when the government opened the power grid to independent developers and offered tax incentives for renewable energy. About 115 MW of capacity was then added, bringing the country's total to more than 180 MW, and another 100 MW should have been in place last year. India's total wind potential is estimated to be 20,000 to 50,000 MW.

Other countries where wind power is steadily gaining a foothold are Argentina, Bolivia, Brazil, Chile, Mexico, Morocco, Egypt, Indonesia, and China.

Source: **Vital signs 1995: The trends that are shaping our future.** Published annually by World Watch Institute, 1776 Massachusetts Ave. NW, Washington DC 20036, USA. Fax +1-202 296 7365.

### Correction

In the box on p. 15 of AN 4/95, right-hand column, the figure of 0.3 per cent represents the estimated cost of noise, not air pollution.

The figure for the estimated cost of local air pollution (lower down) should read 0.4 per cent, not 4.

We regret these oversights.

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Proposals put forward by the European Commission for limiting emissions from road vehicles in stages up to 2005, which are being attacked by industrialists as going too far, are regarded by environmentalists as too feeble.

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Improvements to health and ecosystems would result if more of the enormous quantities of freight transported across natural barriers, such as the Alps and the English Channel, was sent by combined road-rail.

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With the reduction of emissions from petrol driven vehicles, diesels are attracting more attention. Here are discussed possible developments in diesel-engine technology for meeting the expected emission requirements in coming years.

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As the effects of air pollution are becoming more widely known, steps are being taken to counteract them in new places. In Brazil the city of Sao Paulo has been trying to restrict car use, and networks to tackle urban transport in particular and air pollution generally have been started in the Far East.

### Full picture 15

A fact-packed report from the UN Economic Commission for Europe tells of compliance with the ECE protocols and developments within each country, as well as giving tables and maps showing where in Europe the emissions of air pollutants mostly occur.

## Situation...

*Continued from front page*

human health, buildings and materials, crops and forests throughout Europe, resulting from the emissions of just one big country (be it France, Germany, or Great Britain), within the range of 2.5 to 11.2 billion ecus per year.

Although the cost to health appears to be the most significant, the damage to buildings, materials, forests, and crops is also important to note. The estimates are said to be conservative, taking into account only sulphur dioxide and nitrogen oxides, and without investigating chemical interactions and assessing the role of ozone and particles. More comprehensive calculations for Europe as a whole are now being made.

As regards what is being done within the EU to reduce emissions, the report lists a number of directives that have either been issued or are in preparation – such as the Large Combustion Plants directive (presently being revised), the Framework Directive on Integrated Pollution Prevention Control (in draft), the proposal for a directive on the sulphur content of liquid fuels, the revision of emission standards for road vehicles and standards for fuel quality, a draft directive for emissions from non-road vehicles, and the Framework Directive on Ambient Air Quality Assessment and Management, where there will be sub-directives dealing with SO<sub>2</sub> and NO<sub>x</sub>.

In order to illustrate some future trends as regards acidification, the Commission has constructed three scenarios, each assuming a different degree of emission control (see box). Under that labelled “mild” sulphur emissions would be reduced by 60 per cent between 1990 and 2010, under “strict” by 70 per cent, and “BAT” by 90 per cent. During the same period the emissions of nitrogen oxides are assumed to fall by 33, 53 and 70 per cent, respectively. The BAT scenario, covering the whole of Europe, envisages a considerable reduction of the emissions from countries outside the Union.

The report then compares the changes in fallout, resulting from the assumptions of the three scenarios, with the critical loads. Here however the limits are set from the combined effect, both of sulphur and nitrogen, but since it is the first time

# Coordinating strategy

AT THEIR MEETING last December 18, the EU environment ministers instructed the Commission to produce, at latest by mid-1997, a coordinated strategy to deal with the problems of acidification – as a direct follow-up to the working paper presented by the Commission at that meeting. This is something that had previously been urged by Sweden in March.

In a statement from the meeting the ministers said the strategy should include but also go beyond measures that are already in the pipeline, in order to put the EU well on the way to achieving the goal of bringing the acid deposition down to the level of the critical loads. Among the further measures mentioned were tightened controls on the emissions of SO<sub>2</sub> and NO<sub>x</sub>, standards for ammonia, financial instruments, and means to promote structural changes.

Besides enjoining coordination with the work being carried out within the UN Economic Commission for Europe, the ministers asked for the setting of interim targets for stemming acidification. They also noted that “both effect and source-oriented approaches can serve as complements to arrive at an optimal policy mix for the development of cost-effective abatement strategies,” adding that the Commission should consider the effects of acidifying compounds in other respects as well, such as eutrophication and the creation of ground-level ozone.

The ministers were also insistent that the Commission should not halt work on the production of directives for curbing the emissions of acidifying pollutants while awaiting agreement on a coordinated overall strategy, but should proceed on them with all speed.

this has been done, the reported results must be regarded as preliminary.

The following are the main conclusions of the working paper:

- Existing and forthcoming EU legislation will reduce the emissions of acidifying compounds, and thus the deposition. But even with the strict scenario there will still be a significant part of Europe where depositions will exceed the critical loads, leaving ecosystems unprotected against damage from acidification.
- Emissions from within the Union are the dominant source of deposition in most parts of the EU where it exceeds the critical load.
- Although the problems of acidification are largely generated within the Union, coordinated action with other countries in Europe will probably be needed if depositions are to be brought down to the level of critical loads. It will also be essential to coordinate future EU strategies concerning acidification and tropospheric ozone with the work of the UN ECE.
- The fact that the costs tend to rise disproportionately as emission reductions increase points to the need

for cost-effective solutions. It will also be important to consider the interaction with other environmental phenomena, such as air quality, ground-level ozone, and climate change.

It also appears that if the ultimate goal of no exceeding of critical loads is to be attained, emissions will have to be reduced to a greater extent than proposed in the scenarios.

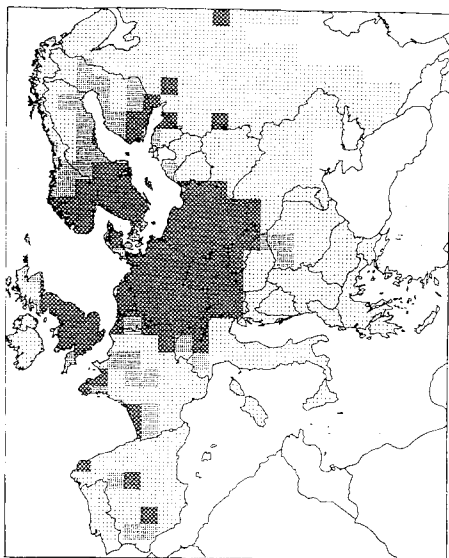
The Commission's report ends with a general discussion of possible approaches to the problem of acidification, yet without giving any specific proposals. Ways of reducing the emissions of ammonia are not even considered.

PER ELVINGSON

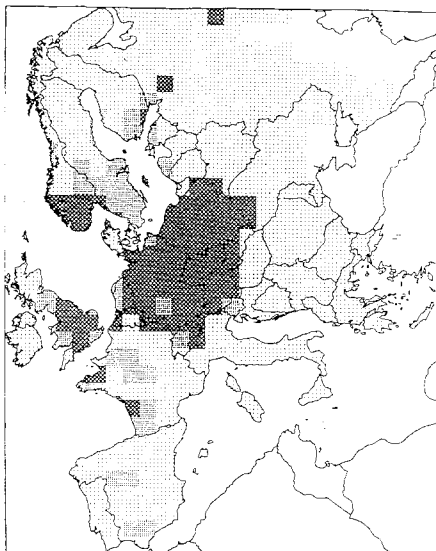
Note. In its report the Commission puts the annual cost of carrying out the measures of the three scenarios respectively at 16, 21, and 31 billion ecus, compared to no control of any sources. It notes however that the figures tend to be an overestimate, since the costs are based on add-on technologies, with no accounting for energy saving or fuel switching. Consequently the Commission has now called for tenders for a study analyzing least-cost solutions for meeting critical loads for acidification and critical limits for ground-level ozone.

Black squares show where less than 80 per cent of the ecosystems are safe (i.e. acidic depositions are less than the critical loads). In the grey squares 80-95 per cent of the ecosystems are protected, and in the lightest-shaded areas more than 95 per cent.

