

# Acid News



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## EU EXPANSION

# Study of the possible effects

THE USE OF ENERGY diminished by more than 30 per cent in the countries of Central and Eastern Europe (CEE)<sup>1</sup> between 1990 and 1994, and by about 20 per cent in the ten so-called accession countries<sup>2</sup> seeking entry to the European Union. Emissions of sulphur dioxide and nitrogen oxides dropped in consequence. The future emissions of acidifying, eutrophying, and ozone-forming air pollutants will depend not only on the extent of energy use, but also on the composition of the various emission sources, and the measures, technical or otherwise, that are taken to control their emissions.

The International Institute for Applied System Analysis, IIASA, has made a study<sup>3</sup> of the possible environ-

mental effects resulting from economic and social developments in the countries of central and eastern Europe, together with a parallel one to outline what may happen in the ten accession countries as they make moves to become members of the EU.

The IIASA went to work by building up various scenarios, with a reference one based on projections of economic growth and energy use derived from official statistics supplied by the various countries to the UN Economic Commission for Europe. An energy scenario developed by the EU Commission's energy directorate was taken over for the EU countries (called the "conventional wisdom scenario", this is the one used for the EU acidification strategy). Both scenarios go

as far as 2010. In both cases the results must be regarded as exaggerations. Those for the EU scenario, for instance, show an increase of about 10 per cent in CO<sub>2</sub> emissions between 1990 and 2010.

Further, two alternative scenarios were worked out for the CEE countries, both based on the assumption that they would gradually approach the levels for energy intensity and consumer activity that are typical for the EU countries. The one assumed "full convergence" and the other "half-way convergence" to those levels – the latter being considered the more realistic. A number of variants of all these scenarios were also tested. In general it may be said that develop-

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# 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:

**The Swedish NGO Secretariat on Acid Rain**  
Box 7005, S-402 31 Göteborg, Sweden

Telephone: +46-(0)31-10 55 90

Telefax: +46-(0)31-711 46 20

Editor: Christer Ågren

E-mail: christer.agren@snf.se

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## THE SECRETARIAT

The Swedish NGO Secretariat on Acid Rain was formed in 1982. It has a board 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 Convention on Long Range Transboundary Air Pollution.
- ☐ Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.

# Hitching a ride

THAT FOREST FUNGI can consume rock is a discovery recently made by a team of Dutch and Swedish scientists when studying the weathering of minerals in the soil of coniferous forests of northern Europe.

Here is an effect of mycorrhiza, the symbiotic association between a fungus and a higher plant, in this case a conifer, where the hyphae of the fungus help the tree to take up water and mineral substances from the soil, and receive in exchange carbohydrates (sugar) from the tree.

It was found, from a study of the mineral particles under an electron scanning microscope, that the hyphae could disintegrate and force their way into the particles and thus take up mineral nutrients such as calcium, potassium, and magnesium directly from the rock. It had previously been thought that they could only do it from the soil water.

If this is really so, it may help to explain why forests growing on acidified soil can stay alive and continue to grow. In any case it emphasizes the importance of fungi for the proper functioning of a forest ecosystem. Previous research has shown the species that give rise to mycorrhiza to be especially sensitive to increased doses of nitrogen. Several are also sensitive to acidification.

Research and monitoring of the environment are of fundamental importance – not only for increasing our understanding of the world we live in, but also for keeping a watch on known problems and revealing new ones. They can moreover have a decisive influence on political decisions that are intended to remedy environmental aberrances.

Research and monitoring of the environmental problems associated with air pollution have long been coordinated under the Convention on Long Range Transboundary Air Pollution. There is a so-called effects program under the leadership of a special working group, and a few countries have voluntarily undertaken to attend to the coordination of five International Cooperative Programmes (ICPs) that are dealing with the effects on forests, fresh-

waters, materials, farm crops and herbs, the monitoring of ecosystems, and mapping of critical loads.

There seems to be general agreement on the injustice of letting a handful of countries bear the whole cost of an activity that is so fundamental to effectiveness of the convention – especially as it is to the advantage, directly or indirectly, of almost all. Attempts have therefore been made for several years to devise some means by which the costs could be distributed equitably among the parties to the convention.

The total annual cost of coordination of these five research programs – which in themselves involve research costing tens of millions of dollars – has been put at US\$1.4 million. Despite its relative modesty – especially in view of the fact that it would be shared among some forty countries – in December it once again proved impossible for the executive body of the convention (see p.11) to agree on the necessary financing. France, Germany, Italy, and Russia were among the countries refusing to give support to any proposal.

It will be necessary to have the financing in place not only for the work within the convention, but also for that of integrated assessment modelling which is being carried out by IIASA, the International Institute for Applied Systems Analysis.

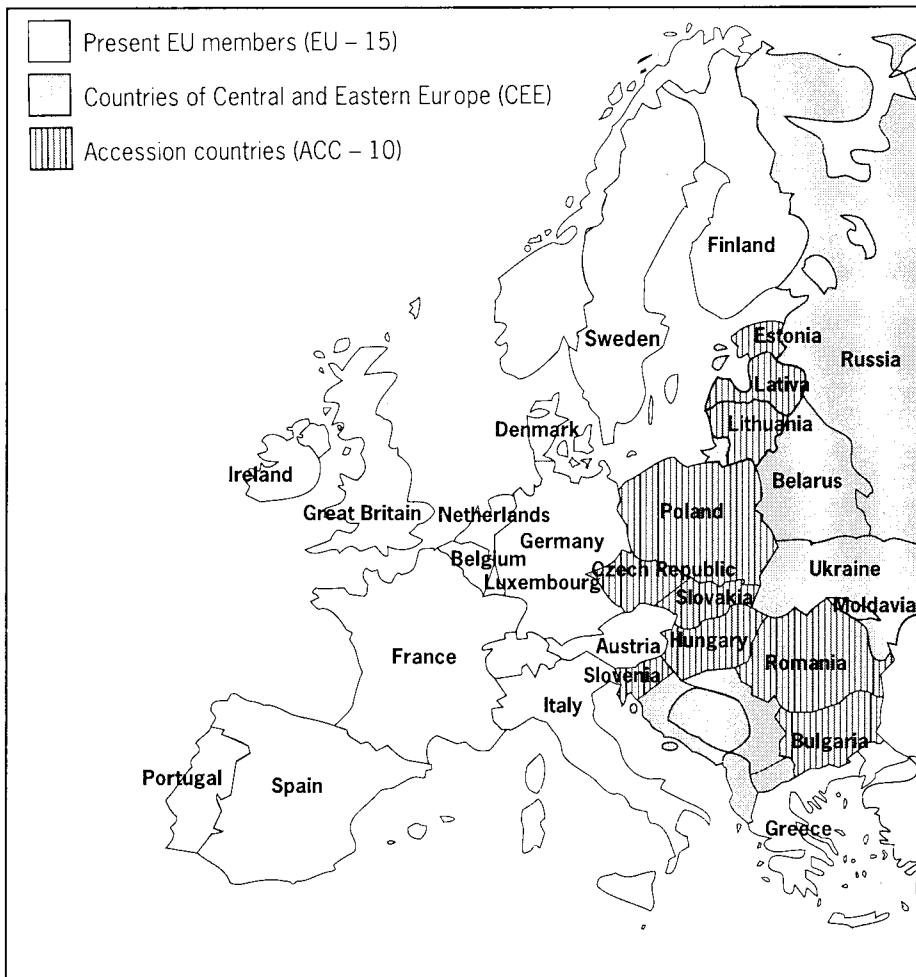
It has in fact been the convention's effects research and IIASA's computer modelling that have enabled cost-efficient international agreements to be reached for lowering emissions. The modern strategies employed here have brought forth smart solutions which have saved quite a few billions of dollars – on account both of their cost-efficiency and avoidance of damage that air pollution would otherwise have caused.

It is shameful that some countries should now be blocking agreements that are vital for the progress of the convention's work. While they have no objection to harvesting its fruits, they seem unwilling to do anything to make those fruits possible.

CHRISTER ÅGREN

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MAP: SVEN TORESSON



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Despite appearances on paper, the actual reductions that were undertaken by the industrialized nations at Kyoto will be exceedingly modest.

## Integrated strategy 5

While stressing the need for a coherent EU strategy to combat acidification, tropospheric ozone, and eutrophication, the environment ministers also emphasize the importance of getting the countries of central and eastern Europe involved in EU efforts to reduce emissions.

## Large combustion plants 6

Surprisingly, the EU Commission's proposal for a revised directive for controlling emissions would only apply to new plants.

## Heavy-duty vehicles 7

The EU Commission's proposal for new emission standards for heavy-duty vehicles met with immediate criticism – the German environment minister maintaining that a 60-per-cent reduction of pollutant emissions was needed, rather than the proposed 30 per cent.

## Non-road diesels 8

The US Environmental Protection Agency is proposing standards for non-road diesel engines that would reduce emissions by up to two-thirds.

## New shipping dues 9

Tiring of attempts to reach international agreements for reduction of the emissions of acidifying pollutants from ships, the Swedish maritime authority has introduced a system of fairway dues that are differentiated according to the environmental effects of individual vessels.

## Protocols to come 11

Now that thirteen countries have ratified the 1994 sulphur protocol, and three others declared their intention of doing so, the way should be clear for the protocol to come into force. Negotiations for a super-NOx protocol are now about to start, and work on two others is well under way.

## Critical loads 12

The development of a super-NOx protocol is complicated by the fact that three environmental problems are to be considered at once. Charts show how the critical loads for acidity, eutrophication, and ground-level ozone vary over Europe.

