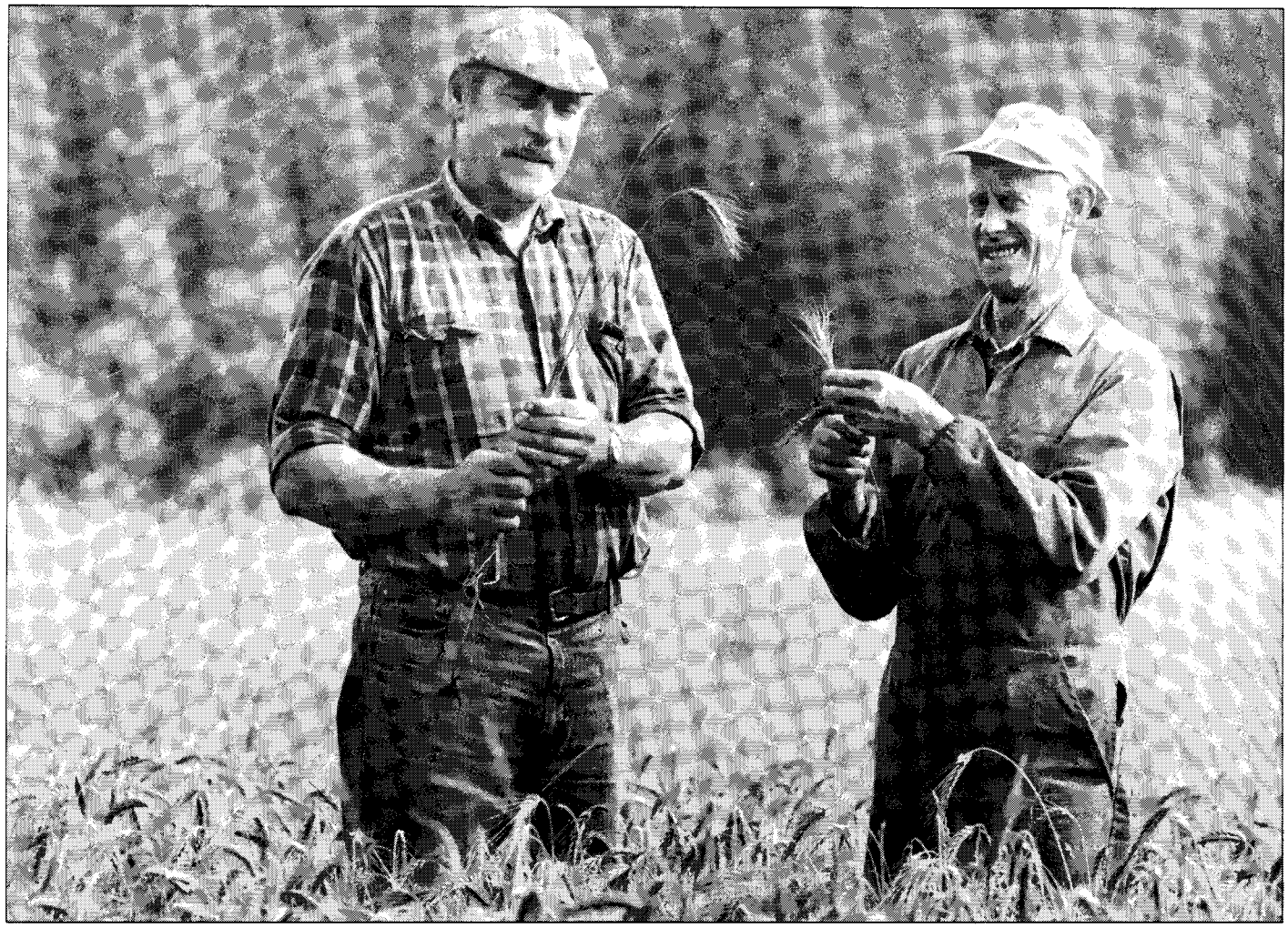
NO. 3, OCTOBER 1997

Acid News



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RESEARCH

Acidification and health

THE SWEDISH Environmental Protection Agency has just revealed the results of a five-year study of the effects of soil and water acidification on health. Acidification alters people's exposure to a number of noxious metals, including cadmium, methyl mercury, and lead. It also affects the bodily uptake of important trace elements, such as selenium. But it has so far been impossible to prove any adverse effect on humans, although it is clear from the available data that the margins of safety are small.

The acidification of soil and water is a widespread problem in regions where the bedrock has a low buffering capacity and the precipitation is acidic. Although the scientists have found no direct effects of acidification on human health, there can be indirect ones. It has long been known that the mobility of many metals changes in an acidified environment (see figure on page 3), but little attention has been paid to the way this affects people's uptake of these metals and what health effects may follow. And that the Swedish researchers have now been studying.

One group studied the way the extent of the soil's acidification (its pH value) affected the content of toxic and essential trace elements in spring wheat, carrots, and potatoes. It was found that the plants' uptake of several metals changed with the degree of acidification, and that of the noxious metals, cadmium needs the most attention (see box, p. 4). A significant correlation was seen between a declining pH value in the surface soil and an increased cadmium content in carrots and potatoes. In spring wheat it was in the straw, but not the grain. When liming was used to counteract acidification, moderate doses were found to result in lower amounts of cadmium in the plants, while large doses brought about an increase – probably due to the fact that the calcium separates the cad-

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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 fullfill 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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Published by: The Swedish Society for Nature Conservation

Printed by: Williamssons Offset, Solna, on paper not bleached with chlorine.

ISSN 0281-5087

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.

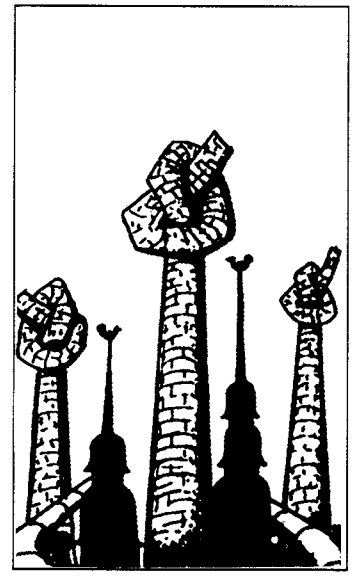
☐ Acting as coordinator of the international activities, including lobbying, of European environmentalist organizations, as for instance in connection with the meetings of the bodies responsible for international conventions, such as the Convention on Long Range Transboundary Air Pollution.

☐ Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.

EDITORIAL

Can't be left out

THE TIME IS NOW approaching for meaningful negotiations, under the Convention on Long Range Transboundary Air pollution, for the new so-called super-NOx protocol. The aim is to have the problems of acidification, eutrophication, and ground-level ozone treated in a single document.



The difficulty of dealing with all three aspects of the matter simultaneously has meant that the preparatory work on the proposal has taken longer than expected. Ever since the appearance of the first sulphur protocol in 1985, a new one has been produced under the Convention every third year, culminating in the so-called Oslo protocol of 1994 for sulphur. It is now intended that the new super-NOx protocol, covering nitrogen oxides, ammonia, and volatile organic compounds, shall be ready for signing before the end of 1998.

It has been very evident, both from the preparatory work on this last, and the development of the EU strategy on acidification, that the most cost-effective way of attacking acidification – no matter whether ozone, say, and/or eutrophication are being dealt with at the same time – will inevitably have to involve reductions in sulphur emissions beyond those agreed in the Oslo protocol.

This had already been clearly foreseen when the protocol was signed, since it contains a clause (Article 8) envisaging a review of the signatories' commitments. It was further stated that the "first such review shall be completed in 1997." In view of the slow progress of ratification however (see article, p.5), the Executive Body of the Convention decided last November that the review was to be postponed but that it was "to be concluded six months after the first session of the Executive Body following the entry into force of the Protocol."

In reality this means that such a review cannot take place until the spring of 1999 at the earliest; in other words, after the super-NOx protocol is supposed to be ready.

There are various reasons why that protocol should be expanded so as to include measures for further reductions of the emissions of sulphur.

☐ It has long been evident that sulphur emissions will have to be reduced considerably more than they will be as a result of the Oslo protocol.

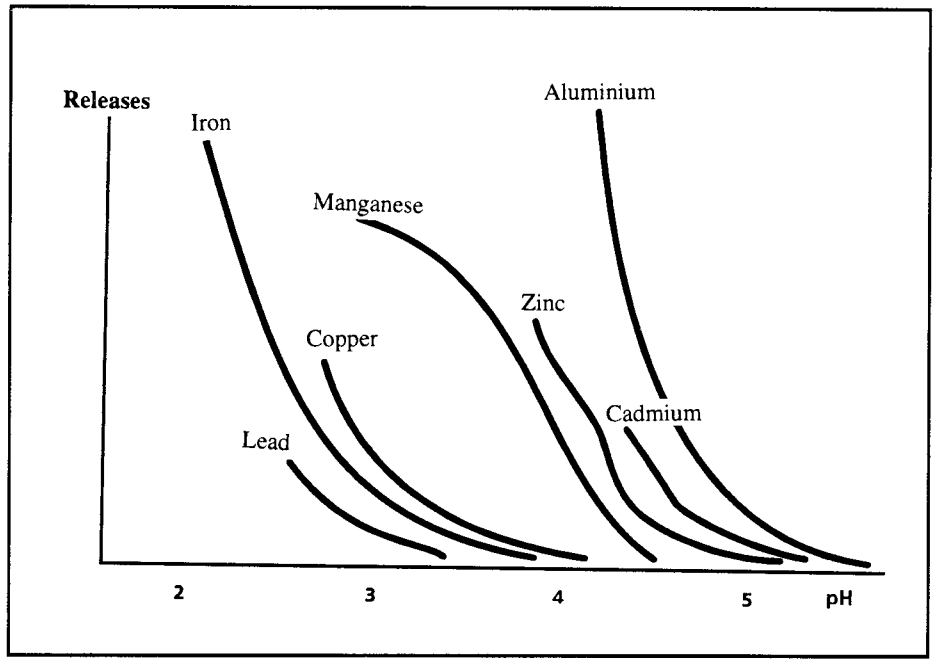
☐ Imminent and future EU legislation, including those associated with the acidification strategy, is expected to promote such reductions in the member states (and eventually in the ten so-called accession countries of central and eastern Europe as well).