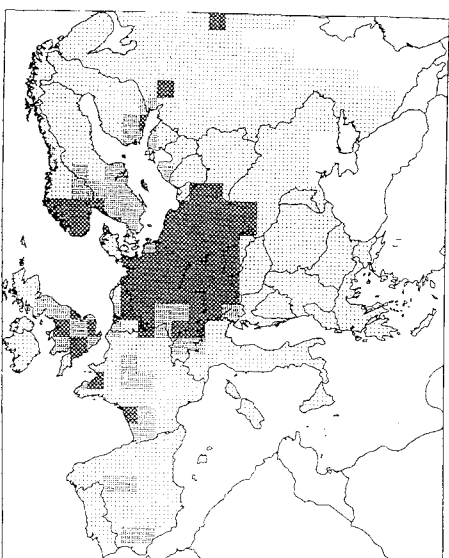
As in 1990.



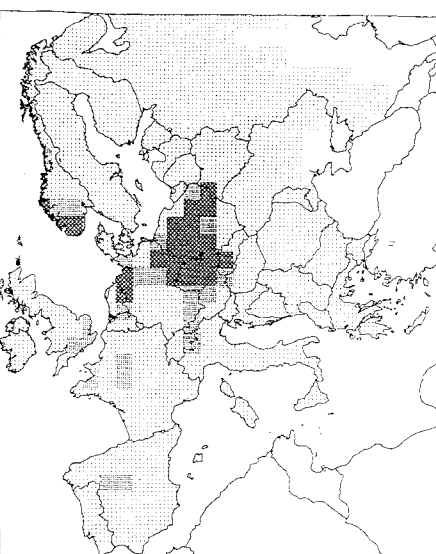
In 2010, "mild" scenario.



In 2010, "strict" scenario.



In 2010, with BAT.



## The three scenarios

**MILD.** Assumes that the existing LCP directive will still apply in 2010, that the proposed directive for non-road vehicles has been adopted, and that there will be a base package of vehicle-emission controls. If these measures would have resulted in greater emissions than some country has declared as its national target, the latter has applied.

**STRICT.** This adds the effects of a revised LCP directive, a strict package of further measures for vehicle emissions and fuel quality, and a strict revision of the directive on the sulphur content of liquid fuels (a limit of 1 per cent for the sulphur content of heavy fuel oil is assumed).

Here, too, when a country's announced target for the reduction of emissions is lower than would be achieved under the assumptions of the scenario, that target is what applies.

**BAT.** While based on official projections for energy pathway consumption, this scenario assumes a strict application of the currently best available technologies for emission control to all sources of emissions in all the countries of Europe. The best available technology is not meant to include structural changes such as energy conservation, fuel switching, or technological improvement.

## French windshift

It is intended that by the year 2010 France will have expanded its windpower capacity from the present 3.4 megawatt to something between 250 and 500 MW. The government will shortly be asking for tenders to that end, says Claude Mandil, director for energy at the department of industry, writing in the January number of the magazine *Systèmes Solaires*. The move appears to indicate a distinct change of attitude as regards energy policy in France, where nuclear power has hitherto claimed almost all attention.

*Ny Teknik*, No. 1-2, 1996.

## A matter of price

Speaking at a conference on solar cells at Nice last October, Wolfgang Palz, who is responsible for renewable energy at the European Commission's research directorate, claimed that a modern factory, with an annual production capacity of 100 megawatt, should be able to bring cell prices down by two thirds. The factory should be located in Europe, but produce mainly for the third world. At present solar electricity is 5-20 times more expensive than ordinary power, but Palz maintains that with a big factory it should be possible to produce cells at a price that would make it competitive.

World capacity of the solar cells produced in 1995 was 70 MW. According to the European trade association, Epia, output will rise to 100 MW in 1997, 200 MW in 2002, and 630 MW in 2010. In industrialized countries solar cells are mostly used to supply electricity in isolated places. But provided the cost of the cells can be brought down, the big market will be in the developing countries.

*Ny Teknik*, No. 48, 1995.

## Enormous savings

Russia's possibilities of saving energy are enormous. Close on 400 TWh electricity – up to 45 per cent of the country's consumption – could be saved if energy were used more effectively. Even if the saving were only a quarter as much, it would suffice to close down all the country's nuclear plants. One reason for the present overconsumption is that both households and industrial users pay at a fixed rate, irrespective of consumption. Alternations of prices and taxes, and making way for competition and foreign investment, are among the chief recommendation in a report from IEA, the International Energy Agency, from which the above figures have been taken.

*Natur&Miljö Bulletin*, December 1, 1995. The IEA report, *Energy Policies of the Russian Federation* (350 pp, 615 FF) can be obtained from the OECD Publications Service, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

# Proposals for future limits

IN DECEMBER the industry and environment directorates of the European Commission at last unveiled their plans for EU limits on emissions from vehicles and for fuel quality standards. It is said however that there is still considerable disagreement on these matters within the Commission.

The Commission's proposals are a result of two years of collaborating with the automobile manufacturers and the oil companies in the so-called auto-oil program, focusing particularly on urban air quality. Nitrogen oxides came to be singled out as the chief form of pollutant needing attention. The program also comprised extensive tests of engines and fuels, aimed at finding the most cost-effective packages of measures.

The following is the essence of the draft proposals that have now been put before the experts of each member state.

□ Emission limits for passenger cars as shown in the table. Uncertainty is greatest about the values for 2005.

□ To encourage early application of the standards for 2000 and 2005 for cars, member states should be allowed to grant fiscal incentives but not to set their own intermediate limit values.

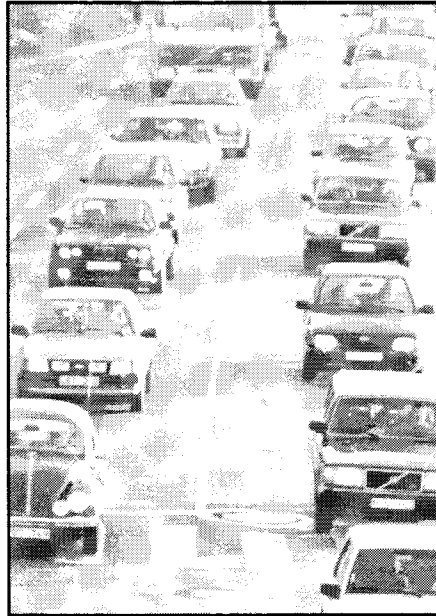
□ Detailed provisions are to be developed for the recall of car models that do not keep within the as-new emission limits for 80,000 kilometres.

□ As from 2000 the emission limits for light commercial vehicles should be lowered by 40 per cent for nitrogen oxides and hydrocarbons, and 30 per cent for carbon monoxide. For heavy vehicles the lowering should be 50 per cent for nitrogen oxides and particles. Standards for the year 2005 are to be proposed for both these types of vehicle.

□ Lowering the maximum benzene content of petrol from the present 5 per cent to 2 per cent. (In practice this will mean very little, since the average is now around 2.3 per cent.) The maximum for aromatic hydrocarbons should be 37 per cent, as against 40 per cent today. Also proposed is a lowering of the limits for sulphur in petrol and diesel.

The draft immediately came in for

heavy criticism from representatives of the automobile and oil industries, who are complaining that the Commission is going beyond the most cost-effective measures that have been identified in the the auto-oil



program – a view also shared by the Commission's own economic affairs directorate.

Responding, the industry and environment directorates point out that although the auto-oil program indeed focused mainly on NO<sub>x</sub>, particles and volatile organic compounds had to be considered too. The emissions of VOCs need to be curbed, on the one hand because of their effects on health, and on the other because they contribute to the formation of

ground-level ozone, which is causing ever greater problems all over Europe.

While the draft is being attacked by industrialists as going too far, it is thought too feeble by environmentalist and similar groups. Six environmentalist, consumer, and public health associations have pointed in a joint statement to the enormous health problems that road traffic is causing. They demand standards that will be equivalent to the highest international ones for all cars sold in the EU by 2005, as well as fiscal incentives, legally based, to force the introduction of cleaner vehicles and fuels.

After the Commission has reached internal agreement on a draft directive, which can hardly be earlier than February, it will have to be discussed and passed by both the Council of Ministers and the European Parliament. Considering all the differences of opinion, there will be little time in which to arrive at standards that are intended to apply from 2000.

PER ELVINGSON

Main source: **Environment Watch: Western Europe**, December 15, 1995.

Note. The six associations mentioned above have joined in organizing The European Clean Air Campaign. They are the Euro Citizen Action Service (ECAS), European Environmental Bureau (EEB), European Federation for Transport and Environment (T&E), European Public Health Alliance (EPHA), and Confederation of Family Organizations in the European Community (COFACE).