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ments in the CEE countries point to a lowering of energy intensity in industry, but increases in the transportation and domestic sectors.

It is assumed in the reference scenario that the legislation that is now well on its way, both in the EU and the CEE countries, will be carried out according to plan. The effects on the levels of emission of introducing EU legislation in the CEE countries, and the ten accession countries in particular, have also been examined. The RAINS computer model, developed by IIASA, was used to make a so-called integrated assessment, to give an idea of the environmental effects of the various scenarios, and to estimate the costs of technical measures to curb emissions.

### The reference scenario

Table 1 (page 14) shows what would happen to the emissions of SO<sub>2</sub>, NO<sub>x</sub>, and NH<sub>3</sub> between 1990 and 2010 according to the reference scenario – in the CEE countries as a whole, the ten accession countries, and the European Union.

In 1990 the critical loads for acidification were exceeded on 83 million

hectares of sensitive ecosystems in Europe – in other words, on 15 per cent of the whole European ecosystem area. By 2010 the situation would be markedly improved if emissions were reduced as shown in the reference scenario. The affected area would then have come down to 21 million hectares, or 3.7 per cent of the whole.

As regards eutrophication, the critical loads were exceeded on 79 million hectares of sensitive ecosystem, equal to 15 per cent of the total ecosystem area, in 1990. By 2010 the figure would be 51 million hectares, or 9.8 per cent.

### Convergence towards EU

According to the IIASA, the emissions of sulphur in the ten accession countries would not be noticeably affected by the introduction of EU regulations. The reason is that most of these countries are already bound by rules, commitments (to the 1994 sulphur protocol, for instance), and planned measures that just about come up to EU standards. The introduction of EU rules in the remaining CEE countries, where for the most part there are either no such happenings or none

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# Kyoto meeting with vague outcome

Doubtful effect on greenhouse-gas emissions as result of protocol

FROM THE AGREEMENT reached at Kyoto last December it would appear that the industrialized countries had undertaken unreservedly to reduce their emissions of greenhouse gases by a good 5 per cent between 1990 and 2008-2012. But it may not be as simple as that.

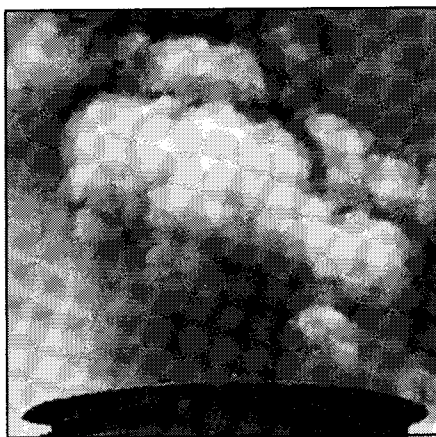
The protocol that the delegations of 160 nations were eventually able to arrive at covers six greenhouse gases, taking in the three industrial gases – hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>) – in addition to the three “natural” ones, carbon dioxide, methane, and nitrous oxide. The combined emissions of these, weighted in accordance with the effect of each on the climate, are to be reduced by the industrialized (Annex I) countries by 5.2 per cent by 2008 – or by 2012 if they choose to take an average for the period 2008-2012. The base years are 1990 for the “natural” gases and any year between 1990 and 1995 for the others.

Widely differing emission targets have however been allocated to individual signatories. The EU countries collectively, Switzerland, and most countries of central and eastern Europe are to reduce by 8 per cent, the United States by 7 per cent (which is, at least on the face of it, far more than the stabilization it was proposing before the meeting), while Japan, Canada, Hungary, and Poland are committed to 6-per-cent cuts. Three countries will be allowed to increase their emissions: Australia by 8 per cent, Iceland by 10 and Norway by 1 per cent. New Zealand, Ukraine, and the Russian Federation are required to stabilize theirs at 1990 levels – despite the fact that industrial decline in the two last has already brought emissions down to about 30 per cent below 1990 figures.

The 5.2-per-cent aggregate cut amounts to a reduction of 30 per cent below the emission levels that would have been expected in 2010 if no additional action had been taken. As environmentalist groups have pointed out, however, seeing that Annex I countries' emissions are al-

ready 4.6 per cent lower than they were in 1990, the Kyoto agreement will only mean a cut of 0.6 per cent.

One main cause of the United States agreeing to reduce emissions is thought to be the possibility for Annex I countries to buy and sell emission quotas among themselves. It appears likely that the United States, as well as Canada and Japan, will want to buy Russia's unused quotas as a means of avoiding the need to take more expensive



measures in order to meet their own emission targets. The rules for such emission trading still remain however to be negotiated, and will be on the agenda for the next conference of the parties to the climate convention (COP4) in Buenos Aires in November.

Also much debated at Kyoto was the question of whether the uptake of carbon dioxide by forests and other vegetation in any country could be accounted as “negative emissions,” sinks, that could be deducted from emissions from fossil fuels. According to the protocol this would be allowable if the sink has arisen as a result of “direct human-induced land-use change and forestry activities, limited to afforestation, reforestation, and deforestation since 1990.” But if these activities result in more emissions instead of creating a sink, their consequences will have to be accounted on the debit side. The exact rules for assessment remain however to be worked out.

Much argued, too, was the possibility for an Annex I country to count

as its own emission reductions resulting from measures undertaken in a non-Annex I country. In Kyoto it was agreed that it could, although instead of “joint implementation” it would now be called “clean development mechanism.” But here, too, many of the details will have to be sorted out in coming negotiations.

An important question is when the protocol is likely to come into force – if indeed it ever will. For it to do so it must have been ratified by at least 55 of the signatories, and that number must include as many Annex I countries as were accountable for at least 55 per cent of the Annex I emissions in 1990. This means that if the United States should fail to ratify, it will be necessary to get ratification from practically *all* the other Annex I countries – and it is doubtful whether the US will ratify. Even if the Clinton administration should be agreeable, it is unlikely that the protocol will get past the senate before the bigger developing countries, including China, have made some sort of commitment. As it is, according to the protocol only the Annex I countries have to do that.

The EU countries will now have to decide how the overall reduction of 8 per cent is to be divided up among the members, and also whether they may go beyond the requirements of the protocol. The previous distribution of a 10-per-cent reduction only concerned three greenhouse gases (see AN 1/97, p.16). The matter will be taken up by the environment ministers when they meet in March and June, after analysis of the protocol by the EU Commission.

PER ELVINGSON

Sources: **Environment Watch: Western Europe**. December 19, 1997. **ENDS Report 275**. December 1997.

More information about the Kyoto proceedings can be found on internet, for instance under the addresses [www.unfccc.de](http://www.unfccc.de) (Climate Convention), and [www.igc.org/climate/ECO.html](http://www.igc.org/climate/ECO.html) (commentary from Climate Action Network).

# EU ministers stress need for integrated strategy

WITHIN the European Union there is a clear divide between north and south as regards the urgency of measures to deal with acidification. While Austria, Germany, the Netherlands, and the Scandinavian countries would like to see more strenuous efforts being made to reduce the emissions of acidifying air pollutants, Great Britain and the Mediterranean countries are dragging their feet.

Nevertheless, after a brief discussion of the European Commission's proposed strategy\* for combating acidification, the Environment Council was able to issue, on December 16, so-called Council Conclusions in full unanimity.

There is evident agreement in respect of the general problem of acidification and the long-term environmental aim. The Council starts by saying that "acidification is a major problem for the environment in and outside the EU and [the Council] regards the combating of acidification as an important part of an overall action against air pollution in the Union," and emphasizing that "the long-term environmental objective for acidification is to ensure that critical loads are never exceeded."

While considering the Commission's interim environmental objective, for 2010, to be "very ambitious if applied uniformly across the Community," the Council also argues that a comparable level of environmental protection could be achieved in a different manner. It considers that the Commission should refine its analysis by "making improvements to the data" and by "exploring alternative options."

The cost estimates associated with the provisional emission ceilings in the Commission's Communication are said to imply "an unacceptable economic burden for some Member States." It should be observed however that the Commission states quite clearly in the strategy document that the cost estimates are a "preliminary assessment" and are most likely to be overestimates.

Recognizing in any case that "national emission ceilings can constitute

an effective as well as flexible approach towards the reduction of emissions", the Council "notes the Commission's intention to finalize its proposal concerning national emission ceilings for SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub>, and VOCs during the second semester of 1998."

In their conclusions the ministers also stress the need for an integrated and coherent Community strategy to combat both acidification and tropospheric ozone, as well as to tackle the problem of eutrophication.

Considering the importance of cutting down the emissions of air pollutants from shipping, the ministers deplore the failure of the IMO to designate the North Sea as a special area for control of the sulphur content of the fuel oil in ships' bunkers (see AN 4-5/97). They therefore urge both the Commission and the individual member states to strive to get that sea so designated under the IMO MARPOL convention. They also urge the Commission to "explore additional options for the reduction of acidifying emissions from ships."

The ministers further emphasize the importance of getting the countries of central and eastern Europe involved in the effort to reduce acidifying and ozone-forming air pollutants – saying that this should be done both in the context of the Convention on Long Range Transboundary Air Pollution, and during the process of preparing these countries' entry into the EU.

The Environment Council intends, while the Commission continues to work on legislation to arm the acidification strategy, to discuss further the proposal for a directive to limit the sulphur content of certain liquid fuels. (Both this and the acidification strategy will be debated in the European Parliament during the coming spring.) The ministers also call for ratification of the 1994 Sulphur Protocol as soon as possible by the EU as well as the individual member states.