☐ Only if sulphur emissions are reduced still further will it be possible to arrive at acceptable targets for acidification, and moreover such as will be cost-effective.

Failure to take into account further reductions of sulphur emissions when working out the super-NOx protocol would therefore greatly impair its effectiveness, and so the credibility of the Convention's work in general.

The Executive Body of the Convention should therefore, when it meets at Geneva in December, annul last year's decision concerning the time for review of the terms of the Oslo protocol. It should moreover firmly lay down that further reductions of sulphur are to be taken into account in the development of the super-NOx protocol. Whether that can best be done by extending the directives for the protocol as to make it include sulphur, or by simultaneous revision of the Oslo protocol, is perhaps a matter of opinion.

CHRISTER ÅGREN



Higher releases of metals from the mineral soil as the pH value decline.

Continued from front page

mium from the soil particles, thus making it more available to the plants.

Of the total dietary intake of cadmium, 75 per cent is estimated to come from cereals, potatoes, and other vegetables. Continued acidification of the soil, together with insufficient liming, is likely to result in an increase of cadmium in food. The scientists therefore recommend that steps should be taken in general to reduce the input of cadmium to the environment, and that farmers should keep a close watch on the pH value of their soil, and regularly apply lime in moderate doses. It may be mentioned that in Sweden 90 per cent of the acidification of ploughland is due to farming practices (using artificial fertilizer, harvesting, etc.) and about 10 per cent to deposition of acidifying substances.

It is also a question how much of the cadmium we take in with our food actually becomes absorbed by the body. A group of non-smoking women was taken for a test, where half had a normal diet and half a vegetarian, high-fibre food. Although the intake of cadmium was higher for the latter group, no differences between the groups were discernible in regard to the cadmium content in individuals' blood and urine. Two thirds of the women in both groups did however show reduced stores of body iron, demonstrating a clear connection with high contents of cadmium in the blood. It thus seems that the tendency of the body to take up cadmium is greater when the iron store is small.

"What is possibly the most sensitive period in our life has been surprisingly poorly studied," says Agneta Oskarsson of the Swedish University of Agricultural Science. Professor Oskarsson has studied the exposure of the new-born to metals, and mercury and lead in particular, via the mother's milk. She found a clear connection between the degree of exposure and a raised content of metals in the milk – although the levels are still not regarded as alarmingly high. There was a positive correlation between the levels of mercury in the mothers' milk and the number of amalgam fillings in their teeth, but not with methyl mercury from the consumption of fish. Acidification has thus apparently played no part here.

A suspected cause of adverse health effects in children from acidification is on the other hand a considerable exposure to copper in drinking water (caused by corrosive water in copper piping). It appears from one of the studies that many children get more than their daily requirement of copper just from drinking water. The effect copper in drinking water may have on the frequency of diarrhoea in infants is now being studied.

One of the other special studies concerned the connection between the degree of acidification in an area,

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and the content of metals in the bodies of the inhabitants. About 200 farmers were picked out in southern Sweden, the water from whose wells that was used for drinking water varied from acidic to non-acidic. Although there were found to be distinctly higher contents of metals in the acidic wells than in the non-acidic, no significant differences could be distinguished in the amount of metals in the blood and urine of farmers with the different kinds of well water.

"In our view the effects of acidification have not yet become so great as to influence people's uptake of metals, so there is still time to do something about this before it becomes a real health problem," says Staffan Skerfving of the Department of Occupational and Environmental Medicine at the University of Lund, who headed the well-water study. A possible explanation may be that not even farmers eat locally produced foodstuff to any great extent. This may be an important factor, since much of our metal intake comes via food. It may also be that the acidity of cropland does not run parallel with that of well water – which in turn may be a consequence of liming. Furthermore, the individuals chosen for the study – adult males – are not the most sensitive group of the population. Increased levels of toxic metals in food and drinking water may lead to increased uptakes in certain groups, without the effects showing in a standard population.

Then there is the question of whether there is any connection between high concentrations of aluminium in drinking water – a distinctive effect of acidification – and the risk of developing Alzheimer's disease. The hypothesis was put forward in Norway in the middle of the eighties, after a geographical correlation had been found between cases of Alzheimer and the amount of aluminium in drinking water. Relatively high concentrations of aluminium were said to have been found in the brains of persons who had died of the disease.

Present knowledge clearly indicates that the safety margins are small

Scientists who have now looked into the matter maintain however that the Norwegian study suffered from severe methodological faults: the concentrations in drinking water say little, they say, about the actual exposure, and because diagnosis is difficult, classification may have been wrong. The hypothesis is also suspect because there has not been possible to prove that the Alzheimer sufferers had higher levels of aluminium in the brain than other persons. Also, heavy exposure to aluminium, for instance via some medicines (antacids) has never proved to be a risk factor. The scientists are agreed however that the effects of aluminium uptake on humans need to be studied more thoroughly.

In their abridgement of the whole study in the December 1996 number of *Ambio* magazine the researchers wrote:

"Although there is no firm evidence at present of adverse health effects in humans in Sweden due to acid precipitation, the present knowledge clearly indicates that the safety margins are small and that efforts should be made to keep all sources of exposure to toxic elements as low as possible. Thus, attempts should be made to prevent the ongoing acidification in many areas before adverse health effects become evident."

Falling outside the scope of the study was the question of how other organisms in nature – from microscopically small but highly important decomposers to large elks – react to the raised levels of metals that have been found in groundwater and plants. Are they more resistant, or less, than humans?

PER ELVINGSON

For further information reference is made to the abridgement in *Ambio*, Vol. 25, No.8, December 1996. The final report on the study will be published by the Environmental Protection Agency during this autumn.

Effects of cadmium

Smoking is what mainly causes high concentrations of cadmium in people who are not exposed to it in their work. But foodstuffs also contain considerable amounts. Plants' uptake of cadmium increases when the soil becomes acidified. In Sweden concentrations in the soil are now increasing at a rate of 0.2 per cent a year. This is due in about equal extent to the use of artificial fertilizer containing cadmium and atmospheric depositions.

The atmospheric depositions of cadmium – as of other heavy metals – are an international problem. According to the Swedish Environmental Protection Agency about 70 per cent of the deposition of metals over Sweden is traceable to outside sources – most of it coming from the heavily industrialized areas of Europe, and especially from Germany, Poland, Russia, Belarus, and Ukraine. The main source of the emissions of cadmium as well as mercury to the atmosphere in Europe is to be found in coal burning.

The kidneys are the most sensitive of the bodily organs to cadmium. The medical experts of the World Health Organization have up to now maintained that the safety limit for cadmium in the kidneys lies at 200 milligrams of cadmium per kilogram of tissue, but according to recent Swedish findings damage can occur already at 50 milligrams, especially if the individual suffers from a chronic deficiency of iron.

Cadmium causes changes in the kidneys' tubular parts, bringing amongst other things leakage of proteins to the urine. Normally this causes no obvious trouble, but it does bring an increased risk of kidney stones. Research now indicates, too, an increased risk of dying of other diseases – and so a shortening of the average lifespan.

Cadmium can also cause skeletal brittleness. Recent research in Sweden suggests that this can occur also at concentrations equivalent to 50 milligrams per kilogram of kidney tissue. "Some smokers have so much cadmium in their bodies that they will not only suffer from kidney trouble when they get older. Their skeletons may become so brittle that they will easily break bones," says Lars Järup, a scientist at the medical unit of the Stockholm county council. Carl-Gustaf Elinder, a kidney specialist who has long been engaged by the WHO in matters concerning cadmium, now judges the margin of safety for public health to have become small, fearing that the situation can become worse if the present trends for smoking and emissions to the atmosphere continue.

□

Need to hasten ratification

THE PROTOCOL on volatile organic compounds, figuring under the Convention on Long Range Transboundary Air Pollution, comes into force on September 29 this year, having now been ratified by the necessary sixteen parties.

Ratification means that most of the signatories have undertaken to reduce their emissions of VOCs by at least 30 per cent by 1999, from 1988 levels. The protocol was signed as early as 1991, but ratification has been remarkably slow, and it was not until the Czech Republic came in on July 1 that the tally was complete.

It may be worth noting however which signatories have still not ratified the protocol: Belgium, Bulgaria, Canada, Greece, Portugal, Ukraine, the United States, and the European Community.

Just now a "super NOx" protocol is in process of negotiation, aimed at reducing acidification, ground-level ozone, and eutrophication in a single package. This is to be achieved by lowering the emissions of SO_2, NO_x, VOCs, and ammonia. The way for further, more far-reaching, reductions of the emissions of VOCs will be eased by the coming into force of the present protocol.