**Draft passenger-car emission limits (grams/km).**

Stage	1996/97	2000	2005	
<b>Petrol driven</b>				
CO	2.7	2.3	1.0	
HC	0.341	0.20	0.10	
NO <sub>x</sub>	0.252	0.15	0.08	
<b>Diesels</b>				
			<i>Option 1</i>	<i>Option 2</i>
CO	1.06	0.64	0.53	0.50
HC+NO <sub>x</sub>	0.71	0.50	0.39	0.05 (HC only)
NO <sub>x</sub>	0.566	0.37/0.45	0.28	0.15
Particles	0.08	0.05	0.04	0.025

Note. The 1996/97 values (which have already been decided) have been adjusted to take into account a planned change in the test cycle. In future the measurement of emissions will start as soon as the engine is switched on, not after a 40-second warm-up period.

## Pricing the external costs of transport

THE EUROPEAN Commission's green paper, *Towards fair and efficient pricing in transport*, released on December 20, has been voted by T&E, the European Federation for Transport and Environment, "an excellent piece of work and a major step forward in the political discussions."

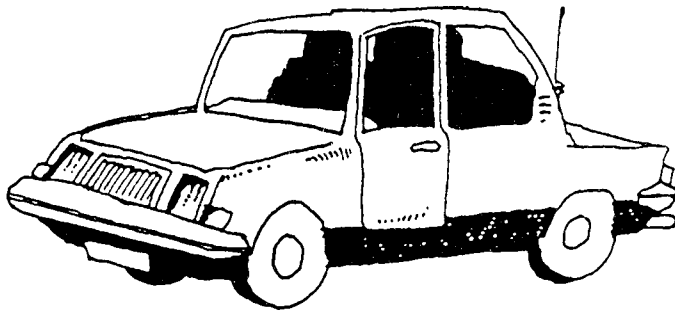
Although the green paper is essentially a discussion document, many of its recommendations coincide with conclusions drawn by T&E itself from its own probings.

Saying its aim is "not to raise taxes but to use charges to curb congestion, accidents, and pollution," the green paper favours a tax system with rates varied according to vehicle mileage. It says it is not important to calculate the exact level of the externalities, since the direction and magnitude of the required changes are mostly known. This is a view that is also expressed in the T&E report on external costs,\* which was published in the same week as the Commission's green paper.

The Federation notes however some omissions in the green paper, of which the most outstanding concerns the emissions of carbon dioxide. Although the EU is committed to stabilizing such emissions, it is not likely to do so, mainly because it fails to take account of the growth in traffic. The ideal solution would be a fuel tax, according to T&E, which also insists that fuel taxes could be a useful instrument pending the development of a sophisticated pricing system, which may take up to ten years or more.

Also seen by T&E to be missing in the green paper is the distortion of competition resulting from tax incentives for company cars and long-distance commuting by car.

\* **Lessons learned – two years after Getting the Prices Right.** 22 pp. BF 200. Available from T&E, Rue de la Victoire 26, 1060 Brussels, Belgium. Fax +32-2 537 73 94.



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## Separate strategy for carbon dioxide

AFTER SEVERAL YEARS of internal disagreement, the European Commission has at last been able to propose a strategy\* for reducing the emissions of carbon dioxide from cars. The ultimate aim is said to be to ensure that the average fuel consumption of the cars on sale in 2005 will be 5 litres per 100 kilometres from petrol-driven vehicles and 4.5 litres for diesels (which in both cases would mean emitting 120 grams of carbon dioxide per kilometre).

The Commission does however admit that the time schedule is rather tight. The current average rates of fuel consumption for new cars in the EU member states ranges from 6.4 litres per 100 kilometres in France to 8.4 litres in Sweden.

The Commission's proposals are essentially as follows:

- Voluntary agreements between the Commission and the carmakers, with the latter undertaking to meet specific requirements. In the communication it says an average 25-per-cent reduction of CO<sub>2</sub> emissions from new cars by 2005 (compared with 1990) would be a reasonable basis for agreement. It would be up to the industry itself to work out how much improvement each producer would have to make to ensure that sector as a whole would reach the agreed target.
- The development of an EU framework for national tax incentives to promote energy-efficient cars, following a review of the national systems for vehicle taxation.
- The introduction of a system for

labelling cars according to their fuel consumption.

It is also said that it will be necessary to increase fuel prices so that lower rates of consumption will not encourage people to use their cars more. But the idea is not an official part of the proposed strategy.

Avoidance of a clear line as to the tax instruments that should be preferred is said to be one of the main reasons why the Commission has finally been able to agree on a proposal. While it has been praised by T&E, the European Federation for Transport and Environment, the manufacturers' association has expressed doubts as to the possibility of achieving a 25-per-cent reduction in the time given.

The communication will now have to be considered by the Council of Ministers and the European Parliament. It is however only one of several EU initiatives that may, directly or indirectly, affect the emissions of carbon dioxide from cars. At their meeting on December 20 the commissioners also approved a paper intended to start a debate on ways to internalize the external social and environmental costs of transportation. A possible rise in the minimum EU rates for excise duties on mineral oils could also add pressure to the demand for greater fuel economy.

Source: **Environment Watch: Western Europe**, December 29, 1995.

\*COM (95)689. A Community strategy to reduce CO<sub>2</sub> emissions from passenger cars and improve fuel economy.

## Recent publications

### **The Emerging International Regime for Climate Change: Structures and Options After Berlin (1995)**

Edited by M. Grubb and D. Anderson. Report of a workshop held at the Royal Institute of International Affairs, June 1995.

Distributed by the Brookings Institution, 1775 Massachusetts Avenue NW, Washington DC 20036-2188, USA.

### **Implementing the European CO<sub>2</sub> Commitment: A Joint Policy Proposal (1994)**

Published by the Royal Institute of International Affairs. An examination of the dilemmas facing the climate change policy of the European Union. It argues that the development of a coherent strategy to ensure attainment of the EU stabilization target could both benefit Europe and lay a good foundation for global efforts.

Distributed by the Brookings Institution, address as above.

### **Climate Change and Biodiversity Conservation (1995)**

By A. Markham. A résumé of the feared effects of climate change on natural ecosystems all over the world.

22 pp. Available in English, French, Spanish, and German from WWF International, Avenue du Mont-Blanc, CH-1196 Gland, Switzerland.

### **Climate Change (1995)**

Describes earth's climate, how we humans affect it, and the threats to which we and the natural ecosystems will be exposed if the climate changes. Includes examples of climate-friendly policies and technologies in various countries.

50 pp. Can be ordered from WWF International, address as above.

### **Policy Instruments in the Borderland of Traffic and Environmental Policy (1995)**

By Gunnar Eriksson. A study discussing strategies for the design of policy instruments in the traffic and environment field.

56 pp. Published by the Department of Infrastructure and Planning, Royal Institute of Technology, S-100 44 Stockholm, Sweden.

### **Atmospheric deposition (1995)**

By J.W. Erisman and G.P.J. Draaijers. Deals with Dutch research on the deposition of air pollutants that cause acidification and eutrophication.

442 pp. 275.00 guilders. Obtainable from Elsevier Science, P.O. Box 211, 1000 AE Amsterdam, Netherlands.

## FREIGHT

# Combined transport urged

THE VOLUME of freight transported through the Alps by road-rail combination could be increased to 40 per cent, and that between Scandinavia and continental Europe to nearly 30 per cent, according to a study recently published by T&E, the European Federation for Transport and Environment.

The study was confined to the main natural barriers – primarily the Alps, but also the southern Baltic, the English Channel, the Pyrenees, and the Carpatian Mountains – where there are some of the worst bottlenecks to the movement of freight. The enormous truck traffic across these barriers is having severe effects on health and vulnerable ecosystems. But its very volume also means that there is a considerable potential for shifting a large part of this freight carrying to combined transport – by rail most of the way, by road only at each end.

Romain Molitor, coordinator of research for the study, comments: "The paradox is that the dense traffic that causes the problems also provides the opportunity for diminishing them."

Bringing about a shift from pure road to combined transport will require both political and technical

measures. Among the structural measures advocated in the study's report are the introduction of liner trains and the gradual conversion of the present terminal system to one with both large and small automatic, decentralized, lower-priced terminals.

On the political side, since there is no indication as yet that external costs will be internalized in any near future, change could be hastened by local or regional measures such as transit permits, as in the Austrian ecopoint system, and/or transit charges.

If a large proportion of long-distance freight were forced to go by train through congested or environmentally vulnerable areas, many transport customers might, it is suggested, choose to let their shipments go most of the whole way by train.

Enforcing the use of combined transport at geographical barriers might thus have the secondary effect of arousing a general demand for such transport, leading eventually to a pan-European network for it.

**Combined transport – Ways towards a European network.** T&E 95/11. Can be obtained from the T&E Secretariat, Rue de la Victoire 26, 1060 Brussels, Belgium. Fax +32-2 537 7394.