CHRISTER AGREN

\* COM(97)88 final. Reported in AN 1/97, pp.6-7.

## The ozone strategy

It is taking longer than planned for the Commission to produce a strategy for ground-level ozone. June 1998 is the date now set for presentation, together with a proposal for a new daughter-directive containing air-quality standards for ozone.

## National ceilings

In conformity with what was said in its acidification strategy, the Commission is planning to present, during 1998, a proposal for a directive setting national emission ceilings for those air pollutants that contribute to acidification and the formation of ground-level ozone: SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub> and VOCs. The reductions required of individual member countries will be determined by intermediate environmental quality targets (for 2010) for acidification and ozone. The environmental target for acidification has already been stated in the acidification strategy, and that for ozone will be put forward in the coming strategy.

For fixing national emission ceilings, the Commission intends to adopt methods similar to those employed for the two strategies. Integrated assessment computer modelling will be used to calculate the most cost-efficient way of distributing the burden among the member countries so as to attain the intermediate environmental targets. This method, which corresponds to that used within the Convention on Long Range Transboundary Air Pollution, enables account to be taken of a number of complex factors, including, besides the pollutants' transboundary character, the costs of reducing emissions in each country, and the geographic variations in environmental sensitivity. Other environmental effects, and especially eutrophication, will also be taken into account.

## Emissions from aircraft

Last December the Commission proposed the introduction of stricter requirements for the emissions of nitrogen oxides from aircraft within the EU – without waiting for new standards from the International Civil Aviation Organization (ICAO), the body that normally sets standards for aircraft. The Commission's proposal for a directive (COM(97)629), applying only to aircraft registered in EU countries, amounts to a tightening of the present ICAO standards by 16 per cent. It would apply to all new types of aircraft engine as from the year 2000. Existing types already in production would have until 2008 to meet the new emission limits. This is almost precisely what was pro-

*Continued on the following page*



# New directive surprisingly excludes existing plants

posed in 1995 by the ICAO Committee on Aviation and Environmental Protection, but was subsequently blocked, in particular by the United States.

Since most modern aircraft engines already meet the proposed emission limits, no new technology would have to be developed – an aspect that has drawn criticism from several environmentalist organizations. Besides more stringent requirements in regard to emissions, they would like to see environmentally differentiated landing fees and taxes on aviation fuel.

**Environment Watch: Western Europe.** December 19, 1997.

## Car makers taken to task

The Environment Council is losing patience with European car makers on account of their slowness in marketing cars with a low fuel consumption. Noting that an offer from the industry was "totally unsatisfactory," in December the ministers issued an ultimatum: if no adequate progress has been made before the next Council meeting in March, the Council will call for regulatory action, asking the Commission to unveil a draft directive setting binding limits – to achieve the aim adumbrated in June 1996, when the Commission was charged with negotiating a voluntary agreement with the industry for the development of cars with an average fuel consumption of 5 litres per 100 kilometres for petrol-engined, and 4.5 litres for diesels, by 2005 or at the latest by 2010. Up to now the European automotive manufacturers association, ACEA, has called those figures "totally unrealistic."

**Europe Environment** No. 513. December 13, 1997.

## Urging a doubling of renewables

The proportion of energy derived from renewable sources in the EU should, in the view of the Commission as presented in a strategy and action plan\* last November, be increased to 12 per cent by 2010. Amounting to a doubling of current use, this is considered by the Commission to be "ambitious but realistic". Support for an increase in the share of renewables had been expressed in the Council of energy ministers earlier in 1997, but because of disagreement among the member countries, no decision could be taken as to the 12-per-cent figure (see AN 1/97, p.8).

\* **Energy for the Future: Renewable Sources of Energy.** White Paper for a Community Strategy and Action Plan.

IT NOW APPEARS that the European Commission's proposal for a revision of the directive\* for controlling the emissions of sulphur and nitrogen oxides from large combustion plants will only apply to new plants. It will consequently be of very limited effect.

Previous drafts that had been discussed with experts from the EU member countries during 1997 included both existing and future plants. The aim was to fix national ceilings for the overall emissions of SO<sub>2</sub> and NO<sub>x</sub> from large combustion plants – an arrangement that would have been in line with the Commission's ideas for an acidification strategy (see p.5). But the very preliminary proposals for ceilings that were put before the experts last summer met with very strong criticism, not only from the representatives of several member countries, but also from industry, and that was probably the main reason for the Commission deciding to drop the inclusion of existing plants.

But in consequence the effect on emissions will be limited, since very few large new coal and oil-fired plants are planned for the next 10-20 years, and any new plants will for the most part be gas fired. Thus, during the next few decades, the greater part of the emissions of SO<sub>2</sub> and NO<sub>x</sub> from LCPs will still be coming from existing coal and oil-fired plants.

Emissions from existing plants can however be controlled by various means, such as:

□ By setting requirements, such as emission limit values, emission ceilings, etc., for these plants. Since the

Commission is, however, abstaining from any attempt at this on an EU level, any steps that may be taken will have to be made by the member countries themselves.

□ By application of the directive on integrated pollution and prevention control (96/61/EEC), by which emissions from existing LCPs would be regulated by local authorities able to issue permits (from 2007). It is however far from clear what the requirements might be, and there will be a risk of considerable variations from one area to another.

□ Through the pressure for emission reductions that will result from the planned (new) directive concerning national emission ceilings for SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub> and VOCs, which is to be developed while keeping in view the proposed acidification and ozone strategies. It should be presented by the Commission this coming December.

□ By using economic instruments such as taxes or charges on emissions. A few EU countries, including Sweden, have successfully applied instruments of this kind.

That measures to lessen emissions from existing LCPs can be cost efficient for most of the EU countries has been shown by an analysis made in connection with the development of the acidification strategy. But now that the Commission has decided to drop that possibility from the revised directive for LCPs, it remains to be seen how the emissions can be reduced.

CHRISTER AGREN

\*88/609/EEC.

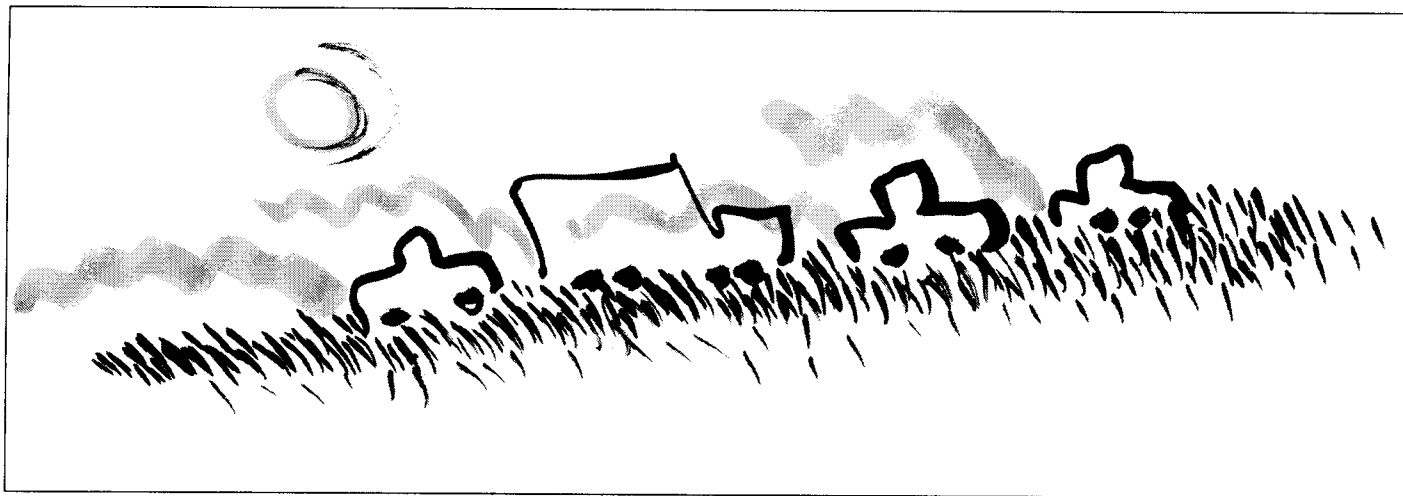
## Threat ended?

The British power generator, PowerGen, has paid a substantial sum – believed to be £3.4 million – to a Kent farmer and his landlord who had claimed that the burning of orimulsion at the nearby Richborough power station had caused severe damage to crops. The settlement was announced only a few hours before a court verdict was due, which would, it is thought, have been highly critical of PowerGen's actions.

Orimulsion is a cheap, bitumen-based fuel imported from Venezuela. Power-

Gen had been using it since 1990 at two of its plants, both of which have now been closed down. Richborough was one of them. Only one day after the settlement had been made known, the country's other big generator, National Power, gave notice that it was dropping a controversial plan to convert its 2000 MW Pembroke power station to orimulsion (see AN 5/95, pp. 14-15). Thus all efforts to introduce this fuel in the UK appear to have come to an end.

ENDS Report 272. September 1997.



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## EMISSION STANDARDS

# Turn comes for heavy vehicles

Final part of the auto-oil package aimed at screwing down limits for all types

A PROPOSAL for a directive aimed at reducing the emissions of gaseous and particulate pollutants from heavy-duty diesels by 30 per cent, from the levels permitted under current standards, has now been adopted by the European Commission – which is also proposing a new test cycle, as well as standards for heavy gas-driven vehicles.