Negotiations on the super-NOx protocol should be further facilitated if the sulphur protocol of 1994 also becomes ratified by the necessary number of parties. Here again there must be sixteen of them ratifying, for the protocol to come into force, and so far ten have done so. These are Canada, the Czech Republic, France, Liechtenstein, Luxembourg, the Netherlands, Norway, Spain, Sweden, and the United Kingdom. At meetings under the convention during the past year a further six – Austria, Belgium, Denmark, Germany, Slovenia, and Switzerland – reported a start on the process of ratification, indicating that it would "soon" be completed. Moreover this spring the EU Commission put forward a proposal that the Union should ratify, which means the protocol will be on the agenda both for the EU parliament and the council of ministers in the autumn.

Because of the unexpected delay in the ratification of the sulphur protocol, its revision, which according to the text of the agreement should have taken place this year, has had to be postponed while awaiting the coming into force of the 1994 version.

In the course of the work on the EU strategy for acidification it has become quite clear that further measures against sulphur emissions are not only necessary but would be a cost-effective means of attaining the agreed environmental aims. Commitments to reduce emissions beyond the requirements of the 1994 sulphur protocol will therefore be needed for the success of the super-NOx protocol. It will be much easier to obtain them if the sulphur protocol has come into force before the end of the super-NOx negotiations.

To conclude, it may be said that there are a number of weighty reasons why those parties to the LRTAP convention that have still not ratified the 1994 sulphur protocol should do so without further delay. Besides the seven that say they are on the way to ratify, this applies particularly to the remaining signers of the agreement – Bulgaria, Croatia, Finland, Greece, Hungary, Ireland, Italy, Poland, Russia, and Ukraine.

CHRISTER ÅGREN

Climate Convention

LITTLE OF CONSEQUENCE came out of the latest meeting of the Ad Hoc Group on the Berlin Mandate, which was held at the end of July and beginning of August. There will now be only one more meeting of the group before the third conference of the parties to the UN climate convention in Kyoto, Japan, this December. Although it had been decided that a protocol with binding clauses for the period after 2000 was to be adopted at that meeting, most of the main questions still remain unanswered.

The proposal from the European Union, that all the industrialized countries should reduce their emissions of greenhouse gases by 15 per cent by 2010, from 1990 levels, and by at least 7.5 per cent by 2005, won little backing, either from the industrialized or the developing countries.

Observers laid much of the blame on Japan and the United States, neither of which has yet come forward with formal proposals for emission reduction targets and timetables. Many now believe that all that is likely to emerge from the Kyoto meeting will be a watered-down protocol containing some structural elements and perhaps a weak target, leaving the details to be worked out over the next few years.

It has been agreed that the fourth conference of the parties will be held in November 1998.

Source: **Environment Watch: Western Europe.** September 5, 1997.

New pamphlet on shipping

Cleaner shipping – a cheap way of reducing acidification in Europe is the title of a six-page pamphlet just published by the Swedish NGO Secretariat on Acid Rain in collaboration with the European Federation for Transport and Environment (T&E) and the European Environmental Bureau (EEB). It describes the voluminous emissions of acidifying pollutants from shipping and the good possibilities of reducing them through available technology, as well as the political obstacles. It ends with exhortations to the International Maritime Organization, the EU, and individual countries to do something about this problem.

The pamphlet can be obtained free of charge from the secretariat.

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FUELS AND VEHICLES

Stricter standards to come

Controversy still reigns however as to their formulation and timing

AT THEIR MEETING in June this year, the environment ministers of the EU countries adopted a common position in regard to the Commission's proposals for directives to regulate the quality of fuel for motor vehicles in general and the emissions of pollutants from passenger cars in particular. Although they represent an improvement over the proposals put forward by the Commission in June 1996, the common-position requirements are still considerably weaker than those called for by the European Parliament at the first reading last April.

The proposals are an outcome of the auto-oil program, a joint research project in which the Commission and automobile and oil industries have been seeking to find the most cost-effective means of meeting the requirements for air quality set for the EU for 2010.

During the year that has passed since the Commission first presented its proposals (see AN 4/96), discussion has mainly centred on the quality requirements for petrol and diesel fuel, with the sulphur content chiefly engaging attention (see box). The environment ministers' agreed on a lowering of the sulphur content in petrol (from 200 in the commission's proposal to 150 ppm) while leaving it unchanged for diesel fuel (350 ppm). The parliament had demanded a lowering of both, to 30 and 100 ppm, with special tax incentives for diesel with a sulphur content of 50 ppm. The limits should apply from the year 2000, although the ministers' decision means that a derogation for max. three years would be allowed for those countries that could claim "severe socio-economic problems" if they were applied sooner. While the Commission left the matter of levels from 2005 open, the ministers wanted to set 50 ppm as an indicative limit value both for petrol and diesel fuel, as a clear signal to the industries concerned of what they had to expect. The parliament would have gone still further and made the limits for 2005 statutory.

There has also been controversy over the maximum permissible content of benzene in petrol. The ministers' common position lowered this from 2 in the Commission's proposal to 1 per cent (it is now 5 per cent). The ministers also decided to set the content of aromatic hydrocarbons at 42 per cent, as against 45 per cent in the Commission's proposal, with 35 per cent as the indicative limit for 2005. As regards lead in petrol they accepted the Commission's proposal to ban the marketing of leaded petrol in the EU from January 2000, but lengthened the time for possible derogation from two to five years for those countries that could show that the ban would cause them severe socio-economic problems.

Not to be forgotten either, as regards fuels, is the possibility for member states to set stricter requirements than those laid down in the directive. Permission to do so can be

granted by the Commission, if a country can show it to be necessary for the protection of people's health and/or the environment in specific agglomerations or ecologically sensitive areas with special problems of air quality.

As for car emissions, the ministers decided to accept the Commission's proposals *in toto*, despite demands from the parliament for a tightening of some of the requirements, such as for the emissions of nitrogen oxides and particles from diesel-driven vehicles. The Commission's proposals had been criticized by many as being too weak – it having been suggested, for instance, that the emission requirements should be technically neutral, in other words be the same for all passenger cars, no matter whether petrol or diesel driven (see AN 5/96, p.10). The parliament has also wanted the indicative figures for the year 2005 to be made binding from the start, but here again its ideas failed to gain response.

In a couple of cases the ministers did however tighten up the Commission's proposals. According to the common position, the functioning of emission control devices shall be ensured through selective after-sales checks on vehicle performance, which it is thought should encourage manufacturers to equip cars with more durable anti-pollution devices. Requirements concerning cold starts, to be applicable from 2002, will mean lower emissions particularly of hydrocarbons.

Tax incentives, to hasten the introduction of cleaner vehicle types, can be used to encourage compliance with the emission limits before they become mandatory (in the year 2000) and with the indicative values during the period 2000 to 2005.

Since these directives are subject to so-called codecision – giving the European Parliament right of veto – the matter will now go to that body for a second reading. The speaker for the parliament's environment committee, Noël Mamère, said right-away that the ministers' compromise was "far from adequate," and added that the parliament would be taking up arms against a directive that seemed, as he put it, "more concerned about the financial interests of the oil industry than consumers' health." An outcome of the battle between the ministers and the parliament can in any case hardly be expected before the middle of 1998.

These two directives will constitute the first part of the auto-oil package to become law. Included in the package will also be directives for standards for light commercial as well as heavy duty vehicles, and rules for periodic roadworthiness tests. Proposals concerning light commercial vehicles were presented by the Commission last February (see AN 2/97, p.5), and can be expected for heavy-duty types in the autumn. Drafts for directives on standards for vehicles and fuels from 2005 onwards will, according to present plans, be presented by the Commission sometime during the first half of 1999.

PER ELVINGSON

Note. Extensive comment on the auto-oil proposals has been published both by the European Federation for Transport and Environment and the European Environmental Bureau. Can be obtained free by calling on phone +32-2-502 9909 (T&E) and +32-2-289 1090 (EEB).

Sulphur in diesel fuel and petrol

The EU Commission's proposals for the limits to the sulphur content of these fuels that are to be applicable from the year 2000 have met with heavy criticism from the European Parliament as well as environmentalist organizations and several EU member countries (see AN 2/97, p.4). It is said that the Commission has greatly overestimated the cost of reducing the sulphur content, while underestimating the beneficial effects of a low sulphur content, mainly by

☐ Causing the three-way catalyzers of petrol-driven vehicles to function more efficiently.

☐ Markedly reducing emissions of the pathogenic small particles from diesel vehicles.

☐ Facilitating the introduction of de-NOx catalyzers (dependent on low-sulphur fuel to function properly) on diesels. Oxidizing catalyzers, which cut down the amounts of hydrocarbons and particles in diesel exhausts by more than 90 per cent, also need low-sulphur fuel.

☐ Having immediate effect – much quicker than changes in vehicle design, where improvement becomes apparent gradually as fleets are renewed.

EU IN BRIEF

Acidification strategy

The acidification strategy, put forward by the EU Commission in March, was formally presented to the environment ministers at the meeting of the Environment Council in June. Although there was no real debate, after the environment commissioner, Ritt Bjerregaard, had introduced the document, a *tour de table* took place, in which the ministers each gave a general opinion. Most critical were the Mediterranean countries, and especially Italy, while the northern countries were more inclined to approve. Great Britain and Ireland seem undecided, supporting on the one hand the idea that transboundary problems should be handled at Union level, but being unable at present to agree to reducing their emissions to the extent that is likely to be required of them according to the strategy.