## EU PROGRAM

# Traffic to the fore

THE EUROPEAN UNION needs an accelerated environmental policy if it is to meet its environmental targets and make substantial progress towards sustainable development, says the European Environment Agency in a review of the EU's fifth environmental action program, *Towards Sustainability*, adopted in 1993. It also says that future policy should focus especially on transportation.

Among the areas where present EU policy is proving inadequate, the agency draws attention particularly to acidification and the emissions of carbon dioxide. Of the former it warns that targets will continue to be widely exceeded, and as regards carbon dioxide: "Current measures are insufficient to prevent a further increase in CO<sub>2</sub> emissions after 2000 as a result of

expected growth of production, consumption, and transport."

Traffic related issues are brought forward for a special comment – the reason being that environmental pressures from this sector are showing a steady increase, with a near doubling of road freight and a 50-per-cent increase in travel by car forecast for 1990-2010. Noting that the contribution of road traffic to urban air pollution and climate change is increasing, the EEA warns that this is offsetting gains in other sectors.

**Environment in the European Union 1995. Report of the review of the Fifth Environmental Action Program.** Ecu 25.00. Available from the Office for Official Publications of the European Communities, 2985 Luxembourg.



# Scientists now more sure



IT NOW APPEARS from the 1995 Second Assessment Report of the UN Intergovernmental Panel on Climate Change (IPCC), adopted at the meeting in Rome on December 11-15, that human activities *are* contributing to the rise in average global temperatures.

When they made their first report in 1990 the IPCC scientists felt unable to assert conclusively that such activities were having an effect on climate. But now in their synthesis report from Rome they say that "the balance of evidence, from changes in geographical, seasonal, and vertical patterns of atmospheric temperature, suggests a discernible human influence on global climate."

The Rome meeting had reports from three of the Panel's working groups to consider. The scientific group's report told of advances in the ability to distinguish between anthropogenic effects on the climate and natural variations. Statistical analyses of temperature data over the last hundred years show that "the observed warming trend is unlikely to be entirely natural in origin."

Another difference since 1990 is that the effect of aerosols is now being taken into account in climate modelling. Aerosols, consisting mainly of sulphate particles can, by reflecting back the incoming sunlight, act to slow down global warming. So

the conclusion of this working group is now that by 2100 the average global temperature will have increased by 1 to 3.5 C, and the sea level risen by between 0.15 and 0.95 metre.

A second group, which has been looking into the probable effects of

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*Warming trend unlikely  
to be entirely  
natural in origin*

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climate change, finds among other things that global warming will result in an impoverishment of biodiversity and an increased likelihood of coastal flooding. Adverse effects can also be expected on forest growth, especially in the boreal regions, as well as on water supplies. Although agricultural production can probably be maintained worldwide, there are likely to be considerable regional changes.

The third working group had considered the social and economic aspects of climate change. Summarizing, it reported that in most countries there were "significant 'no-regrets' opportunities" (measures whose benefits to society equal or outweigh their costs) and that "the precautionary principle provides rationale for actions beyond no regrets."

The group also maintained that worldwide gains of 10-30 per cent in energy efficiency could be made at little or no net cost, and that still further improvements in energy efficiency were possible in the long run.

Observers at the Rome meeting reported that two of the oil-producing countries, Saudi-Arabia and Kuwait, did all they could to get the synthesis report watered down. Their aim was to get such passages excised as could be translated into demands for reductions in emissions of greenhouse gases. The fact that the IPCC has finally decided that human actions are playing a part in climate change is expected to have an effect on work within the UN Framework Convention on Climate Change. In March the IPCC will be presenting its conclusions to the Ad Hoc Group on the Berlin Mandate, the body responsible for negotiating a protocol under the convention.

PER ELVINGSON

Source: **Environment Watch: Western Europe**, December 15 and 29, 1995.

The full Second Assessment Report will be published by Cambridge University Press early in 1996. The synthesis report and summaries of the working group reports are available from the IPCC Secretariat, WMO, C.P. 2300, 1211 Geneva 2, Switzerland. Fax +41-22 733 1270. The same material can also be found on the internet at <http://www.unep.ch/IPCC/IPCC95.html>.

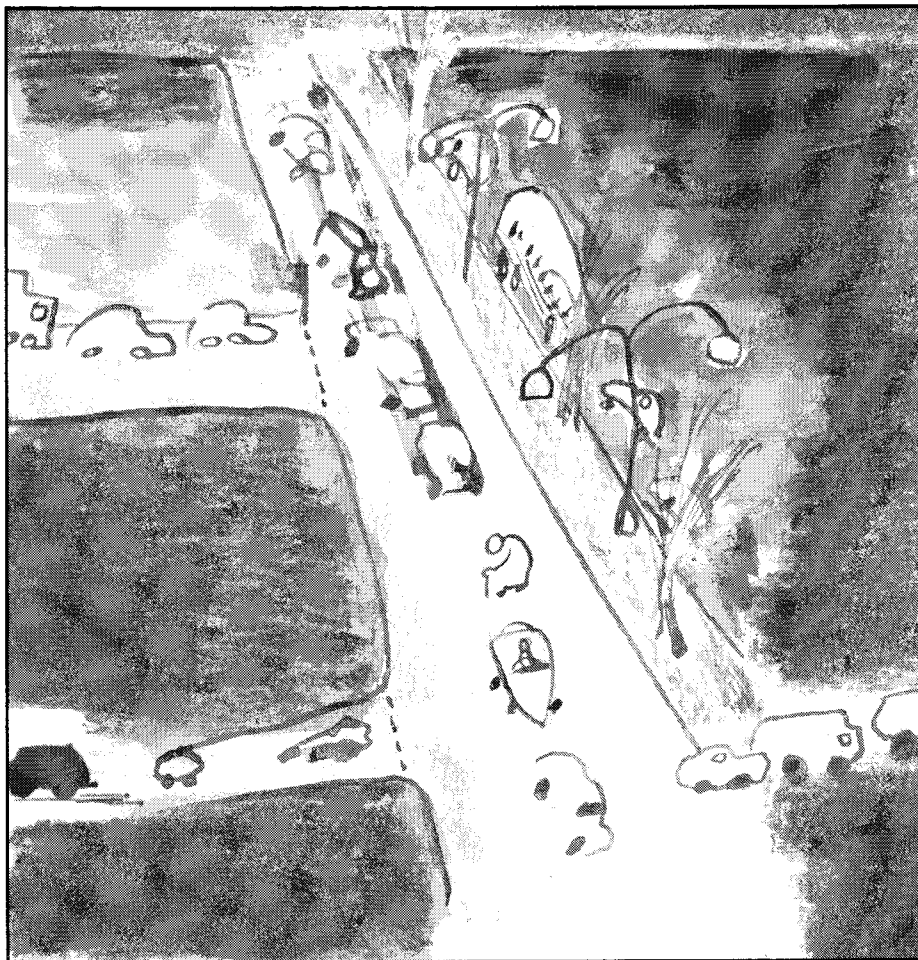
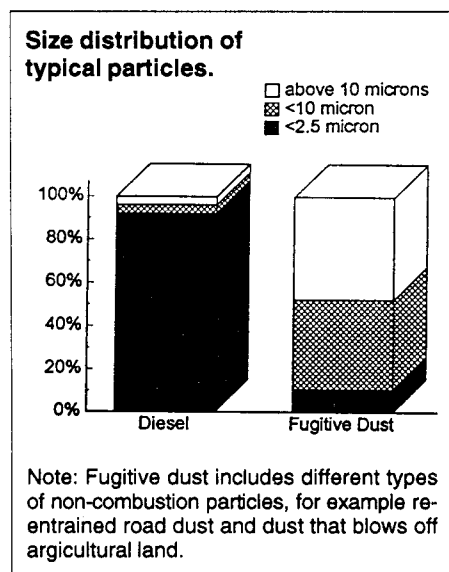
## Smallest are said to be worst

WHILE IN EUROPE attention is centring on stricter standards for PM<sub>10</sub>, in the United States the Environmental Protection Agency is urging control of PM<sub>2.5</sub> – particles of less than 2.5 micrometres diameter.

In a staff report last November the agency said it was the very smallest particles that had the worst effects on health. While advocating retention of the present annual limits for PM<sub>10</sub>, it proposes the setting up of standards for PM<sub>2.5</sub> as well. It suggests a 24-hour value within the range of 25-85  $\mu\text{g}/\text{m}^3$ , and 15-30  $\mu\text{g}/\text{m}^3$  for the annual average. In each case the upper limit is said to represent “a clear level of concern with no margin of safety,” whereas the lower one stands for a level under which there will not, according to available data, be any likelihood of increased health risks, although the possibility of some effects cannot be dismissed.