The proposal for heavy-duty vehicles (COM(97)627) is the final part of the so-called auto-oil package, of which the main part covered emission standards for light vehicles as well as quality standards for fuels (first presented in June 1996, see AN 4/96). At that time the Commission was of the view that the amounts of pollutant emitted from road traffic would have to be reduced by 60-70 per cent between 1990 and 2010, if the standards for air quality that were proposed when the project started were to be attained. The aim of the auto-oil program was to find the least expensive combination of measures that would be needed for that.

Because of proposed changes in the test cycle for type approval, there can be no direct comparison with the current standards for heavy vehicles; but according to the Commission, the result will be a further reduction of 30 per cent in the emissions of nitrogen oxides, carbon monoxide, and particulates, and 34 per cent in hydrocarbons. The changes in the test cycle have been made to give better conformity with actual driving

patterns, both within and outside of urban areas.

The Commission is now proposing, for the first time, standards for heavy-duty gas-driven vehicles. It is doing so with a European type-approval in mind, to enable authorization throughout the European Union. The requirements for natural-gas driven vehicles will be similar to those for diesels, with the important difference that there will be a limit value for methane emissions instead of that for non-methane hydrocarbons as in the diesels standards. Since natural-gas engines emit very small amounts of particles, too, there will be no requirement in this respect, as there is for diesels.

### Immediately criticized

The EU Commission's proposals for new emission standards for heavy-duty vehicles met with swift criticism from Germany. "We need a 60-per-cent reduction from today's levels," was the response of Angela Merkel, environment minister, who also deplored the lack of standards for 2005 and after. This was especially serious, she said, because such standards could be the basis on which to grant tax incentives as a mean of encouraging manufacturers to start meeting the standards before they were due.

According to Merkel, the one million heavy vehicles in Germany emit more nitrogen oxides than all the country's 41 million passenger cars together, and twice the amount of particles.

Environment Watch: Western Europe. December 19, 1997.

The new standards are proposed to take effect from October 2000 for new vehicle and engine models, and a year later for all vehicles and engines leaving the factory. The Commission is refraining for the time being from proposing standards for 2005, explaining that it wants to await the outcome of Auto-oil II, as well as expected technical developments and the possible emergence of a new, worldwide, harmonized test cycle. The intention is to be able to put forward proposals for standards for 2005, and beyond, before the end of 1999. It is rumoured that a tightening of 40 per cent is being considered, compared with the present proposal.

Furthermore, the Commission is aiming to present proposals for standards for voluntary certification of "enhanced environmental vehicles." It is said that while there is a great interest in low-emitting vehicles for urban fleets, the lack of a widely accepted technical definition of an EEV has been "a clear impediment" to action. Standards of the proposed type are considered to be important, too, for the development of fiscal incentives to promote an increase in the numbers of less-polluting vehicles.

PER ELVINGSON

Sources: European Commission DGXI. *Europe Environment* No. 512, December 9, 1997. *Environment Watch: Western Europe*, December 19, 1997. *ENDS Report* 275. December 1997.

## First with a petrol-driven ULEV engine

USING only well-tried and inexpensive technology, Honda has become the first car maker to develop a petrol engine that meets the Californian ULEV requirements (for ultra low emission vehicles). The new engine will be in the 1998 model of the Honda Accord, one of the most-sold cars in the United States. According to the manufacturer, the extra cost of a car with these very low emissions will be no more than \$350.

The European car makers have maintained, ever since the ULEV requirements were first made known, early in the nineties, that it would be impossible to obtain such low emission figures at any reasonable cost. The fact that Honda has now succeeded gives support to the idea that if technical development are to be hastened, politicians will have to set standards that are higher than can be met with any existing technology. Since the European standards have so far been based on existing technology, they have on the contrary served to freeze existing techniques.

Low emissions have been attained in the Honda engine through better control of the fuel injection, more efficient combustion in the cylinders, and an improved, quickly warmed-up catalyzer. To meet the ULEV requirements, the petrol must however have a lower sulphur content than the present EU standard. Low-sulphur petrol is nevertheless obtainable in some places in Europe, including Sweden, as well as in California.

	CO g/km	HC g/km	NOx g/km
ULEV	1.0	0.04	0.12
EU 1996/97	2.7	0.34	0.25
EU 2000*	2.3	0.2	0.15
EU 2005*	1.0	0.10	0.08

\* EU 2000 and 2005 represent the Commission's proposals for petrol-driven cars as presented in June 1996. For diesel-driven cars the emissions of NOx would be allowed to be three times as great. Somewhat different test cycles mean that comparison of the American and European requirements can only be approximate.

Source: Ny Teknik No. 34, 1997.

## Standards for non-road diesels

STANDARDS that would reduce emissions from a typical non-road diesel engine by up to two thirds have been proposed by the US Environmental Protection Agency. They would apply to a wide range of mobile non-road equipment used in construction, agriculture, and industry, as well as to some marine diesel engines. The agency estimates that the cost of meeting them would add no more than 2 per cent, if that, to the purchase price of new equipment. The cost of the whole program would be about \$300 per ton of the NOx that it will eliminate, comparing very favourably with other emission-control strategies.

The new standards would be phased-in in two stages between 1999 and 2008, the year and standards depending on engine-power ratings.

The EPA considers it urgent to introduce the new standards, since the proportion of the emissions of air pollutants from this type of engine has been increasing of late. Approximately 10 per cent of the total US emissions of nitrogen oxides now comes from non-road diesel engines and small marine diesels (under 50 hp). As regards particulates, the agency estimates that under existing control programs, by 2010 more than 80 per cent of the emissions from diesels would be coming from non-road engines.

The proposed regulations have been worked out in collaboration with the European Commission. An EU directive with similar requirements, but with a somewhat different time-

table, was in fact adopted this last autumn. See below.

The EPA is also working on new emission standards for other types of engine, such as small petrol engines, marine engines, and locomotives – the latter being responsible for 9 per cent of the NOx emissions from the mobile sector, but have so far remained entirely unregulated. Aircraft are also being considered. The only other category that has avoided controls up to now has been recreational non-road equipment – go-carts, all-terrain vehicles, and snowmobiles – although the agency intends to turn attention to these, too, shortly.

Source: Car Lines. October 1997.

### The EU directive

The EU Commission had put forward a directive for non-road mobile engines in the autumn of 1995, and by June 1996 all concerned were largely in agreement as to its contents. Its formal adoption was however delayed by more than a year on account of controversy between the Environment Council and the EU Parliament concerning handling within the EU bureaucracy. In essence, this directive will, according to the Commission, when fully implemented in 2003 have resulted in reducing the emissions of particulates, nitrogen oxides, and volatile organic compounds from these types of engine by 67, 42, and 29 per cent respectively (in comparison with unregulated engines). Compared with the requirements for similar engines in highway vehicles, those now proposed for non-road ones are distinctly modest. For details, see AN 5/95, p.9 and 4/96, p.7.

## Saving both climate and health

Altogether 8 million lives could be saved between 2000 and 2020 by reducing the emissions of greenhouse gases, can be read in the *Lancet* of November 8, 1997. Researchers at the World Resources Institute report there the outcome of a comparison they have made, in cooperation with the World Health Organization, of two scenarios: one assuming a reduction of greenhouse gases of 15 per cent between 1990 and 2010 by the industrialized countries, at the same time as the developing ones curtailed their increases by 10 per cent by 2010, the other assuming no agreement whatsoever to reduce emissions.

The gain from the former in the way of fewer deaths would be a secondary effect of reducing the emissions of carbon dioxide – since that would be a result of burning less coal and oil, with consequent lower emissions of the small particles that are damaging to health. As a result by 2010 at least 700,000 premature deaths would be avoided each year.

Further information can be obtained from a leaflet entitled *The Hidden Benefits of Climate Policy: Reducing Fossil Fuel Use Saves Lives Now*, published by the World Resources Institute, 1709 New York Avenue NW, Washington DC 20006, United States.





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## SHIPPING

# System of differentiated dues

As from January 1, all vessels entering Swedish ports, of no matter what nationality, are having to pay fairway dues that are partly based on their emissions of sulphur and nitrogen oxides. This is one step towards getting the emissions of atmospheric pollutants from shipping reduced by 75 per cent.

Ships let out enormous amounts of acidifying air pollutants. After having made strenuous efforts over a long period to reach effective international agreements for the reduction of these emissions, without success, the national shipping authority finally came to the conclusion that Sweden would have to take the matter into its own hands.

In the spring of 1996 agreement was reached with the shipowners' association and the association of local harbour authorities to the effect that measures should be taken to reduce the emissions of sulphur and nitrogen oxides from ships by 75 per cent between the early nineties and the beginning of the next century. It was also agreed that differentiating harbour and fairway dues according to the ships' environmental effects

would be the first best means of bringing this about.

So far no harbour authority has taken any steps. Only the fairway dues set by the National Maritime Administration are differentiated according to the amounts of sulphur and nitrogen oxides emitted (see box). The aim of the scheme is to keep the administration's income unchanged; the reduced rates for "clean" ships will simply be made up for by the higher rates paid by the "dirty" ones.

The question is then whether it will pay shipowners to make the necessary changes to meet the requirements for a lowering of the dues – to switch to low-sulphur fuel and install equipment for reducing emissions of nitrogen oxides.

As regards sulphur, the answer in most cases would be yes – if the

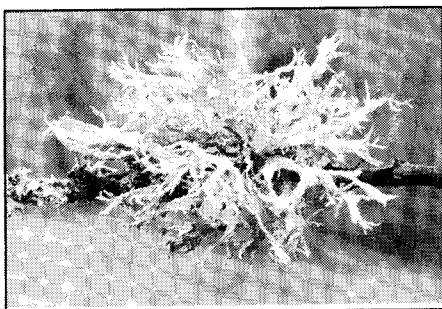
vessel regularly makes Swedish ports. For several years a large proportion of the ferry traffic on Swedish ports has consisted of ships running on fuel oil with a sulphur content of less than 0.5 per cent, and it would cost relatively little for the rest to get under the 1-per-cent limit.