This autumn both the European Parliament and the Environment Council will be giving their views of the strategy. A declaration – in the form of a "resolution" or "conclusions" – can be expected from the Environment Council when it meets in December.

Also for ozone

The Commission has started on the development of a strategy for reducing the concentrations of ground-level ozone too. The procedure is largely the same as for the acidification strategy. For one thing IIASA, the International Institute for Applied Systems Analysis, has been asked to find cost-effective ways of attacking the problem through computer modelling. At the same time the Commission is working on a new air-quality directive concerning ozone. Both the strategy and the directive are scheduled for presentation in March 1998.

LCP directive

A review of Directive 88/609/EEC on the limitation of emissions of certain pollutants into the air from large combustion plants has now been in the hands of the Commission for several years. According to the directive a proposal for revision should have been forthcoming between 1994 and 1995, but there have been delays. During the summer, however, two meetings took place, attended by experts from the member countries, industry, and environmentalist NGOs, where the Commission presented a proposal for a new text to the directive.

The most important sections concern new emission limit values for new plants as well as limits for the emissions from existing plants. The Commission pro-

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posed setting new ceilings for sulphur dioxide and nitrogen oxides, covering the collective emissions from both new and old plants. These ceilings should be in the line with those expected for national emission totals under the acidification strategy.

There is still considerable disagreement among the members as to the actual aims, both as regards the emission limit values for new plants and the emission ceilings. Many countries have moreover reservations concerning the principles according to which ceilings should be set. Other matters among the many waiting to be settled include various definitions as well as the fuels that are to be covered by the directive. The express aim of the Commission is to present a formal proposal for a new directive this autumn.

EU treaty revision

One of the main goals for the EU, as was agreed when the treaty was up for revision in Amsterdam during the summer, is to promote "balanced and sustainable development of economic activities." In a declaration attached to the treaty, the European Commission has promised to make "environmental impact assessment studies when making proposals which may have significant environmental implications."

An important institutional change in the new treaty is that the European Parliament is to have power of codecision in most of the environmental legislation. This will put the parliament on a more or less equal footing with the Council of Ministers and give it an ultimate power of veto over any legislation it considers unacceptable.

A proposal that all matters of environmental concern should be decided by majority vote in the Council of Ministers was voted down, which means that the acceptance of new taxes, such as the long-awaited energy/CO_2 tax, will still require unanimity among the member states.

The most controversial treaty change in regard to the environment concerned the extent to which member states are to be allowed to apply more stringent rules in their own country than the EU harmonized ones. Hitherto it has only been possible to employ stricter national rules if they had been in place before the harmonization law was adopted, but now the member states can do so in any case. The possibility is however in fact strongly limited by the proviso that such national measures shall not "constitute an obstacle to the functioning of the internal market."

The treaty is due to be signed early in October.

Sources: **ENDS Report** 269. June 1997. **Environment Watch: Western Europe**. June 20 and August 1, 1997.

DIRECTIVE

Reducing sulphur in fuel oils

After coal, heavy fuel oil is far and away the largest source of sulphur dioxide emissions in Europe. A new directive would now limit the sulphur content of such oil to 1 per cent – a move that has already been criticized in some quarters as being too weak.

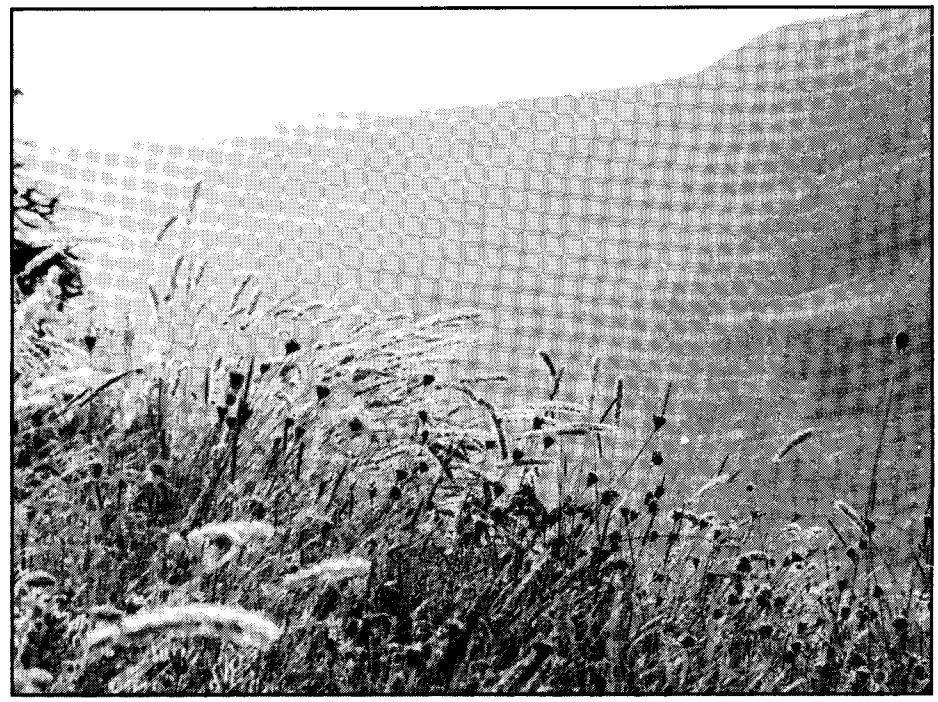
A DRAFT DIRECTIVE that would limit the sulphur content of heavy fuel oil to 1 per cent as from the year 2000 has now been presented by the Commission. It is intended as a key legislative plank in the EU strategy for combating acidification (see AN 1/97, pp. 6-7).

The proposed directive will partly replace the existing Directive 93/12/EEC which regulated the sulphur content of certain liquid fuels, including gas oils and diesel fuels. In that the maximum sulphur content of gas oils was set at 0.2 per cent as from October 1, 1994. The 1993 directive does not however cover heavy fuel oil, which is a main contributor to the emissions of sulphur dioxide.

Heavy fuel oil is used for generating power and heat in power stations, industrial plants, and refineries. In 1993 nearly 3 million tons of SO_2, or about 20 per cent of the European Union emissions, came from the burning of heavy fuel oil (Table 1). The Commission estimates that in the absence of targeted measures this share will have increased to 40 per cent by 2010.

The consumption and average sulphur content of heavy fuel oil vary from country to country – Italy, the United Kingdom, Spain, France, and Germany being the biggest consumers (see Table 2). The average sulphur content in the EU has been estimated to be about 1.8 per cent, although some categories used in Spain have concentrations as high as 3.5 per cent. National legislation in several member states, such as Denmark, Germany, and Austria, has however resulted in the average sulphur content there being already around or below 1 per cent. In Sweden a national sulphur tax has brought it as low as 0.3 per cent.

In general, the new directive would limit the sulphur content of heavy fuel oil (HFO) to 1 per cent from January 1, 2000. The proposed text



Environmental Factsheet No. 7 October 1997

Previous factsheets in the series:
No. 1 Forest Damage (December 1992)
No. 2 Critical Loads (February 1993)
No. 3 The ECE Convention (April 1993)
No. 4 Climate Change (October 1993)
No. 5 Sulphur Emissions (December 1994)
No. 6 Critical Loads (April 1995)

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A threat to life

Air pollution is a serious threat to the diversity of life. This factsheet deals primarily with the effects of acidification, nitrogen fallout, and ground-level ozone – where the specific pollutants are sulphur dioxide, compounds of nitrogen and volatile organic substances. Another potentially serious threat is climate change, only touched upon here, resulting from anthropogenic emissions to the atmosphere of greenhouse gases.

In general it can be said of the effects of air pollutants on biological diversity that:

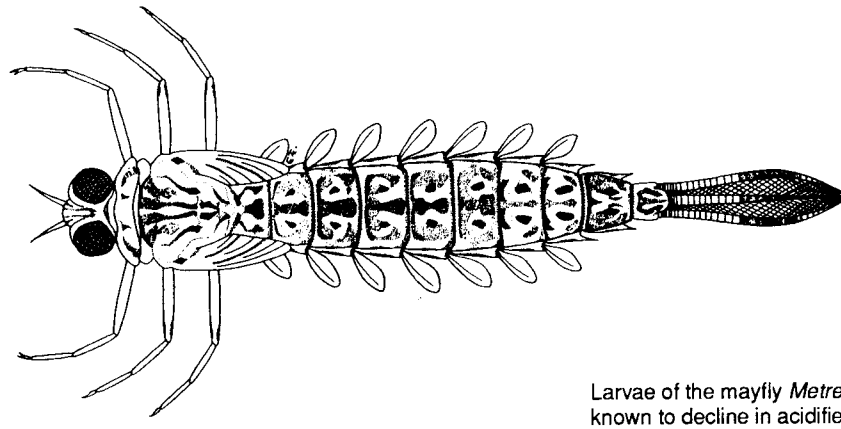
Lower life forms are usually more affected than higher forms. Whereas the effects on larger organisms may be more noticeable, those that can be seen on lower forms of life are far more extensive, as regards both the number of species that are affected and sensitivity of individual species. Especially hard hit are lichens, bryophytes, fungi, and soft bodied aquatic invertebrates.