The report is part of the ongoing revision of the National Ambient Air Quality Standards for particles. Homing in on the smallest particles is likely to result in greater attention being given to diesel exhausts – where by far the greater part of the particles fall within the smallest size range.

Source: *Car Lines*, M.P. Walsh. November 1995.



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BRITAIN

## New standards likely

A SUBJECT THAT HAS particularly commanded attention of late, in the debate of air quality, has been small particles and their effects on health. The British government has now, in response to two specialist reports, held out a promise of strict emission standards as well as other measures to restrict the emissions of PM<sub>10</sub> – particles of less than 10 micrometres in diameter.

Both reports were presented in November. That from the Department of Environment's Expert Panel on Air Quality Standards (EPAQS) puts forward 50 micrograms per cubic metre of air ( $\mu\text{g}/\text{m}^3$ ), in a running 24-hour average, as a PM<sub>10</sub>-level that is “unlikely to affect the health of the very great majority of people,” although it also notes that at 50  $\mu\text{g}/\text{m}^3$  “it is likely that health consequences on a population scale would still be detectable.”

The other, from the Department of Health's Committee on the Medical Effects of Air Pollutants (COMEAP),

says that the death rate rises by 1 per cent per day when there is an increase of 10  $\mu\text{g}/\text{m}^3$  of PM<sub>10</sub> in the air. It says that people with respiratory diseases and cardiac disorders are most at risk from particulate pollution, and adds that there does not seem to be any safe level for PM<sub>10</sub>. It urges measures aimed at a general lowering of particulate levels, and warns against relying solely on those that would avoid any exceeding of the 50  $\mu\text{g}/\text{m}^3$  limit.

In its response, the government says that the 50  $\mu\text{g}/\text{m}^3$  limit is “a relevant benchmark for policy,” and that the possibility should be considered of adopting that level, as soon as possible, as a target for policy in line with the Air Quality Strategy that is now being prepared under the Environment Act. While it would give priority to reducing summer and winter peak levels, it will also be aiming at a general reduction of particles in the air.

If adopted, the new standard

would give Britain the toughest regulations for particles in the European Union. The current EU limit for particles in general is  $150 \mu\text{g}/\text{m}^3$  over a 24-hour period. A working group is however to present a proposal for new limit values at the latest in December, with tighter standards as the most probable result.

The foremost means of cutting down peak levels in winter (the time of year when they are highest) will be to reduce emissions from road vehicles. High summer contents of particles in the air are due mainly to secondary formation from emissions, among other things of sulphur dioxide, of which there are sources all over Europe.

From an inventory of emission sources of primary particles in Great Britain, commissioned by EPAQS, it appears that about a quarter of the total can be traced to road traffic. It seems however from another investigation that in greater London in 1990 as much as 86 per cent of the primary emissions came from motor vehicles.

Although the emissions of particles from road traffic will, according to official estimate, become halved in Britain during the next ten years, as a result of measures already taken, that is not considered enough. The government says it will be taking "early action to reduce emissions from vehicles in urban centres." It seems such action will focus on the powers of traffic management and vehicle inspection conferred on local authorities under the Environment Act 1995, and on continuing trials with alternative fuels and vehicle technologies.

The volume of emissions of particles in Great Britain will also depend on the regulations for vehicles and fuels that will apply in the EU after the year 2000 ( see p. 6). Road traffic is in any case not the only source, and according to the British government tightened rules are likely for other sources, too, such as manufacturing industry, quarrying, and domestic coal burning.

Source: **ENDS Report** 250, November 1995. See also AN 5/95, p. 16.

COMEAP: **Non-biological particles and health.** £18.00. EPAQS: **Particles.** £6.75. Both available from the HMSO, P.O. Box 276, London, England SW8 5DT. Fax +44 171 873 8200.

USA

## Emissions cuts may come too late

PHASE I of the Clean Air Act Amendments of 1990 has now been completed and allowance trading in sulphur dioxide emissions is well under way, and the impact and adequacy of the EPA's innovative Acid Rain Program are now being evaluated by industry representatives, government officials, and environmental watchdogs alike.

The EPA has touted the program as a model of effectiveness as a means of environmental protection. By the end of March 1995, the agency points out, over 19 million emissions allowances had been privately traded by utilities, brokers, fuel suppliers, and environmental groups. All the 110 utility units under Phase I have been equipped with continuous emissions monitoring systems, and over the next several months more than 2000 Phase II units will come on line. The program's cost has moreover decreased each time it has been analyzed: early this year, the U.S. General Accounting Office estimated that the allowance trading system could save as much as \$3 billion per year, or 50 per cent, over more traditional command-and-control programs. The tangible result, claims the EPA, is a documented decline in  $\text{SO}_2$  emissions from Phase I units – from 9.3 million tons in 1985 to 7 million tons by the end of 1994.

At individual Phase I plants throughout the United States, emissions have been reduced – sometimes drastically – and utilities have praised the EPA initiative for providing a feasible method of compliance. The utility giant Virginia Power, for example, recently fitted its largest coal-fired plant with a limestone scrubber, which, in addition to capturing 94 per cent of its  $\text{SO}_2$  emissions, also produces readily usable gypsum material for wallboard as a byproduct. "The good thing about the Clean Air Act," claims the senior vice-president of corporate services at the company, "is that it is going to clean up the air, but allows you to do it in a cost-effective manner."

Amidst this good news, however, there are signs that the targeted reductions of the Acid Rain Program

may not suffice. The gradual decline in  $\text{SO}_2$  emissions and the still aspirational cuts in  $\text{NO}_x$  may come too late for many American ecosystems that are still reeling from decades of uncontrolled acidification. Especially in the most sensitive areas of new England and the mid-Atlantic states, numerous forests, streams, and lakes continue to suffer from chronic acid deposition and have lately shown little improvement.

The EPA's Acid Deposition Standard Feasibility Study, mandated by the Clean Air Act Amendments (CAAA) and released last year, cautioned that lowering the levels of acidity in surface waters of the Adirondack mountains "may require reducing anthropogenic depositions of sulphur and nitrogen by 40-50 per cent or more below the levels achieved by the CAAA." Clean Air Act target levels may or may not be adequate for ecosystems in the Appalachian mountains, the report continued, depending upon the rate of nitrogen saturation in the region's surface water.

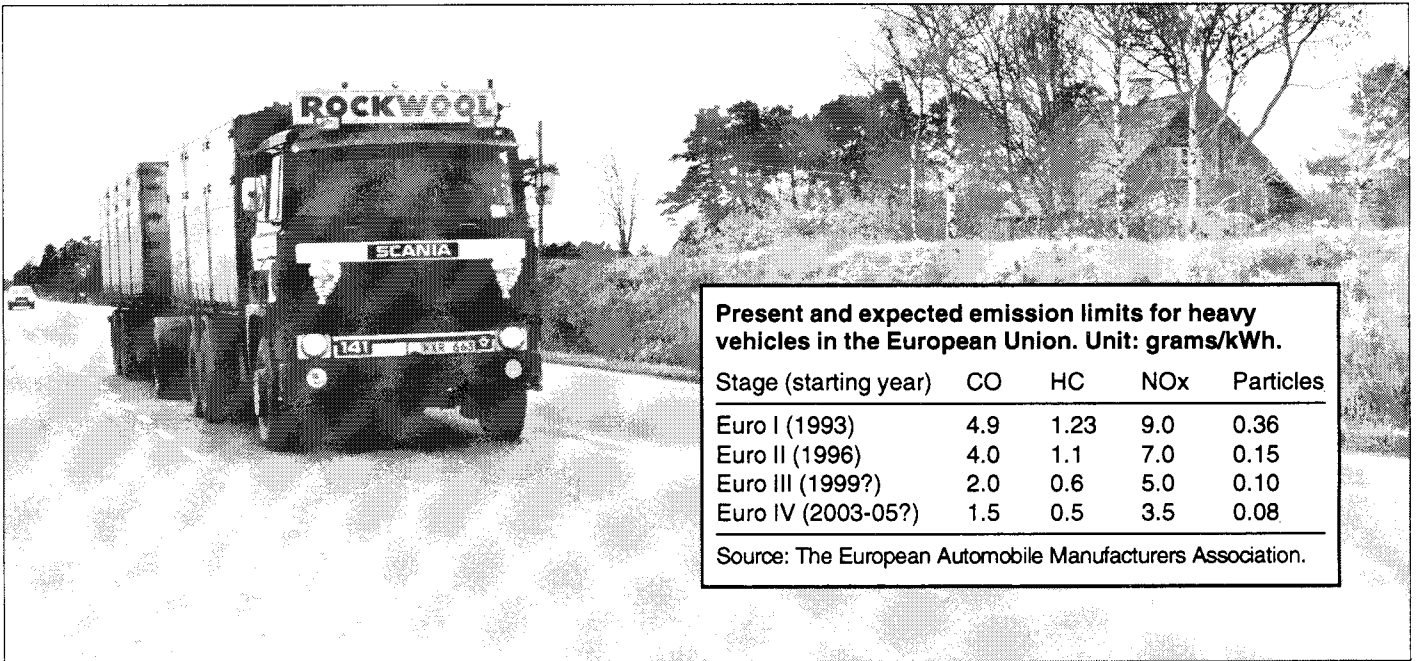
Even more troubling than chronic deposition in these areas is however episodic deposition – sometimes called "acid shock" – produced when pulses of acidic water enter lakes and streams during stormwater runoff and spring snowmelt. A recent analysis in the Adirondacks indicated that a severe high-water episode would acidify more than three times the number of streams and lakes than are chronically acidic today. Because episodes of high water often occur during biologically sensitive periods, such as fish spawning and reproduction, the threat to ecosystems is especially great.