Stefan Lemieszewski, environment officer at the Maritime Administration, tells of a great interest among shipowners to join the scheme. Within two weeks of the start in January, applications for certification to obtain a sulphur rebate had come in for some 255 vessels. It may be noted that about 80 per cent of the emissions of sulphur from shipping in Swedish waters comes from about 10 per cent of the vessels, 320 in all, that regularly call at Swedish ports: ferries, ro-ro ships, and coastal types

## Swapping debts for environment

By agreement last November, two per cent of the Polish state debt to Sweden, or 50 million kronor, is to be written off against a commitment of the Polish government to invest an equal sum in environmental projects. Sweden is thereby associating itself with the US, France, and Switzerland, each of which is waiving 10 per cent of its claim on the Polish state in favour of similar projects. The money goes into an ecofund and is used for such purposes as energy saving, improving the quality of air and water, and the preservation of biological biodiversity.

Nyhetsbyrån FLT, December 1, 1997.



## Lichens as monitors

A school project has been started in Germany for measuring air quality with the aid of lichens – a group of organisms in which many species exhibit great sensitivity to air pollution. Although the studies will be confined during the first year to Lower Saxony, the intention is that they should be extended to the whole of Germany. Should an interest be shown, a European network is a further possibility.

For information, please contact Sylvia Reckel, AG Bioindikation, Lister Meile 27, 30161 Hannover, Germany. Fax +49-511-311740. Internet: [www.bionet/schule.de/](http://www.bionet/schule.de/)

## Transportation and Rio

A regional UN conference on transport and environment, attended by ministers of transportation and environment from some fifty countries, was held in Vienna last November – with the aim of implementing commitments made at the 1992 Earth Summit in Rio by setting targets for the transport sector. The conference adopted a declaration and non-binding plan of action to make transport policy more sustainable. Although the need to curb the growth of road transportation, and support public transport facilities, was urged by a number of speakers, no substantial measures to address these issues could be agreed upon. A follow-up conference is envisaged for 2002.

plying fixed routes (so-called dedicated trade).

In order to decide whether it would be worthwhile to deal with nitrogen oxide, a shipowner would have to consider the cost of installing and running the necessary equipment, the ship's remaining lifetime, and the number of times it would enter Swedish ports. Because of the increased tendency of consignors to look at the environmental aspects, he might also count in the competitive advantage of having a cleaner ship. But to make it really attractive for a shipowner to install, say, selective catalytic cleaning for nitrogen oxides, much greater differentiation of the dues will probably be needed.

To encourage owners to substantially cut down emissions of nitrogen oxides – to levels that in practice will mean installing SCR – the Maritime Administration is offering an investment subsidy. During five years all ships (of whatever nationality) that have been so equipped as to bring their emissions of NOx to below 2 grams per kWh will be eligible for reimbursement of their fairway dues to an amount equal to a maximum of 40 per cent of the cost of investment (or 30 per cent if the installation is made after the year 2000).

To obtain the lower rates, a shipowner has to produce a certificate from an independent agency showing that the equipment is functioning as claimed. In making the application, he also consents to the Administration making unannounced checks

both of the NOx cleaning equipment and the sulphur content of the fuel.

It remains to be seen whether the present dues, in combination with the planned differentiation of the harbour dues, will suffice to achieve the intended environmental aims. "We shall be making a first evaluation at the end of the year," says Lemieszewski, "and then decide whether the dues need adjusting."

It is the hope of the Administration that the Swedish system will be copied in other countries, and according to Lemieszewski the interest is very great. An important pressure group are likely to be the shipowners whose vessels are already adapted to the Swedish rules, since they would naturally profit from having to pay lower dues in as many countries as possible. The administration will in any case be active in promoting the system both around the Baltic and in the European Union.

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For further information, apply the National Maritime Administration (*Sjöfartsverket*), att. Stefan Lemieszewski, 60178 Norrköping, Sweden. Fax +46-11-23 99 34. Tel. +46-11-19 13 77.

An account of the international negotiations for reducing the emissions of air pollutants from shipping, as well as a report on the latest figures for emissions of air pollutants from shipping in northern waters, appeared in the preceding issue of *Acid News* (No. 4-5, 1997). A leaflet outlining the situation and what needs to be done has also been published by the secretariat, and can be obtained free of charge.

## The Swedish system

**SULPHUR.** Ships burning fuel with a sulphur content of more than 0.5 per cent (in the case of passenger and railway ferries, 1 per cent for others) have to pay a sulphur charge of 0.90 kronor per gross ton every time they enter a Swedish port, but no such charge if the sulphur content is less.

**NITROGEN OXIDES.** If the emissions of nitrogen oxides are 12 grams or more per kilowatt-hour (calculated as NO<sub>2</sub>), the full charge of 4.10 kronor per gross ton will be payable (but 4.40 for bulk carriers of mineral-oil products). For lower emissions the charge is reduced on a linear scale down to 2 grams per kWh, ending at 2.50 (or 2.80) kronor per gross ton.

Gross tonnage, which is a measure of the ships cargo-carrying capacity, is held by the Marine Administration to be an

acceptable parameter for charging, it having been shown after extensive investigation to give a close indication of a ship's emissions of air pollutants (no proper connection could be found between pollution and engine rating).

To avoid undue penalizing of regular passenger and cargo traffic, and also tankers, as a result of this differentiated system and a simultaneous harmonizing of fairway dues with EU rules, there are ceilings to the amounts of charge, both per port entry and year.

By agreement with the Maritime Administration and the shipowners' association, harbour dues will also be differentiated, in the same way as the fairway dues, thus compounding the effect of the scheme. Each harbour authority, however, sets its own dues.

# Sulphur almost clear, others to come

AT THE MEETING of the Executive Body of the Convention on Long Range Transboundary Air Pollution in December, it was reported that thirteen countries<sup>1</sup> had now ratified the sulphur protocol of 1994, and that Austria, Slovakia, and Slovenia had announced their intention of doing so within a few months. This means, provided these three actually do ratify, that the sixteen ratifications necessary for the protocol to take effect should be in place sometime during the first quarter of this year. There still remains however a whole row of countries<sup>2</sup> that have signed the protocol but have neither ratified nor given any official indication that they would soon be doing so.

For several years the negotiating body under the convention – the Working Group on Strategies – has been engaged on preparatory discussions for a new NO<sub>x</sub> protocol. It has long been agreed among the participating countries that this protocol should take account of several environmental problems (acidification, eutrophication, and ground-level ozone), and thus should cover several pollutants (ammonia and volatile organic compounds as well as nitrogen oxides). Consequently it has often been called the “super-NO<sub>x</sub>” or “multi-pollutant” protocol.

It has been clearly demonstrated in several studies that it will be both necessary and cost-efficient, in combating acidification, to reduce sulphur emissions still further – beyond the reductions already prescribed in the 1994 sulphur protocol. The executive body has therefore decided that such reductions shall be allowed as an option in the scenarios and analyses that will form the basis for the forthcoming negotiations on the super-NO<sub>x</sub> protocol. If it is then agreed that there must be further reductions of sulphur emissions, that can be formalized either through revision of the 1994 sulphur protocol, or by extending the new protocol to include sulphur as well.

The first real negotiations for a super-NO<sub>x</sub> protocol are expected to take place when the working group meets in March, and to be followed up in June and September. The pre-

vious aim, of having a protocol ready for signing before the end of this year, has had to be postponed somewhat – the hope now being to have it ready during the first half of 1999. Among the reasons given for the delay are the vast amount of new data that is emerging, as well as the more complicated computer models, analyses, and counterweightings that will be necessary when dealing with

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*At the December meeting attention was also drawn to the connection between the super-NO<sub>x</sub> protocol and what the EU is doing for its acidification and ozone strategies.*

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several environmental problems and pollutants simultaneously. There is also the fact that all last year, and during the beginning of this, the working group has had to spend a great deal of time on negotiating two other new protocols under the convention (see below).

At the December meeting of the executive body attention was also drawn to the connection between the super-NO<sub>x</sub> protocol and what the EU is doing for its acidification and ozone strategies (see p.5). In both cases much the same information comes into play (such as critical loads, emission data), and also the same analytic methods, i.e. the IIASA computer model RAINS, which is used for the construction of scenarios, which in turn form a basis for the development of cost-effective strategies.

Further emphasized was the need to ensure adequate financing of the convention's two so-called “effects-oriented programs,” as well as of the group at IIASA that does the computer modelling. Unfortunately discussion of this matter led to no result at all – since a small number of countries refuse, with no other ex-

cuse than the usual references to the state of the economy, to agree to an equitable spread of the cost (see also editorial comment, p.2).

The executive body was on the other hand able to set up a Compliance Committee, consisting of eight legal experts from among the parties to the Convention. While the main task of this committee will be to monitor “the implementation of and compliance with” the 1994 sulphur protocol, it will also have to keep an eye on the VOC protocol of 1991 and other, subsequent protocols. But there was no noticeable change of attitude in regard to transparency and public participation in the work under the convention. It was stated emphatically that the meetings of the Compliance Committee would be held behind closed doors. In other words, environmentalist NGOs and other observers would be excluded. Moreover, the possibility of bringing “submissions” before the committee concerning the performance of parties to the protocols is expressly restricted to the parties to the relevant protocol – a further means of circumscribing the influence of outsiders who might also have an interest in the matter.