On land, plants are more affected than animals, but not in freshwater. By nature plants are less able to adapt to sudden changes in pollution levels and climate than animals, which can often migrate or change their source of food. A wide survey of the literature (Tickle et al. 1995) gave evidence of more than three times as many terrestrial plants being affected by pollution as animals. In freshwater ecosystems on the other hand the decline is greater among animal species than among plants. It has been found in studies of benthic fauna in Sweden that the diversity of animal species declined by 40 per cent with a reduction of the water's pH value by one unit, as against a decline of only 25 per cent for plant species.

While most affected species decline as a result of air pollution, some increase. A great majority of species are adversely affected by air pollutants. There are some however that benefit. Many aphids, for instance, appear to be stimulated by air pollutants. Other species are resistant to them and expand to fill the space left by the disappearance of more sensitive kinds.

Effects on different groups

Most of the studies of the effects of air pollutants on animals and plants have been confined to single species or groups



Larvae of the mayfly *Metretopus borealis*, known to decline in acidified waters.

of species. In the study mentioned (Tickle et. al 1995), there were found to have been documented effects on some 1300 species in Europe, including 11 mammal, 29 bird, 10 amphibian, 398 higher plant, 305 fungi, 238 lichen, and 65 invertebrate.

Sensitivity varies, generally speaking, from species to species within each group of organisms and according to such things as the pollution load, the stage of life at which the individual is exposed, and the way competition becomes changed within a particular ecosystem.

The effects found on **plants** were mostly among lichens, bryophytes, fungi, herbaceous flowering species, and trees. The sensitive examples include blue-green algae of the *Nostoc* and *Scytonema* genera (endangered all over Europe because of air pollution), lichens of the *Usnea* and *Ramalina* genera (decline due to gaseous sulphur dioxide), and *Lobaria* (reduced by wet acid deposition), mycorrhizal fungi (affected by nitrogen deposition on acid soils), some species of herbaceous flowering plants, including *Primula veris, Vicia sepium, Trifolium medium*, and *Melica nutans* (cause of decline: soil acidification).

Although the effect on **invertebrates** has been poorly researched, the fact of their being affected has been statistically proved. Among the species that decline in acidified water are all kinds of zooplankton (number of species more than halved), flatworms, leeches, snails, bivalves, small crustaceans, freshwater crayfish, and some mayfly and stonefly larvae (although a few are more tolerant). Some species of insect, such as water boatmen and dragonflies, actually increase in acidified water because of the predatory pattern having changed with the disappearance of fish. Terrestrial invertebrates are also affected, although in their case knowledge is still more limited. Particularly sensitive groups are earthworms, slugs and snails, but effects have also been proved on certain kinds of spider, butterflies, and beetles.

Relatively few examples are known of **higher animals** suffering direct toxic effects either from acidity or gaseous air pollution. The effect tends rather to be indirect, mainly through loss of food sources and the disturbance of reproductive systems. The connection is clearest as regards food loss in acidified waters, which has hit for instance otters, dippers, and ospreys. Amongst animals of slightly lower orders, particularly amphibians and fish, the effects are more commonly related to loss of reproductive capacity – as in the case of Atlantic salmon, brown trout, the common frog and natterjack toad. Usually it is not acidity itself that appears to be the problem, but the effect of acidification in releasing metals such as aluminium into the water.

Research has also indicated that high levels of aluminium, arising from acidification, have contributed to a thinning of the shells on the eggs of some bird species, such as the great tit and pied flycatcher.

Ecosystem responses

Whether and in what way ecosystems are affected by air pollutants depends especially on the nature, concentration and time of arrival of the pollution, but also on the existing status and nature of the particular habitat. In general it can be said that:

Some environments are particularly susceptible. Ecosystems are likely to be most at risk if they are on substrates with a low buffering capacity, and/or receive occasional, heavy doses of pollution, and/or contain key species that are vulnerable. Examples of the last are bark-living communities dependent on foliar lichens and epiphyte mosses. Details of some of the most sensitive European ecosystems appear in the next section.

Air pollution tends to reduce biodiversity, but not necessarily biomass or primary production. The effects on biodiversity are summarized on page 4. The losses usually represent a decline in rarer, more sensitive species, their places being taken over by commoner and more robust species. In the case of plants, these may be many successful weed species that are adapted to a wide range of soil and climatic conditions.

Air pollution does not respect the boundaries of nature reserves and conservation areas. Because loss of habitat has long been the greatest threat to biodiversity all over the world, much conservation effort has been directed to the creation of protected areas which, however, give little protection against air pollution. There are even studies suggesting that the protected areas of Europe are especially at risk from acidifying air pollutants, since they have often been set up on low-pro-

ductive ground of little commercial value – which in many cases offers little resistance to acid fallout.

Liming is not the solution. There are few possibilities, apart from reducing emissions, of getting to grips with the effects of air pollution. In Scandinavia, liming has been used for decades as a means of counteracting acidification. This has saved sensitive freshwater ecosystems, and restored damaged ones. Liming does however leave obvious problems in its trail: disruption of ecosystems, long-term changes in water chemistry, and the risk of causing further damage by the shock of sudden changes in pH value. A similar mixture of benefits and problems occurs with liming of forest soils. Fundamental in both cases is the fact that as long as pollution continues, any gains will be both partial and temporary.

Air pollution is a significant contributory factor to the global decline in biodiversity. To date, research suggests that air pollution has been involved in the decline and attenuation of species, rather than their extinction. It is likely, however, that if the trend continues, particularly sensitive groups in temperate regions will continue to decline until they have become extinct. This is, for example, a real possibility for some lichens. Pollution effects in some areas of the tropics, which are now becoming ever more widespread, can also lead to extinction of species, since both biodiversity and ecosystems are more fragile there than in temperate regions.

Sensitive ecosystems

Among the ecosystems of Europe that are most affected by air pollution are the following:

Freshwater systems in base-poor areas. The surface waters are sensitive to acid deposition in areas where the bedrock does not easily weather. They have become acidified in many parts of Europe, including Scandinavia, Belgium, mid-Wales, and Scotland, as well as in parts of eastern North America. The effects on freshwater life increase with the level of acidity. Some species and groups disappear quickly at the onset of acidification, while others remain resistant to damage, and in the absence of competition may even increase. Estimates indicate that at least 20 per cent of plant and animal species have died out in the 15,000-25,000 European lakes where the pH has fallen by more than 0.5 unit as a result of anthropogenic acid deposition.

Forest ecosystems in polluted environments. From the European survey of 1995 it appears that 25 per cent of the sample trees could be classified as damaged, in equal proportion for broadleaved and coniferous species. The worst damaged were oak (*Quercus* spp.)

Not so simple

It is far from simple to determine the extent to which air pollutants affect biodiversity.

Different pollutants will affect any one species in a variety of ways. The mixture of airborne pollutants to which organisms are exposed can vary in composition, and each combination will have a slightly different effect. Different substances in combination can sometimes have a greater effect than the sum of the effects each one of them would have separately, while in other combinations they can cancel each other out. Although our knowledge of pollutant interactions is still limited, there can be no doubt that certain lichens, for instance, are more sensitive to gaseous sulphur dioxide than to wet deposition of acid, while for other species the reverse is true. Several species of sphagnum mosses decline where there is high sulphur-dioxide pollution, and a few are susceptible to nitrogen oxides too. But in acidified waters many of them increase.

Initially, some pollutants appear to be beneficial, only later to become harmful. Air pollution can benefit some species at the expense of others, either because they are especially resistant, or because the surrounding habitat changes in a way that favours them more than other species. Studies in Germany, for example, suggest that forest decline can result in a temporary increase in some endangered species, such as the three-toed woodpecker, citril finch, crossbill, and rock bunting – by increasing the number of dead trees and the herb and scrub layer in managed forests. On the other hand research also suggests that a still greater number of species will suffer as a result of forest decline.

Air pollution poses both threats and opportunities. The effects of air pollution interact with natural and other anthropogenic factors to alter ecosystems. A number of changes occur, for instance, when a lake becomes acidified: more metals come into circulation, some insect species increase their numbers, fish disappear. This affects aquatic bird species in various ways. Fish-eating species such as divers will gain from the increased transparency of the water but lose because there will be fewer fish. Reproduction may improve because fewer young birds will be eaten by predator fishes, but be set back by an increased content of metals in the food.

Interaction with ozone depletion and climate change. Biodiversity will be affected both by ultra-violet radiation and climate change. Most threatened by climate change are boreal forests, the ecosystems of mangrove swamps, cloud forests, and some wetland and peatland habitats. Either or both of the above factors may interact with acid deposition.

Interaction of air pollution with natural and other anthropogenic factors. The effects of air pollution are further complicated by the fact that the pollutants are usually acting in the presence of other factors which themselves have an influence on ecosystems, such as forest management practices, soil types, and introduced plant diseases. Sorting out the most important factors is often difficult and sometimes impossible.

and fir (*Abies* spp.), 31 and 32 per cent respectively. (To be classified as damaged, trees must show a loss of leaves or needles of at least 25 per cent, compared with a reference tree of the same species.) Damage was particularly severe in the Czech Republic and Poland, were 60 and 53 per cent of the trees showed a defoliation of more than 25 per cent.

Most researchers now agree that air pollution plays an important role in this decline, along with a mixture of other factors such as climate change, forestry practices, and attacks of pests and diseases – the so-called multiple stress hypothesis. Some of these factors are interrelated; trees may for instance be so weakened by air pollution as to be especially susceptible to disease.