The most potentially threatening development in North America may however be the current political climate in the United States. Since the Republican party gained control of both houses of the American legislature in January 1995, new environmental initiatives have been derailed and older regulations reassessed.

DAVID A. O'NEIL

Pacific Environment and Resources Center, Sausalito, California.

# Ways to meet requirements



Present and expected emission limits for heavy vehicles in the European Union. Unit: grams/kWh.

Stage (starting year)	CO	HC	NO <sub>x</sub>	Particles
Euro I (1993)	4.9	1.23	9.0	0.36
Euro II (1996)	4.0	1.1	7.0	0.15
Euro III (1999?)	2.0	0.6	5.0	0.10
Euro IV (2003-05?)	1.5	0.5	3.5	0.08

Source: The European Automobile Manufacturers Association.

© ANDRÉ MASIENNIKOV

AS THE EMISSIONS of pollutants such as nitrogen oxides from petrol-driven cars diminish, as a result of using catalyzers, the relative share from diesels is becoming all the greater.

Since they operate with a much greater quantity of air, in relation to fuel, than petrol engines, diesels emit relatively small amounts of carbon monoxide (CO) and hydrocarbons (HC), and so the makers have had no difficulty in meeting the prescribed limits for these substances. But nitrogen oxides are another matter.

The table shows the current EU limits for heavy vehicles (Euro I) and those (Euro II) that are scheduled to come into force next October. It also gives an indication of the emission limits that might be expected in the coming decade.

It should be noted that Euro I has already involved considerable reductions. It has not, however, covered small diesel engines (less than 85 kW). The Euro II requirements will apply generally for heavy vehicles sold within the European Union – except that the particle requirements for lighter ones, 3.5 to 7 tons, will be easier during a transition period.

Turbo-charged engines in any case meet the present requirements as regards hydrocarbons and carbon monoxide, and with the addition of an intercooler there is a good chance of their being able to meet those of

Euro II as well. With oxidizing catalyzers the emissions of HC and CO can be reduced still further, and those of substances such as aromatic hydrocarbons, including the carcinogenic benzene, likewise reduced.

All the big European makers of heavy vehicles can already supply at least one engine model that meets the Euro II requirements, and the Netherlands, Sweden, and Germany

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### *Important that fuel should have a low sulphur content*

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are using tax incentives to hasten the introduction of Euro II types of vehicle before the standards come into force.

Reducing the emissions of nitrogen oxides and particulates beyond what is required in Euro II will on the other hand call for more advanced technology. High-pressure injection, electronically controlled fuel pumps, exhaust-gas recirculation (EGR), and further increases in engine efficiency are among the solutions now being considered.

It may be necessary, if the Euro IV requirements for NO<sub>x</sub> are to be met, to abandon the traditional diesel en-

gine in favour of one operating on the principle of the Otto cycle and fitted with a three-way catalyzer (see box). The fuel might be natural gas, bio-gas, or LPG. Gas-driven trucks and buses that meet the requirements of Euro IV are already in operation in several parts of the world. Another way to achieve relatively low emissions of NO<sub>x</sub> might be to use alcohol.

It is however also possible that the makers of big diesel engines may find solutions that will give the traditional type an extended life. It is generally agreed that its potentialities are far from exhausted. It might for instance be fitted with a so-called de-NO<sub>x</sub> catalyzer using some form of zeolite, which would reduce the nitrogen oxides to nitrogen gas with the aid of the hydrocarbons.

Further, selective catalytic reduction (SCR) may have become developed to the extent that it can be applied in heavy road vehicles. By this method, in which the nitrogen oxides are reduced to nitrogen gas through the injection of ammonia, NO<sub>x</sub> emissions can be cut down by more than 90 per cent. At present it is being used primarily in stationary plant and in a few cases in ships.

There are also various ways of bringing down the emissions of particulates. Combustion techniques can be improved, and switches made to



© VOLVO

## The know-how is there

If heavy diesel vehicles should still be emitting great quantities of air pollutants, it is not from lack of technological know-how in the part of the makers – as Volvo demonstrated last autumn when it unwrapped a new type of truck and bus. Both vehicles were hybrids, driven by a combination of gas turbine, batteries, and an electric motor.

Running on the batteries alone the truck could go 25 kilometres without recharging, while the bus managed 5 kilometres in urban conditions. There would be no limit to the distance both can go when the turbine is used to drive the vehicle through the electric motor, while at the same time charging the batteries.

Although in principle the turbine can run on any kind of liquid or gaseous fuel, Volvo has chosen ethanol made from renewable sources – said by the company to result in the emissions of 0.5 g/kWh of nitrogen oxides, which is only a tenth of what the best ordinary diesels can attain. The emissions of particulates are also very low, 0.05 g/kWh. Fuel consumption is kept down by the special tires, with extra-low rolling resistance, that Volvo has developed.

These vehicles are not intended for commercial production, but only to test possible ways of meeting the strict exhaust standards that can be expected in the 2000s.

Teknik i Tiden, No. 3, 1995.

## More time needed

There will, after all, not have to be any zero-emission vehicles on the roads in California by 1998. At the end of last year an independent commission found that although research was well advanced, saleable cars could not be marketed until some time later. The chief stumbling block is still the batteries. The original ruling from 1990, by which at least 2 per cent of the seven largest carmakers' sales in 1998 was to have been zero-emission vehicles, has therefore had to be annulled. The requirement calling for at least 10 per cent ZEVs by 2003 nevertheless remains. In 2003 the requirement will moreover apply to all carmakers, not just the seven largest.

New Scientist, January 6, 1996.

cleaner fuels. Vehicles can also be equipped with particle traps or filters. The cost of a filter alone (if retrofitted) is 30-40,000 Swedish kronor (3,400-4,600 ecus), while that of a combination of particle filter and an oxidizing catalyzer (which will reduce the emissions of HC and CO) may be 40,000 kronor. Trials with such equipment are now being carried out.

With the possible exception of NO<sub>x</sub>, the emissions from vehicles leaving the factory ten years from now seem likely to be very low, amounting in most cases to no more than 10-15 per cent of the Euro I values.

There are however other problems, one being that the emissions of CO, HC, and particulates can be affected by driving habits and the degree of engine maintenance. According to an OECD report, the emissions from badly maintained diesels may be 10-15 times greater than from vehicles with properly serviced engines.

Poor manufacturing control also results in considerable differences in the quality of individual vehicles. With better quality control during manufacturing, and continuous post-factory control (including random wayside checks) it should be possible to rectify this state of affairs.

But there is too a need to impose a requirement on the manufacturers to guarantee the functioning of the exhaust-cleaning equipment in prin-

ciple throughout the life of the vehicle. While rules to this end are now mandatory at least in the United States and Sweden, they are absent in the EU legislation.

Yet another way of reducing the emissions from heavy vehicles, especially of particulates and the most deleterious HC compounds, is to use cleaner fuels. Most important is that they should have a low sulphur content, which besides hindering the formation of particles is a prerequisite for proper functioning of the catalyzer. When Euro II comes into force, the EU will in any case be lowering the maximum permissible content of sulphur in diesel fuel from the present 0.2 per cent to 0.05 per cent.

In Sweden, as a result of a system of fuel classification, extremely low-sulphur diesel has captured a large slice of the market – though largely because the extra cost of producing the cleaner fuel has been covered by a government subsidy. Since that cost is relatively high, it might actually be more cost effective to pay for fitting all vehicles with catalyzers and particle traps. But without waiting for any such help several Swedish bus companies have already equipped their vehicles with oxidizing catalyzers.

PER KÅGESON

The writer is chairman of the European Federation for Transport and Environment, T&E.