The working group on strategies also reported on the development of two further protocols, on heavy metals and persistent organic pollutants (POPs). It appeared fairly optimistic that the work on both could be concluded during the first few months of this year. In that case they could be officially adopted and signed at an extra session of the executive body, which is to take place at the Environment for Europe conference at Århus, Denmark, June 23-25, 1998.

CHRISTER ÅGREN

<sup>1</sup> The thirteen countries that have ratified are Canada, the Czech Republic, Denmark, France, Germany, Liechtenstein, Luxembourg, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.

<sup>2</sup> The following have signed the 1994 Sulphur Protocol, but neither ratified nor declared that ratification may soon be expected: Belgium, Bulgaria, Croatia, Finland, Greece, Hungary, Ireland, Italy, Poland, Russia, Ukraine, and the European Community.

## Recent publications

### **Acid Earth: The Politics of Acid Pollution (1997)**

By J. McCormick. Third edition. A global overview, describing the science, politics, and economics of acidification. 202 pp. £12.95. Available from Earthscan Publications, 120 Pentonville Road, London N1 9JN, England. Fax +44-(0)171 278 1142. Internet: [www.earthscan.co.uk](http://www.earthscan.co.uk).

### **Traffic, Air Pollution and Health (1998)**

A general survey of the effects of air pollutants on humans, the part played by transportation in their occurrence, the relevant legislation, and current projects at the EU level, together with recommendations as to how monitoring, laws concerning vehicles, and urban development can be improved.

1200 francs (950 for NGOs). English and French versions. Can be ordered from Euro Citizen Action Network (ECAS), 53, rue de la Concorde, B-1050 Brussels, Belgium. Fax. +32-2-548 0499.

### **Towards More Sensible Decision Making on Infrastructure Building (1997)**

By G. Kuneman. A publication from the European Federation for Transport and Environment (T&E) analyzing the arguments for huge investments in new infrastructure. A conclusion is that there is no economic justification for a blanket assumption that infrastructure building is good for the economy or employment.

22 pp. Report 97/3. Available from T&E, Bd. de Waterloo 34, 1000 Brussels, Belgium. Fax. +32-2-502 99 08. E-mail: [tande@knooppunt.be](mailto:tande@knooppunt.be)

### **Caring for Our Future – Action for Europe's Environment (1997)**

A popular-science run-through of 25 outstanding environmental problems in Europe, produced by the EU Commission in collaboration with the European Environment Agency.

140 pp. 20 ecus. In English, French, and German editions. Publisher: Office for Official Publications, 2 rue Mercier, L-2985 Luxembourg. Fax +352-2929 42709.

### **Power for Change (1997)**

Following a brief description of the various possibilities for making energy use more efficient, and developing renewable sources, actual cases are presented of where such measures have been taken: in Russia, Ukraine, Czech Republic, and Slovakia.

28 pp. Available from Greenpeace International, Keizersgracht 176, 1016 DW Amsterdam, Netherlands.

## CRITICAL LOADS

# Mapping is becoming ever more important

The number of pollutants that need to be considered makes the development of a super-NO<sub>x</sub> protocol especially complicated.

The development of a super-NO<sub>x</sub> protocol, under the Convention on Long Range Transboundary Air Pollution, is making it ever more important to determine the amounts by which the depositions of various substances will have to be reduced if the critical loads are not to be exceeded. The aim is to arrive at a strategy that will provide, at the lowest possible cost, the greatest possible gains in the way of less acidification, less eutrophication, and lower concentrations of ground-level ozone (see preceding article).

This is a rather complicated matter. While sulphur dioxide, nitrogen oxides, and ammonia cause acidification, both nitrogen oxides and ammonia contribute to eutrophication, and nitrogen oxides and volatile organic compounds to the formation of ground-level ozone. The achievement of any desired reduction of acidification, at the lowest possible cost, as aimed at in the EU strategy, requires an apportioning of emission reductions among the three acidifying substances separately for each country (see AN 1/97, pp.6-7). The optimal apportioning for acidification would however probably not be the best for solving the problems of eutrophication and ground-level ozone.

The most cost-efficient combination of measures for dealing with all three problems at once can however be calculated with the aid of advanced computer modelling. To enable the calculations to be made, after targets have been set in each case, a great amount of data is required, such as figures for the present emissions and their geographical spread, the ways they become transformed and carried about in the atmosphere, the cost of reducing them in each country, and – not least – the relevant critical loads for acidification and eutrophication and the critical concentrations for ground-level ozone.

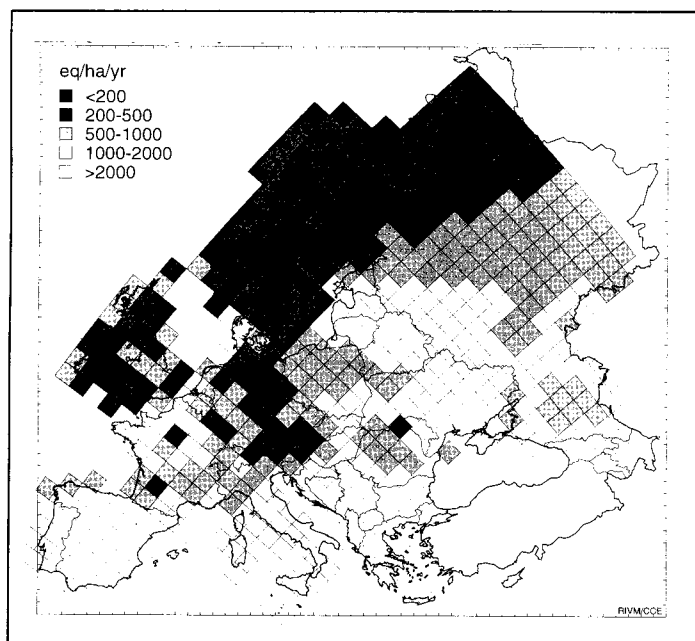
The first chart shows how the critical load (the sensitivity) to acid de-

positions varies in Europe, and Chart 2 how greatly the loads were being exceeded in 1990. In the latter the degree of sensitivity has been combined with figures for the actual depositions of acidifying substances in each square of the grid.

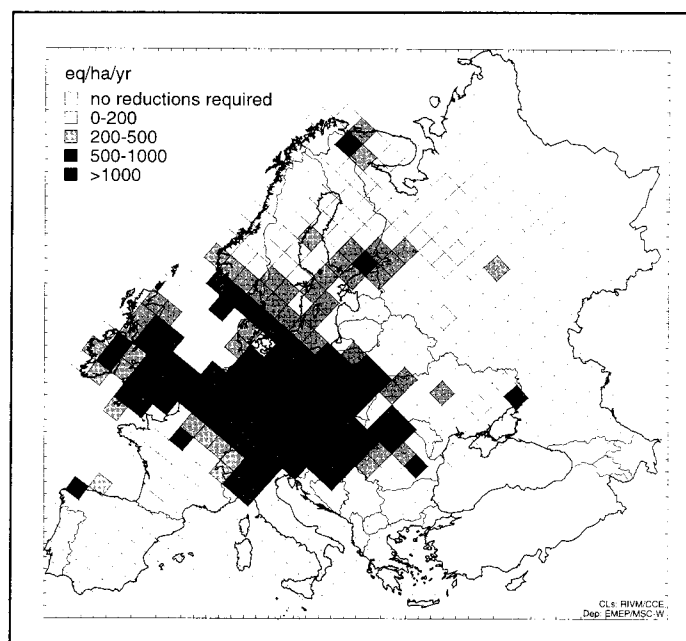
The critical limits for the eutrophying effects of nitrogen have been set so as to prevent the release of nitrogen from the soil on the one hand, and on the other to avoid undesired changes in the vegetation. For most terrestrial ecosystems, nitrogen is a growth-limiting factor, and airborne accretions may lead to an impoverishment of biodiversity.

The way the critical loads for eutrophication vary can be seen from Chart 3. As a result of improved knowledge, there has recently been a general downward adjustment of the figures, so that the critical load for nitrogen now lies within the range of 3-6 kilograms per hectare per year for most of Europe, but no more than 2.5 kilograms, if that, for the most sensitive areas (in both cases expressed as a 5 percentile\*). If every country reported its data according to the recommended method of calculation, the critical loads would be still lower. The actual depositions of nitrogen are now running at levels many times over the critical loads. If the environment is to be protected against eutrophication, they will have to be greatly reduced in most of Europe – and much more than if it was only a matter of dealing with acidification.