Mountain sites. High altitude environments will be among the first to show the effects of acidification. Although pollution often decreases with altitude, deposition can remain high because precipitation will increase. Harsh climatic conditions also make plants unable to absorb additional atmospheric nitrogen, which instead leaks into steams. From measurements in the Bavarian Alps, it appears that ozone also increases with altitude.

Peat ecosystems. Since most peat bogs and mires are already acid or neutral, an additional load of acid can cause serious changes in the ecosystem. Peat ecosystems are also sensitive to additional inputs of nitrogen.

Heathlands. Air pollution can cause major changes in acidic or base-poor heathlands. Excess inputs of nitrogen to unmanaged heathland in the Netherlands, for instance, has resulted in nitrophilous grasses replacing slower-growing heath species.

Microhabitats on acid tree bark. Lichens are likely to decline more rapidly on acid than alkaline bark.

Plankton communities in the ocean. Research suggests that increased nutrient load, and so eutrophication, is having an important effect on plankton in some areas. Part of the loading is from atmospheric pollution.

Literature

The information in this factsheet comes mostly from **Air Pollution and Biodiversity** by Nigel Dudley and Sue Stolton, WWF International 1996. Also recommended is **Acid Rain and Nature Conservation in Europe** by Andrew Tickle et al., WWF International 1995. The biodiversity-climate change complex is treated at length in **Some like it hot: Climate change, biodiversity and the survival of species** by Adam Markham, Nigel Dudley and Sue Stolton, WWF International 1993. All three can be ordered from WWF International, CH-1196 Gland, Switzerland.

A recent survey, dealing primarily with acidification, but also with the problems of air pollution generally and ways of dealing with them is **Still with us** by Per Elvingson and Christer Ågren, The Swedish NGO Secretariat on Acid Rain, 1997.

A summary of the effects of air pollutants on biodiversity

ALGAE. Blue-green algae are particularly susceptible to a whole range of air pollutants. Some species risk extinction in polluted areas.

LICHENS. Probably the one group that shows the strongest responses to pollution, in the form both of dry-deposited sulphur dioxide and wet acid deposition. Sensitive species extinct in many localities and in some cases nationwide.

BRYOPHYTES. Also highly sensitive to many air pollutants, tree-living and bog mosses being especially susceptible.

FUNGI. Many mycorrhizal fungi decline in acidified environments.

PTERIODYOPHYTES. Evidence for the decline of some fern and many club moss species in polluted air.

HERBACEOUS FLOWERING PLANTS. Increasing evidence of decline, both from sulphur dioxide in the air and acidified soils.

TREES. Many species decrease in polluted environments on the account of air pollution and other stress factors.

MICROORGANISMS. Zooplankton decline in diversity in acidified waters, as do soil microorganisms generally in acid soils.

SOFT-BODIED INVERTEBRATES. Almost all lower invertebrates decline in acid waters, and many species, including earthworms, are known to do so in acid soils. There is increasing evidence of molluscs and other species being directly or indirectly affected by air pollution on land.

ARTHROPODS. Many crustaceans and insects decline in acid waters, although some insects thrive in the absence of competition. Fragmentary information suggests that air pollution is likely to cause many species to decline on land, although some, particularly aphids, thrive and increase in environments with high concentrations of sulphur dioxide.

FISH show a range of responses to acidification. Some species disappear in slightly acid waters, while others are able to withstand even fairly severe acidification. Decline has occurred widely in Europe and North America.

AMPHIBIANS. Many species decline in acidified waters, primarily because of reproductive failure. A few resistant species thrive in the absence of competition.

REPTILES. Information is lacking.

BIRDS. While a minority of species have declined because of losses in the food chain, especially in acidified waters, others have proved adaptable enough to cope with any changes.

MAMMALS. Despite much evidence of a build-up of heavy metals and sulphur in mammals in polluted areas, the main effects have been due to disturbances in the food chain for species such as otter and elk.

Source: Dudley & Stolton, 1996.

does however provide a number of exemptions from this general rule:

☐ In regions where the existing and future EU air-quality standards for SO_2 are met and the contribution to transboundary pollution is negligible, member states would be allowed to authorize the use of HFO with a sulphur content of up to 2.5 per cent.

☐ No sulphur limit will apply to HFO used in combustion plants equipped with effective desulphurization technologies. This would include new plants covered by the Directive 88/609/EEC (the so-called LCP directive). Other combustion plants, i.e. existing ones and those with less than 50 MW thermal effect, would have to burn HFO with less than 1 per cent sulphur, or else fit abatement equipment to meet an emission limit of 1700 mg/m^3 for sulphur dioxide. This level of emission is roughly equivalent to the concentration resulting from burning HFO containing 1 per cent sulphur.

As regards the first exemption, it is expected that most rural (though not urban) areas of Portugal and Greece, and some rural areas of Spain and Italy (especially in their southern parts) would qualify for the derogation.

The Commission estimates that the directive will have reduced the emissions of SO_2 from the burning of heavy fuel oil by more than 1 million tons by 2010 – from 2.1 million tons in the base case for that year, to below 1 million tons. The greater part of the reduction would be in Italy, Spain, and the UK, each one of which would contribute over 20 per cent of the total reduction. The total annual cost for implementation of the new sulphur limit in all fifteen member states has been put at 760 million ecus for the year 2010.

This would imply an average cost of about 700 ecus per ton of SO_2 so eliminated. The studies that have been made of the costs of the damage caused by sulphur dioxide and other acidifying emissions have in general focused on the economic cost of the effects on human health and modern buildings and building materials. The damage to the structure and functioning of ecosystems, to biodiversity, and the cultural heritage has never been quantified. According to the Commission, the economic cost of the damage resulting from one ton of SO_2 emitted in the EU is, on an average, 4000 ecus – the greater part, or more than 80 per cent, being attributable to damage to human health.

Directive will have reduced emissions by more than 1 million tons

The draft directive also puts a limit of 0.2 per cent on the sulphur content of gas oils, including those for marine use, to take effect from January 1, 1999. This is the same as that in the above-mentioned Directive 93/12/EEC. Since however the proposed new directive is based on article 130s of the Treaty, member states would be permitted to set tighter standards if they wish. (Directive 93/12/EEC is based on article 100a, aiming at harmonization.) Under the new directive, countries such as Austria will be allowed to retain their existing limit of 0.1 per cent for gas oils.

Earlier drafts of the directive also contained proposals for limiting the sulphur content of ships' bunkers and aircraft kerosene. The Commission has however finally chosen not to include these fuels in the new proposal, stating with regard to aviation kerosene that the SO_2 emissions from this source "make a very small contribution to the problems of acidification and atmospheric pollution." Concerning marine bunker oil it refers to work going on under the MARPOL Convention of IMO, the International Maritime Organization – and especially the proposals for designating the Baltic and the North Sea as special areas for sulphur emission control.

The European Environmental Bureau (EEB) has criticized the Commission's proposal as being too weak – saying that the general limit value for sulphur in HFO should be 0.5 per cent instead of 1 per cent. Among the reasons given is that the analysis made for the acidification strategy showed that reducing the sulphur content of heavy fuel oil down to 0.6 per cent would be cost effective for all member states except Spain, Portugal, and Greece. So taking into account the permitted derogation, enabling HFO with a sulphur content of up to 2.5 per cent to be used in some areas, the EEB takes the view that the general limit should be lowered to 0.5 per cent.

Referring to recent studies of the direct effects of sulphur dioxide and sulphate particles on human health, the EEB further suggests a lowering of the maximum sulphur content of gas oils to 0.1 per cent, while indicating the possibility of allowing a derogation in areas where emissions from gas oils make no significant contribution to the emissions total. In such areas, gas oils with up to 0.2 per cent sulphur could be allowed.

CHRISTER ÅGREN

Table 1. Total emissions of sulphur dioxide in 1993 from different fuels in the European Union.

Fuel	Million tons/yr	%
Petrol	0.09	0.6
Kerosene	0.03	0.2
Gasoil/Diesel	1.08	7.0
Bunkers	0.3	2.0
Heavy fuel oil	2.82	18.4
Coal	9.66	62.9
Refinery fuels	0.99	6.5
Other	0.38	2.5
Total	15.35	100

Table 2. The use and average sulphur content of heavy fuel oil in 1995 in the European Union (including use in refineries).

	Total consumption[1] (ktons)		Average sulphur content (%)
Belgium	1,975	(1,925)	1.0
Denmark	811	(811)	1.0
Germany	7,012	(3,160)	1.2
Greece	2,677	(102)	2.7
Spain	8,222	(720)	1-3.5[2]
France	7,275	(1,215)	2.1
Ireland	1,284	(60)	2.0
Italy	30,586	(19,406)	1.53
Luxembourg	98	(98)	–
Netherlands	1,176	(170)	2.2
Austria	930	(475)	0.96
Portugal	3,335	(339)	–
Finland	1,678	(1,220)	1.1
Sweden	1,930	(1,930)	0.3
United Kingdom	9,028	(?)	2.18

[1] Figures in brackets give the estimated consumption of heavy fuel oil with a sulphur content of less than 1 per cent.

[2] Dependent upon the specific type of heavy fuel oil.

The situation in Europe

THE AIR OVER EUROPE is getting better – but only in certain respects and not at all at the pace needed if environmental requirements are to be met. So it appears from a new and highly readable report* from the European Environment Agency.

The EEA is the EU's environmental agency, and the report deals primarily with the fifteen member countries of the Union. It does however also take account of data from other parts of Europe where such is available. The environmental problems that the agency has looked at are climate change, acidification, eutrophication, urban air quality, and tropospheric ozone.