## Diesels and petrol engines compared

All petrol-driven cars have Otto-cycle engines, working with a controlled mixture of fuel and air. The exhaust gases contain, besides carbon dioxide and water, which are the remains of combustion, nitrogen oxides which are always formed when air is heated, uncombusted hydrocarbons and carbon monoxide. With a three-way catalyzer in the exhaust pipe the carbon monoxide and the hydrocarbons can be burned (oxidized, take up oxygen) and the nitrogen oxides reduced (release oxygen). The former are converted into carbon dioxide and water, while the nitrogen oxides turn into nitrogen gas. A catalyzer in good trim can capture up to about 90 per cent of the pollutants NO<sub>x</sub>, HC, and CO. There will be less cleaning effect however at cold starts (i.e. before the exhaust gases have become warmed up), during sudden acceleration, and when the catalyzer is ageing.

Heavy vehicles almost always have diesel engines. They are more reliable, have a better performance, and get more out of the fuel than Otto engines. Their high air-fuel ratio ensures effective combustion. The emissions of carbon monoxide and hydrocarbons – more or less unburnt fuel – are therefore small. Those hydrocarbons that are emitted are however highly noxious. The large amounts of oxygen in diesel exhausts make it difficult to bring about chemical reduction of nitrogen oxides to nitrogen gas. To do so would require the addition of a reducing agent. With an oxidizing catalyzer it is possible however to burn the hydrocarbons and carbon monoxide in the exhaust gases.

Diesel vehicles emit more particulates than petrol-driven ones, mainly because of the greater amounts of pollutants, including sulphur, in the fuel.

## Relieving pollution in Sao Paulo

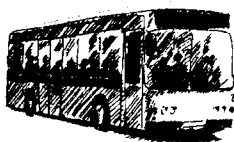
THE AIR IN SAO PAULO has been dirty for some time. Now it is known to be deadly too. According to studies conducted at the University of Sao Paulo Medical School, there is a direct correlation between heightened air pollution and increased mortality rates in certain population groups.

A lung-disease specialist, Paulo Saldiva, found that when pollution levels were high, the mortality rate for children under five increased by 15 per cent. On those days, too, the rate for adults over sixty-five went up by 12 per cent. Saldiva noted that while persons with existing ailments were likely to suffer more by pollution than others, income level was also a factor, since medical care is less available to people in the lower income groups.

Early in 1995 the Brazilian department of the environment attempted to alleviate air pollution by restricting the use of cars on certain days, depending on whether they had odd or even numbers on their licence plates. Although there was no compulsion, according to the department pollution fell by 30 to 40 per cent on days when restriction was asked – thereby avoiding the state of emergency that would have had to be declared if levels of carbon monoxide had exceeded 40 ppm (parts per million). It is now intended that the policy shall become law, with fines for violation.

Restricting the use of cars has however revealed another problem: there is not enough public transport. Buses and subway trains are already overcrowded, so if the system is to be able to handle the massive increase in travel that will result if the restrictions on car use should be successful, heavy investments will be needed in public transportation.

Source: *Car Lines*. M.P. Walsh. November 1995.



## Attacking air pollution

LAST AUGUST representatives of environmental NGOs in North East Asia met for five days in the South Korean capital of Seoul to form the Atmospheric Action Network East Asia (AANE), which will concern itself with the problems of air pollution, including the greenhouse effect. The aim of this network will be to build up and support NGOs in the region, stimulate cross-border cooperation and encourage the exchange of information and experience, and act to influence international developments and policies.

Attending the first meeting were representatives of NGOs from China, Hong Kong, Japan, Mongolia, the Russian Far East, and Taiwan, as well as South Korea. East Asia being such a heterogeneous region, both in the economic and political sense, it was useful as well as interesting to hear what the various representatives had to say about their particular air

pollution problems and the way their organizations were trying to work up opinion for dealing with them.

Hosts at Seoul were the Citizens' Coalition for Economic Justice, the Korean Federation for Environmental Movement, and Green Korea. Assisting in the planning for the network were also two Japanese organizations, and the next meeting of the network is scheduled to take place in Japan, at Osaka, in March.

**MIKAEL JOHANNESSON**

Mikael Johannesson, a member of the board of the Swedish NGO Secretariat on Acid Rain, was invited to Seoul to give an account of the secretariat's experience as coordinator of environmental action in Europe concerning acidification and climate change. For more information please contact Atmospheric Action Network East Asia, c/o Citizens' Coalition for Economic Justice, 25-1 Chongro 5-Ga, Chongro-Gu, Seoul, Korea 110-125. Tel. +82-2-741-7961-5. Fax 745-8006, 765-9861.

## ...and traffic congestion

RAPID ECONOMIC EXPANSION in many Asiatic countries has brought a great increase in the number of cars and other road vehicles. Since the population density of Asian cities is on an average three times greater than in Europe, this development is causing huge problems in the way of congestion and air pollution.

At a meeting in Malaysia last September an association for attacking these problems was formed, called Sustran-AP – Sustainable Transport

Action Network, Asia-Pacific. It will publish a periodical newsletter, reporting on promising solutions wherever in the region they may be found.

The meeting in Malaysia was organized by AP 2000, a Far East initiative of the UN development program.

For information apply: Sustran-AP, Anwar Fazal, AP 2000, P.O. Box 12544, 50782 Kuala Lumpur, Malaysia. E-mail: tkpb@barter.pc.my.

### Attention: Action days!

Trans European Networks (TENs) is the name of an EU scheme for 140 road-building projects as well as various rail extensions, terminals for combined road-rail transport, airport expansions, etc. (see AN 4/95, pp. 10-11). Many parts of this gigantic investment plan, of which the total cost is estimated to be 400-500 billion ecus over the next fifteen years, are being opposed by environmentalist organizations.

Action Day March 30 will give all local groups the opportunity for launching a common manifestation. The coordinating body will be ASEED (Action for Solidarity, Equality, Environment, and Development) Europe, which can offer ideas and information material, arrange contacts, and provide financial support for promising types of action.

ASEED Europe will also be acting as a coordinator for the Fourth Annual Climate Action Day on May 15.

Information from: ASEED Europe, P.O. Box 92066, 1090 AB Amsterdam, Netherlands. Fax +31-20 6650166. E-mail: aseedeur@antenna.nl.

## Further publications

### Acid Rain Research: Do We Have Enough Answers? (1995)

Edited by G.J. Heij and J.W. Erisman. Proceedings from a conference held in 1994, summarizing research on acidification in the Netherlands 1985-1994.

504 pp. 290.00 gulden. Published by Elsevier Science, P.O. Box 211, 1000 AE Amsterdam, Netherlands.

### Acid Reign '95?

Summary statement from the fifth international conference on acidic deposition in Göteborg, June 1995.

15 pp. Published by Kluwer Academic Publishers. Available from IVL, Box 47086, S-402 58 Göteborg, Sweden.

### Acidification in the Black Triangle Region

Edited by J. Cerny and T. Paces. Report from the excursion that preceded the above conference describes the state of the environment in the region as well as giving an account of the current local research. 98 pp. Can be ordered from IVL, address as above.

### Environmental Resources on the Internet (1995)

By M. Flood and J. Button. Explains what kind of environmental material is now becoming available on the Internet and discusses how it can best be accessed and used.

27 pp. £10.00 (free to environmental NGOs, teachers, journalists, and other bona fide individuals in Central and Eastern Europe and developing countries). Published by Powerful Information, 21 Church Lane, Loughton, Milton Keynes, England MK5 8AS. Tel/fax +44-1908 666275.