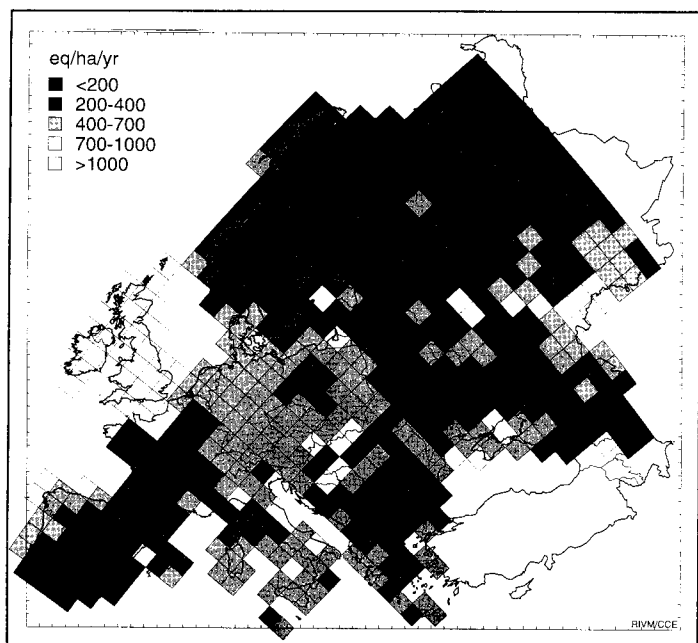
The critical concentrations for ground-level ozone were reset a couple of years ago (see AN 4/96, p.10). They are now expressed as the highest acceptable dose, in terms of ppb-hours, above a threshold value of 40 ppb. The limit for crops, which is considered adequate for wild plants as well, is being exceeded by a factor of at least three over most of Europe (Chart 4). Emissions of the air pollutants that form ground-level ozone



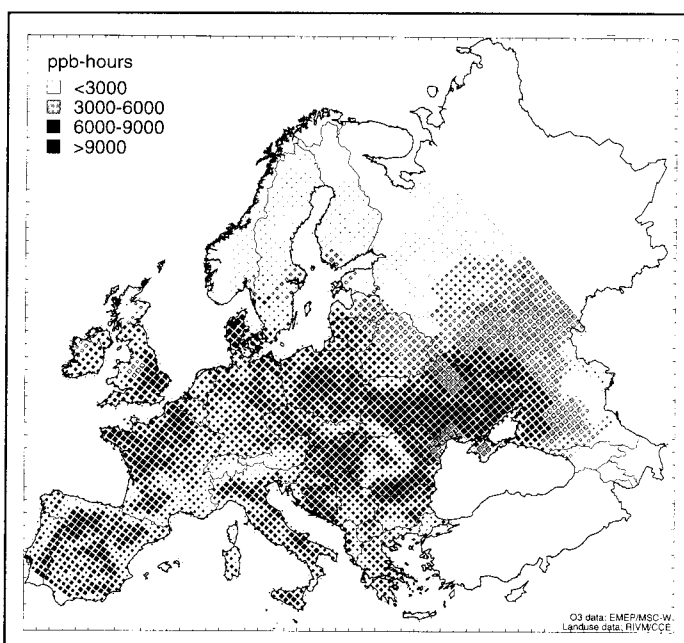
1. The critical loads for acidity. The darker the shading, the greater the sensitivity. At these deposition values 95 per cent of the ecosystems in each grid square will be protected.



2. Loads being exceeded. Comparison of the situation on the map alongside with figures of the acid fallout on each square yields information as to where and to what extent the critical loads were being exceeded (in 1990). The darker the shading, the greater the excess deposition of acid.



3. The critical loads for eutrophication. The darker the shading, the greater the sensitivity. At these deposition values 95 per cent of the ecosystems in each grid square will be protected.



4. Ground-level ozone. Accumulated exposure above a threshold of 40 ppb for crops (in 1990). The critical level has been set at 3000 ppb-hours, measured in daytime during a three-month growing season (May to July). The size of the squares is proportional to the share of arable land in each grid cell.

under the influence of sunlight – that is, nitrogen oxides and volatile organic compounds – will obviously have to be greatly reduced if we are to get down under the critical concentrations.

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\* The standard method used when presenting maps of critical loads, involving the elimination of the most sensitive 5 per cent of the

ecosystems in each grid cell. Thus if the actual load in any grid cell equals the critical load, 95 per cent of the area can be taken as protected.

The information in the article comes from *Calculation and Mapping of Critical Thresholds in Europe: Status Report 1997*, produced, together with the charts used here, by the Coordination Center for Effects, which is responsible for the mapping procedure under the Convention on Long Range Transboundary

Air Pollution. The report tells how mapping is done as well as showing the background reports, on which it is based, supplied by each country. It can be ordered from the CCE, c/o RIVM/MNV, P.O. Box 1, 3720 BA Bilthoven, The Netherlands.

A factsheet containing further information as to the way critical loads and concentrations are determined can be obtained free of charge from the Secretariat.



## A good investment

At its superstores in the home country, Sweden, the home-furnishings giant IKEA has been giving away one million compact fluorescent lamps as a part of a campaign started in cooperation with the Swedish Society for Conservation of Nature. The aim has been to get more people to try out the lamps and cause them to become aware of the savings they can make by installing them in their homes. While giving the same amount of light, a compact fluorescent lamp uses only a fifth of the energy required for a corresponding incandescent bulb. Even at IKEA's current retail price of 39 kronor (4.5 ecus), compact fluorescent lamps make a good investment. One lamp during its lifetime of about 8000 hours will save approximately 250 kronor even at Swedish electricity prices, which by international comparison are low. If every household in Sweden were to exchange ten ordinary lamps for low-energy ones, there would be a saving of something like 2 TWh of electricity a year.

## Pressure on air travel

The two days of the weekend of December 5-6 were designated action days on aviation and environment by Friends of the Earth Europe as a part of a campaign entitled *The Right Price for Air Travel*. Responses came from some fifty towns in twenty countries. In Japan the campaign was directed at the Kyoto climate conference, which was taking place at the same time.

More information about the campaign can be had from Paul de Clerck, FoE Netherlands, P.O. Box 19199, 1000 GD Amsterdam, The Netherlands. E-mail: paul@foenl.antenna.nl

## Death from the air

Up to 24,000 people die prematurely each year in the United Kingdom, and a similar number are admitted to hospital, following short-term pollution episodes, according to an assessment made by a government advisory committee and published in January.\* The committee estimated that particulates contribute to around 8000 premature deaths annually and 10,500 hospital admissions, sulphur dioxide to 3500 of both, and ozone to 12,500 deaths and 9900 admissions. Nitrogen oxides and carbon monoxide are also suspected of having much to do with this, although the effects cannot be quantified because of insufficient data. Nor has it been possible to assess the long-term effects of all these pollutants.

\*Quantification of the Effects of Air Pollution on Health in the UK. Committee on the Medical Effects of Air Pollutants.

Continued from page 3

so well advanced, would on the other hand bring about a distinct change in the pattern of sulphur emissions.

Given halfway convergence in respect of energy intensity, sulphur emissions in the ten accession countries would drop somewhat compared with what would happen under the reference scenario. The cause would be increased energy efficiency, in particular in industry. There would also be a slight further reduction of emissions from the application of EU rules.

With halfway convergence (in respect of energy intensity) the emissions of nitrogen oxides would remain largely unchanged from the reference scenario figures. They would on the other hand drop much more quickly if EU rules, in particular those for motor vehicle exhausts and fuels that have been proposed as an outcome of the auto-oil program and are likely to come into force as from 2000, were to be applied.

As can be seen from Table 2 the changes in energy use, and especially in its efficiency, are clearly more likely to affect the emissions of sulphur in the ten accession countries than would the application of present EU legislation.

Introduction of the EU requirements for 2000 for vehicle exhausts and fuels would on the other hand accelerate reduction of the emissions of nitrogen oxides. It may be of interest to speculate whether the accession countries are likely to adopt the EU standards for exhaust gases and fuels for motor vehicles, irrespective of whether they join the Union or not.

It is evident from what has just been said that the uncertainty about future emissions of the acidifying air pollutants SO<sub>2</sub> and NO<sub>x</sub> is intimately connected with the trend of energy use on the one hand, and on the other with the way road traffic will develop and the emission standards that are imposed on motor vehicles.

The IIASA reporters' conclusion is that improvements in energy efficiency will be of great importance for a further reduction of emissions, and especially of sulphur. They will also make it less expensive to attack the problem directly than it would otherwise have been. The report also underscores the effect the present relatively modest energy-intensive habits and consumer patterns are having in the ten accession countries, such as in the use of private cars and in dwelling standards. Convergence towards the EU in this respect would to some extent counteract the gain from various emission-reducing programs.

## Acidification, eutrophication

Assuming halfway convergence and the adoption of EU standards in the ten accession countries, there would be less exceeding of critical loads for acidification and eutrophication com-

**Table 1. Changes in emissions between 1990 and 2010 according to the reference scenario (in per cent).**

	SO <sub>2</sub>	NO <sub>x</sub>	NH <sub>3</sub>
Europe	-57	-34	-16
CEE	-54	-19	-18
ACC-10	-62	-36	n.a.
EU	-66	-48	-15

**Table 2. Changes in the emissions of SO<sub>2</sub> and NO<sub>x</sub> between 1990 and 2010 in the ten accession countries according to various energy scenarios (HC=halfway convergence, FC=full convergence) with and without EU legislation.**

	SO <sub>2</sub>	NO <sub>x</sub>
1990 (kton)	10,777	3,788
REF 2010	-62%	-36%
HC 2010	-68%	-37%
HC+EU 2010	-68%	-54%
FC 2010	-70%	-37%
FC+EU 2010	-70%	-58%

**Table 3. Exceeding of critical loads for acidification in the whole of Europe, the EU itself, and the ten accession countries. Per cent of total ecosystem area.**

	Area	1990 per cent	REF 2010 per cent	HC +EU 2010 per cent
Europe	82,928	14.8	3.7	3.6
EU-15	33,452	24.8	7.0	6.7
ACC-10	11,798	39.2	9.6	8.7

pared with the levels under the reference scenario. The outcome as regards acidification can be seen from Table 3. Not unexpectedly, it would be mostly in Germany, Finland, Sweden, and Austria, of the EU countries, that improvement would show up as regards both acidification and eutrophication.