The reported improvements apply mostly to acidification and urban air quality, and are a result of sulphur emissions having been reduced from point sources and the widespread availability of unleaded petrol for cars. Under "Main conclusions" the agency does however point out that:

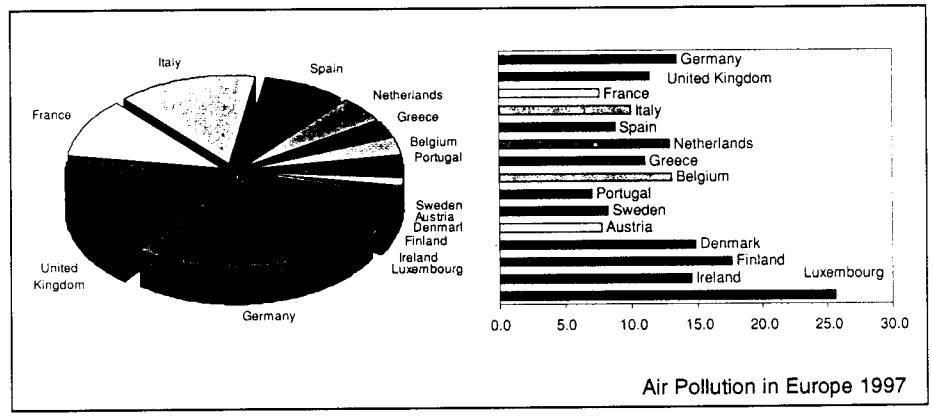
☐ Even these improvements have not been sufficient to achieve acceptable levels of sulphur and lead in many parts of Europe.

☐ In recent years there has either been no improvement, or at best stabilization, in respect of two other matters related to air pollution: climate change and tropospheric ozone.

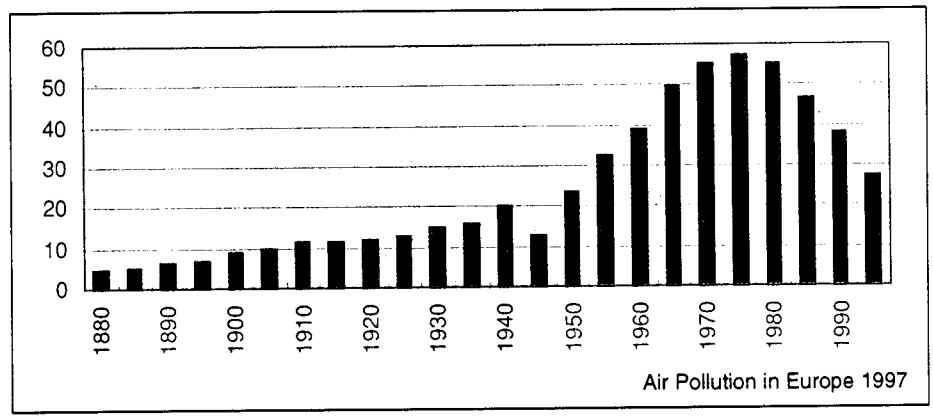
☐ The policies and measures directed against all air-related environmental problems have been largely offset by an increase in the driving forces behind emissions, particularly in the transport sector.

☐ To reach the target levels for air quality, and prevent exceeding of the critical loads for ecosystems, further substantial reductions of all emissions to the atmosphere will be needed.

The state of emissions as compared with reduction targets is dealt with in a separate column. In the part of the report concerning Driving Forces, the way society has developed during the last fifteen years is examined, with an exposure of the changes that have counteracted trends towards improvement, such as the installing of better emission-control equipment on power plants and road vehicles, namely: population increases, the enormous growth of road traffic, and a steady increase in the demand for energy – where a more efficient use in industry has been offset by an increased demand from the transport sector.



Total emissions of greenhouse gases in the EU, showing share of each member country (left), and right, emissions per capita (tons of CO_2 equivalents per capita and year).



Development of the emissions of sulphur in Europe since 1880 (million of tons).

The number of passenger-kilometres in the fifteen EU countries increased for instance by 50 per cent between 1980 and 1994, and in the period from 1980 to 1992 freight transport grew at an average annual rate of 3.3 per cent – trucks being answerable for almost the whole increase.

The report also brings out the interconnection between the various problems. They are all caused by a relatively small number of air pollutants, and reducing emissions in order to master one problem often yields multiple gains. Lowering emissions of carbon dioxide, for instance, to reduce the risk of climate change, also brings down those of sulphur dioxide and nitrogen oxides, thus lessening the named problems of acidification, eutrophication, tropospheric ozone, and urban air quality.

The next major report from the EEA, which is due in next year, will be a follow-up of *Europe's Environment – the Dobris Assessment* from 1995. This report will cover forty countries, and is intended as an input for the next conference of the European environment ministers which is to be held at Aarhus in Denmark in June 1998.

PER ELVINGSON

* **Air Pollution in Europe 1997**. Ed. A. Jol and G. Kielland. EEA Environmental Monograph No. 4. Available from EEA, Kongens Nytorv 6, DK-1050 Copenhagen K, Denmark. Fax. 45-33-36 71 99. See also the Agency's homepage on internet: www.eea.eu.int.

Targets & trends

Climate change. The emissions of carbon dioxide fell between 1990 and 1994 in several of the EU member countries (particularly in Germany, United Kingdom, Italy), resulting in a reduction of 2-3 per cent for the whole Union. The drop is regarded as incidental, being due to the restructuring of industry in eastern Germany, the closing down of coal mines, and a changeover from coal to gas in the United Kingdom. The EEA is doubtful whether the target for the year 2000 – to stabilize emissions at their 1990 level – will be attained. On a business-as-usual reckoning they would be more likely to rise. The agency also points out that whereas the EU environment ministers have proposed that the developed countries should reduce their emissions of greenhouse gases to 15 per cent below 1990 levels by the year 2010, present commitments in the member states will only lead to a reduction of 10 per cent during that period (see AN 1/97, p.16 for details).

Acidification and eutrophication. Between 1980 and 1994 the emissions of sulphur in the fifteen EU member countries dropped by 55 per cent. For Europe as a whole the reduction was 50 per cent. There are said to be many reasons for the decline, among them being the fitting of desulphurization equipment, changes of fuel (especially from coal to gas) and economic restructuring in central and eastern Europe. Although it is still far from certain that the EU countries will fulfill their commitment under the second sulphur protocol – to reduce by 62 per cent between 1980 and 2000 – calls for even greater reductions, the EEA notes, are to be expected as a result of the acidification strategy (see p. 7).

As the emissions of sulphur decline, the relative importance of the two other main causes of acidification, nitrogen oxides and ammonia, will increase. These two pollutants also contribute to the eutrophication of land and water ecosystems.

As regards nitrogen oxides, the EEA reports a drop in emissions of 13 per cent for the whole of Europe between 1987 and 1994 (the NOx protocol of 1988 called only for stabilization). The aim of the EU member countries for a 30-per-cent reduction between 1990 and 2000, adopted in the fifth environmental action program of 1992, is deemed by the EEA as unlikely to be achieved – largely because of an expected further increase in road traffic. Nearly two-thirds of the EU emissions of nitrogen oxides stem from road transportation.

No international goals have been set for containing ammonia. Emissions dropped somewhat in the EU between 1990 and 1994, probably because of reduced animal husbandry – farming being by far the greatest source of ammonia emissions.

Because of the reductions in sulphur emissions, the total area of Europe that is subject to greater depositions of acid than its ecosystems can withstand fell from 40 to 20 per cent between 1980 and 1994 – nevertheless leaving great problems. The fallout of nitrogen that is greater than the critical load for eutrophication is still taking place over about a third of Europe's total area.

Tropospheric ozone. Ozone formation at low levels depends on the presence of nitrogen oxides and volatile organic compounds. Between 1990 and 1994 the emissions of the latter declined by 14 per cent over the whole of Europe but only by 9 per cent in the EU countries. Since several important directives for controlling the emissions in the Union will only take effect after 2000, attainment of the aim of the fifth environmental action program – a 30-per-cent reduction between 1990 and 2000 – remains in doubt.

From measurements taken at urban stations, the EEA concludes that 80 per cent of the EU city dwellers are exposed to ozone levels that exceed the present threshold value for the protection of human health on at least one day of the year (see AN 2/97, p. 16 for further details). The threshold value for daily average concentrations for the protection of vegetation (65 $\mu g/m^3$) were not only exceeded by a good margin (up to a factor three) but also frequently in all reporting EU countries in 1995. Twenty-seven per cent of the EU area was affected on more than 150 days.

Air quality. Although data is not complete, it is known that the present limit and guide values for a number of pollutants are exceeded regularly and by wide margin in many places. Despite the reduced emissions of sulphur dioxide, about 70 percent of the total population of all European cities with monitoring stations are being exposed to levels above the present EU guide value. För small-sized particulate matter (PM_{10}, 98-percentile) there are as yet no EU standards, but the recommended guideline in the United Kingdom (50 $\mu g/m^3$) is exceeded extensively in most European cities from which data are available.