### Hazardous Air Pollutants (1995)

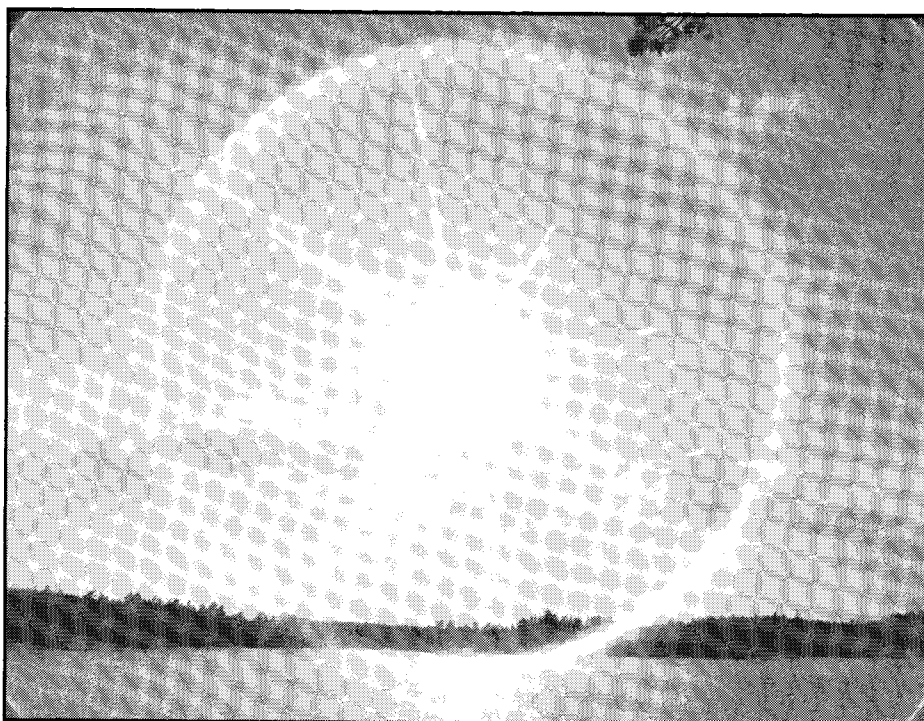
Proceedings from a workshop in London, where representatives from fifteen OECD countries met to assess existing control strategies and future options for a comprehensive approach. Of the more than 3000 substances now polluting urban air, to date in most countries only a handful have been subject to regulation.

Available from OECD Publications Service, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

### Renewable Energy Strategies for Europe – Foundation and Context (1995)

First report in a series examining in detail the renewable energy sector.

218 pp. £12.50. Published by the Royal Institute of International Affairs, Chatham House, 10 St James Square, London, England SW1Y 4LE.



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UN ECE REPORT

# Progress in abatement of emissions

WHAT ARE THE COUNTRIES of Europe and North America doing to reduce their emissions of sulphur, nitrogen oxides, ammonia and volatile organic compounds? Are current strategies giving the desired results?

Answers to such questions can be found in a fact-packed report from the UN Economic Commission for Europe (UN ECE). It reveals, for instance, as regards observance of the various protocols under the UN ECE Convention on Long Range Transboundary Air Pollution, that all the countries that signed the first one for sulphur have met the commitment to reduce their emissions by 30 per cent between 1980 and 1993. It seems, too, that most countries will fulfill the requirement of the nitrogen oxides protocol – although it only meant not allowing emissions in 1994 to exceed their 1987 levels. See AN 5/95 for details.

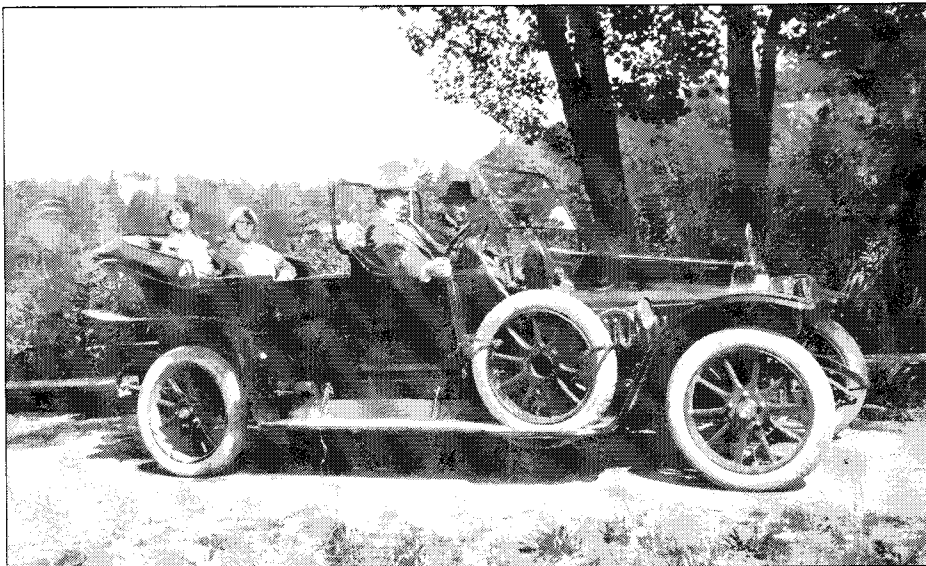
The report includes, besides a general description of the work under the convention, an account of developments in each member country – as regards the strategies employed, aims, legislation, use of economic instruments, etc. There is also information about countries from which it has usually been scarce, such as

Ukraine, Belarus, and Romania.

A special section deals with bilateral agreements in the ECE region, an example being the memorandum signed 1993 by Romania and Bulgaria concerning the technical reconstruction of major stationary sources of air pollution along the Danube. Many instances are also cited of western aid to countries in central and eastern Europe – such as the provision by the German government of finance for networks to measure air pollution in Budapest and Sofia.

Still more information is provided in the form of tables reporting each country's emissions according to source, its consumption of energy, projections of emissions assuming various scenarios up to 2010, as well as standards for emissions and air quality. There are also maps showing where in Europe the emissions of air pollutants occur, and the critical loads in different parts of the continent for sulphur and acidity.

**Strategies and policies for air pollution abatement – the 1994 major review prepared under the Convention on Long Range Transboundary Air Pollution (1995).** 138 pp. US\$33.00. ECE/EB.AIR/44. Available from United Nations, Sales Section, CH-1211 Geneva, Switzerland.



## CAR USE

# Short trips increasing

TRAVEL BY CAR has increased by 40 per cent since 1973. But only a third of the trips are for taking people to work – the greatest increase has been for more private purposes, involving frequent short trips.

The same trend can be seen everywhere, with social travel, such as driving to visit friends and relations, showing the greatest increase. Cars are also being used much more for shopping trips than they were twenty years ago. This is of course largely due to the arrival of out-of-town shopping centres, causing less patronizing of local tradesmen.

Although in general women are still using cars less than men, there is very little difference in this respect between men and women in the younger age groups. It may thus be assumed that the next generation of women will be driving just as much as the men, with a consequent increase in traffic.

“Since car use is intimately connected with people’s lifestyles, great effort will be needed to bring about a change,” comments Lee Schipper, member of a group studying international energy problems at the Lawrence Berkeley Laboratory in California. The research project he is

heading, entitled *The Future of the Automobile in an Environmentally Constrained World*, has been comparing developments as regards car use since the first energy crisis twenty years ago, in countries such as the United States, Germany, Britain, the Netherlands, Norway, Denmark, and Sweden.

“Our project will contribute to an understanding of structural changes in car driving,” says Lee Schipper, adding that this is something that has tended to be underestimated in attempts to size up the future effects of cars on the environment. Previous prognostications have mostly taken into account only the effects of improved engine efficiency and other technical advances.

The great number of short trips that has now been noted means that engines are being run cold much more often than has previously been assumed (the average trip is no longer than 13 kilometres). The emissions from cold starts are far worse than those from driving with a warm engine – a fact that has so far been widely underestimated.

Source: KFB Kommuniké. No. 2, 1995.

## Coming events

**EU Council of Environment Ministers.**  
Brussels, Belgium, March 4-5, 1996.

**Fourth European Conference on Solar Architecture and Urban Planning.**  
Berlin, Germany, March 25-29, 1996.

*Inquiries:* A. Baubin, European Commission, DG XII, 200 rue de la Loi, 1049 Brussels, Belgium.

**Action Day against Trans-European Networks.** March 30, 1996.

See page 14 for details!

**Regional Conference on Joint Implementation: Countries in Transition.**  
Prague, Czech Republic, April 17-19, 1996.

*Inquiries:* SEVEN, P.O. Box 39, Slezka 7, 120 56 Prague 2, Czech Rep. Fax +42 2 2424 7597.

**Natural Gas Vehicles at the Crossroads: Growing the Market.** Basel, Switzerland, May 8-10, 1996.

*Inquiries:* European Gas Vehicle Association, Spaklerweg 28, 1096 BA Amsterdam, the Netherlands. Fax +31 20 597 3000.

**Climate Action Day.** May 15, 1996.  
See p. 14 for details!

**European Union Wind Energy Conference and Exhibition.** Gothenburg, Sweden, May 20-24, 1996.

*Inquiries:* WIP, Sylvansteinstr. 2, 81369 Munich, Germany. Fax +49 89 720 1291.

**EU Council of Environment Ministers.**  
Luxembourg, June 25-26, 1996.

**Ninth European Bioenergy Conference.**  
Copenhagen, Denmark, June 24-27, 1996.

Conference and technology exhibition.  
*Inquiries:* DIS Congress Service Copenhagen A/S, Herlev Ringvej 2C, 2730 Herlev, Denmark. Fax +45-44 92 5050.

**Second Conference of the Parties to the Framework Convention on Climate Change.** Geneva, Switzerland, July 8-19, 1996.