### Ground-level ozone

The IIASA also made an estimate of the way in which changes in emissions in the CEE countries, resulting from convergence towards the EU, would affect the critical loads for ground-level ozone. The effects were examined for two load limits: AOT<sub>40</sub> at 3000 ppbh (for crops and natural vegetation) and AOT<sub>60</sub> (as an indicator for effects on health). AOT stands for Accumulated exposure Over a Threshold, meaning here the accumulated exposure, in ppb-hours, over threshold values of 40 and 60 ppb.

Here the likely reductions of NO<sub>x</sub> were calculated according to the various scenarios, and a rough assumption made of the continued lowering of the emissions of volatile organic compounds that would follow from convergence to the EU. For Europe as a whole there would be 19 per cent less exceeding (in ppb-hours) of the AOT<sub>40</sub> limit value, as against the reference scenario, while exceeding of the AOT<sub>60</sub> limit would be 22 per cent less. For central and eastern Europe the figures would be 28 and 35 per cent, and for the EU 4 and 6 per cent.

### Carbon dioxide

All the energy scenarios gave a reduction of the emissions of CO<sub>2</sub> in the

accession countries. Under the reference scenario they would drop from 987 million tons in 1990 to 979 million in 2010, and, assuming halfway convergence, to 860 million tons, and still further to 844 million under full convergence.

In conclusion it may be said that the pattern of emissions in the CEE countries is changing to the extent that the emissions of sulphur will fall more rapidly than those of nitrogen oxides. Taking the ten accession countries as a group, sulphur emissions there can be expected to drop by 60-70 per cent between 1990 and 2010, no matter whether these countries approach the EU in environmental legislation or not. During the same period the emissions of nitrogen oxides would diminish by 35-40 per cent – or more, by 50-60 per cent, if the proposed EU legislation, and especially that under the auto-oil program, were introduced in these countries too.

CHRISTER ÅGREN

<sup>1</sup> The CEE countries include, besides the ten accession countries, Albania, Belarus, Bosnia-Herzegovina, Croatia, Macedonia, Moldova, Russia, Ukraine, and Yugoslavia.

<sup>2</sup> The accession countries are Poland, Czech Republic, Slovakia, Romania, Bulgaria, Hungary, Slovenia, Estonia, Latvia, and Lithuania.

<sup>3</sup> *Application of the current EU air emission standards to the central and eastern European countries – an integrated assessment of the environmental effects.* Draft final report from the EEA (July 1997) by J. Cofala, R. Kurz and M. Amann, IIASA, Laxenburg, Austria.

## Baltic 21

FOR THE LAST two years the countries surrounding the Baltic Sea have been engaged in a cooperative effort to develop an Agenda 21 for the whole region. The start came at a meeting of the region's prime ministers at the Swedish town of Visby, on the island of Gotland in mid-baltic, in May 1996, and the follow-up has centred on the question of "How can regional cooperation contribute to sustainable development in the Baltic Sea Region?"

Seven working groups, operating under a steering committee, have

each had care of a particular sector – energy, transportation, industry, farming, and so on. It is not only civil servants that have been engaged, but also representatives of non-governmental organizations, business interests, etc. The work has now got to the stage at which a draft regional Agenda 21 is being negotiated, with the aim of having a final document ready for signing this summer.

Further information can be obtained from: Baltic 21 Secretariat, Ministry of Environment, 103 33 Stockholm Sweden. Fax. +46-8-440 1944. Internet: [www.ee/baltic21/](http://www.ee/baltic21/)

## Further publications

### Changing journeys to work (1997)

Commuting accounts for almost a quarter of car use in the UK, and 70 per cent of all journeys to work are made by car. A number of examples of the way business firms, hospitals, and others have tried by various means to get employees to alter their travel habits are presented in this report on green commuter planning. Lack of parking space has often been the chief incentive to action.

£30.00. Published by Transport 2000, Walkden House, 10 Melton Street, London NW1 2EJ, England.

### OECD Environmental Data – Compendium 1997

A vast array of data from the OECD countries concerning emissions of pollutants, consumption of resources, and developments in energy, transportation, manufacturing industry, and agriculture.

288 pp. 260 francs. Bilingual: English and French. Obtainable from OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France. Fax +33-1-4524 8003. E-mail: [sales@oecd.org](mailto:sales@oecd.org).

### Environmental Taxes and Green Tax Reform (1997)

Most OECD countries have introduced various ecotaxes, but only a few are implementing comprehensive green tax reforms. This report reviews the state of the art and the lessons which can be drawn, for example, as to the competitiveness, social equity, and employment implications of green taxes. 68 pp. 50 francs. Also available in German. Can be ordered from OECD, address as above.

### OECD Environmental Performance Review: Finland, Belarus (1997)

Latest to be dealt with in the OECD's continuing scrutiny of individual countries progress in environmental matters are Finland and Belarus. 145 and 142 pp. The Belarus report is available both in English and Russian. Obtainable from OECD, address as above.

### Environmental Balance of Transport: Austria 1950-1996

A lavishly illustrated report on the way traffic is developing in Austria, with its associated emissions, noise, and accidents. The various modes are compared in their environmental aspects, and the implications of the term sustainable transportation are examined, together with examples of Austrian solutions.

48 pp. Published by the Federal Ministry for the Environment, Div. I/5, Stubenbastei 5, A-1010 Vienna, Austria.

## FILM

## “Sex, Sulphur and a Fishy Business”

OIL BARONS AND SHIPOWNERS get some of the worst knocks in a film that is about to be released on acidification – the idea for which came from the Swedish Anglers' Association.

No mere school film, didactically explaining such matters as pH, fish-kill, forest decline, and so forth, this film, entitled *Sex, Sulphur, and a Fishy Business*, is said by Dan Jonasson of the Anglers' Association to aim at “shaking up viewers and again putting one of our time's greatest environmental catastrophes high up on the political agenda.”

Scheduled for showing on TV in Sweden and Norway this spring, *Sex Sulphur, and a Fishy Business* is also being considered by TV broadcasters in several other countries. Moreover a video version will be distributed to environmentalist organizations, anglers' clubs, and others throughout Europe, together with information material in English from the Swedish NGO Secretariat on Acid Rain. The aim is to have it shown at meet-

ings to arouse public opinion and on similar occasions.

*Sex Sulphur, and a Fishy Business* has been directed by Martin Falklind, a freelance film maker with a number of prize-winning productions to his credit. The producer is Anders Envall of Dockhouse Film & TV AB, Göteborg, Sweden. The video version will be available in an English as well as a Swedish version, and possibly in other languages too.

The information material especially produced for the occasion includes an eight-page leaflet entitled *For cleaner air – it will pay to reduce acidifying emissions*, which clarifies the effects of acidification and – still more – what can be done to stop it. A thoroughgoing survey of this and associated problems is also available in a 96-page paperback, *Acidification & Air Pollution: Still With Us*, accompanying the video.

Single copies of the film and printed matter can be had free. Please ask the Secretariat for further information.

## New informational matter on traffic and health

GREATER possibilities for individuals and groups to influence air quality in the European Union were opened up through a framework directive that was adopted by the EU in 1996. These possibilities have now been outlined in a four-page factsheet entitled *The air over Europe: the health effects of traffic*, and explained more fully in a book, *Traffic and Health*, which can be bought for Bfr250.

Both are joint publications of the European Environmental Bureau

(EEB) and the European Federation for Transport and Environment (T&E), which also share the same address: Boulevard de Waterloo 34, B-1000 Brussels, Belgium. Fax +32-2-502 99 08, e-mail: [tande@knooppunt.be](mailto:tande@knooppunt.be) (T&E). Fax +32-2-289 10 99, e-mail: [eeb.bee@skynet.be](mailto:eeb.bee@skynet.be) (EEB).

The factsheet is available in French, Dutch, Italian, Spanish, Portuguese, and Greek versions, as well as in English.

## Coming events

**EU Council of Environment Ministers. March 23, 1998.**

**Nitrogen: The Confer-N-s. Noordwijkerhout, the Netherlands, March 23-27, 1998.** International conference to review current knowledge in the field of nitrogen pollution, organized by the Dutch environment ministry and environment agency, within the framework of the Convention on Long Range Transboundary Air Pollution. *Inquiries:* Eurocongres Conference Management, P.O. Box 74713, 1070 BS Amsterdam, The Netherlands. Fax +31-20-673 7306. E-mail: [eurocongres@rai.nl](mailto:eurocongres@rai.nl).

**Climate Convention. Bonn, Germany, June 2-12, 1998.** *Information:* [www.unfccc.de](http://www.unfccc.de).

**Biomass for Energy and Industry: 10th European Conference and Technology Exhibition. Würzburg, Germany, June 8-11, 1998.** *Inquiries:* WIP, Conference Coordination, Sylvesterstrasse 2, 81369 München, Germany. Fax. +49-89-7201291. E-mail: [renewables@mail.tnet.de](mailto:renewables@mail.tnet.de).

**EU Council of Environment and Transport Ministers. June 16-17, 1998.**

**Environment for Europe. 4th Pan-European Conference of Environment Ministers. Århus, Denmark, June 23-25, 1998.** *Information:* Danish Environmental Agency, Strandgade 29, DK-1401 København K, Denmark. Fax +45-3266 0296. Internet: [www.mst.dk/aarhus-conference](http://www.mst.dk/aarhus-conference).

**1998 World Renewable Energy Congress. Florence, Italy, September 20-25, 1998.** *Inquiries:* Prof. A. A. M. Sayihn, 147 Hilmanton, Lower Early, Reading RG6 4HN, England. Fax +44-118-9611365.

**Fourth Conference of the Parties to the Climate Convention. Buenos Aires, Argentina, November 2-13, 1998.** *Information:* [www.unfccc.de](http://www.unfccc.de).