The EU limit values are now being revised (see AN 2/97, pp. 7-9), and as EEA comments, more stringent target values will make the present situation as regards air quality appear even more unsatisfactory. □

BRIEFS

New US air-quality standards

President Clinton has given his approval to an EPA proposal to tighten the air-quality standards for particles and ozone. For particles of less than 10 micrometres in diameter (PM_{10}) the present standard will remain essentially unchanged. But now standards will also be introduced for particles of less than 2.5 micrometres ($PM_{2.5}$). There will be an annual limit of 15 micrograms per cubic metre ($\mu g/m^3$) and a 24-hour limit of 65 $\mu g/m^3$. These very small particles, coming to a large extent from diesel exhausts, can penetrate deep into the lungs and are considered to be the size that is most dangerous to human health. The EPA claims that the new standards will prevent about 15,000 premature deaths every year. For ozone the standard will be tightened from 0.12 parts per million (ppm) measured over one hour to 0.08 ppm over eight hours, which is a considerable tightening. The new standard will increase pressure for greater control of NOx emissions from all sources, but especially from Midwestern utilities, heavy-duty trucks, and cars.

Car Lines. M. P. Walsh. July 1997.

Higher speed limits – increased emissions

The US Environmental Protection Agency has released a new study that documents likely increases in mobile source emissions since the repeal of national maximum speed limits in November 1995 (see AN 3/96, p.14). The analysis indicates that raising the speed limit has resulted in a nation-wide increase in emissions of nitrogen oxides by 6 per cent (from 9,139,800 to 9,705,500 tons a year) and volatile organic compounds by 2 per cent (from 6,262,500 to 6,385,100 tons a year).

Car Lines. M. P. Walsh. July 1997.

China

China depends heavily on coal for power generation, which in turn accounts for more than two-thirds of the country's total energy supply. In order to reduce the acidic emissions, the government has decided to forbid the mining of high-sulphur coal, and for coal with 2-3 per cent sulphur content, washing is required. All cities will now have to use low-sulphur coal. Desulphurization facilities must be installed at all power plants in areas where there is acid-rain control, and in some regions and cities a tax on sulphur dioxide emissions has been introduced. Fees under the levy system will be increased, making them higher than the cost of treatment.

Car Lines. M. P. Walsh. July 1997.

Environmentally tagged supplies

RE-REGULATION of the electricity market has taken place in several countries during the last decade. Despite variations in the way it has been carried out, re-regulation has always had one common aim: by allowing the consumer a choice of supplier, it has introduced competition into the market.

Giving the consumer the right to choose has also given him the possibility of dictating the terms under which the amount of electricity corresponding to his consumption is produced. The environmentally conscious consumer has thus been given the chance of containing the effects of his consumption on the environment. If seized by many consumers, this possibility could affect the whole system of generation and supply.

In Sweden it has already been put to work by several actors in the market. The state railway company, for instance, has a contract with the Sydkraft power company by which its annual consumption of electricity along a certain length of track is to be balanced annually by an equal amount of specially built windpower. Two MacDonald's restaurants have a similar agreement with Vattenfall, the state electricity supplier.

Individual households have been offered the opportunity of buying wind-generated electricity in various ways. Vattenfall will supply it at an extra cost of 7 öre (0.01 ecu) per kilowatt-hour. The customers of the municipal Göteborg Energi can buy shares in wind turbines corresponding to their normal consumption of electricity. In return they simply have to pay delivery cost for their share of

The Bra Miljöval label with a peregrine falcon. Initially applied mainly to paper products and household chemicals, this environmental labelling system has since been extended to electricity supplies and the moving of freight.

Freight moving can also be labelled

THE SYSTEM of environmental labelling developed by the Swedish Society for Nature Conservation (SNF) has now been extended to the transporting of freight. Firms whose business involves such transports can apply for a licence to use the SNF label. The conditions for labelling are set so as to favour the use of energy from renewable sources, reduce the emissions of acidifying and pathogenic substances, and generally bring about more efficient transport.

Under the system, freight transporting is separated into three categories: for long-haul heavy goods, local delivery, and light-weight freight. The requirements for the first two concern emissions and energy use per ton-kilometre (see table). The aim is to encourage firms to see that the truck, freight car, or ship is well filled for each journey.

In the case of local delivery operations the requirements are for emissions per vehicle-kilometre – since it is a matter of many trips with light products, it would give a wrong picture if the requirements were based on weight. Local delivery is allowed an energy consumption that is six times as high as that for the others, and emissions of air pollutants that are three times greater (see also table). This is because local deliveries involve short trips and frequent starts, with an inevitable increase in energy use and emissions.

The requirements are intended to favour renewable energy, no matter what the source. The rules for electric vehicles are the same as those already applying for electricity supplies (see article above).

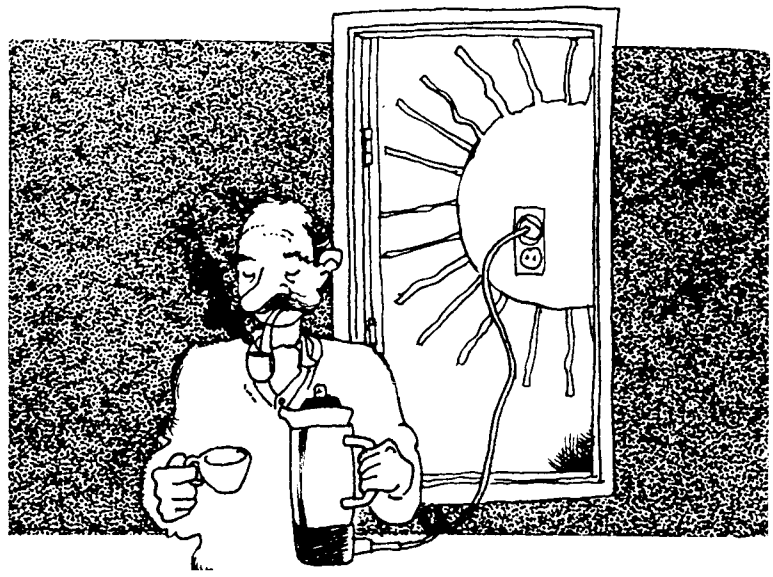
Present diesel-driven trucks fail to meet the requirements for long-haul heavy traffic, although the cleanest types are not far off. Among the modes that can meet the requirements are electric trains, ships equipped for controlling emissions of nitrogen oxides and burning low-sulphur oil, delivery vehicles with a high load factor and low emissions, and combined road-rail transports – provided the train is driven by electricity that meets the *Bra Miljöval* standards. Not forgetting the bicycle, of course...

According to Anders Roth of the society, several firms whose operations involve the transport of freight have expressed an interest in the labelling system, although so far none has been licensed.

	non-renewable energy kWh/ton	NOx+SOx[1] g/tonkm	NMHC[2] g/tonkm
Basic requirements	0.10	0.25	0.01
Distribution	0.60	0.75	0.03
	kWh/fkm	g/fkm	g/fkm
Lightweight	0.6	4.0	0.4

Distribution refers to transporting where at least 75 per cent of the routeing is through built-up areas. **Lightweight** applies to deliveries with a combined total weight under one ton. **Basic requirements** are for all other freight movements.
[1] Combined emissions of nitrogen and sulphur oxides.
[2] Hydrocarbons excl. methane.

For further information, apply Anders Roth, the Swedish Society for Nature Conservation, Box 7005, 402 31 Göteborg, Sweden. E-mail: anders.roth@snf.se.



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the electricity produced. In this way the construction of four new turbines has been financed.

As a guide for consumers in the selection of environmentally friendly electricity, the Swedish Society for Nature Conservation is using its *Bra Miljöval* labelling system, which has been successful in steering consumers' choice and so affecting the market for many products. (*Bra Miljöval* approximately means "Good environmental buy.")

In order to obtain a licence to use the label the electricity supplier must fulfill certain conditions. Basically the electricity sold must have its equivalent in power generated from renewable sources. Even these however are hedged about with restrictions. Hydropower is only acceptable if it comes from plants that were already in place when the Society's terms were laid down (it is against any further development of hydropower, but agrees in the main to existing facilities).

When generators burn biofuels, the ash, which contains important nutrients, must be spread back in the forest. The present conditions apply for the period from 1995 to 2000, and will be revised thereafter. They are then expected to be harder as regards existing hydropower, for instance, as well as the way biomass is produced in farming and forestry.

The Stockholm Energi company has to date signed more than 6600 contracts for the supply of environmentally labelled electricity (including one with the royal palace). This represents more than 40 per cent of the company's generating capacity for such electricity. Today about 15 per cent of the total electricity supply in Sweden is environmentally tagged. There are as yet no figures, however, to show how much is sold under contract to individual consumers.

During the first half-year in which the system has been in operation, the wholesale price of tagged electricity has lain 10-20 per cent above the unlabelled kind. (The wholesale price is about what the big industrial customers pay, but only a third of that charged to households.) This price spread is fully sufficient to considerably affect the relative profitability of producing electricity by various methods. In other words consumers have, by their actions, set going a restructuring of the electricity supply system that the politicians have merely been talking about.

TOMAS KÅBERGER

The writer is an engineer and vice-chairman of the Swedish Society for Nature Conservation. He himself buys environmentally labelled electricity from his local supplier at an extra cost of 2.5 öre (0.003 ecu) per kilowatt-hour.

Details of the Society's conditions for the use of its environmental label for electricity can be obtained from Caroline Hopkins, Swedish Society for Nature Conservation, Box 7005, 402 31 Göteborg, Sweden. Tel. +46-31-10 55 92. E-mail: caroline.hopkins@snf.se

Recent publications

Air and health (1997)
A joint publication of the World Health Organization's Regional Office for Europe and the European Environment Agency, describing the effects of air pollutants on health and suggesting ways for local authorities to improve the situation.

28 pp. £7.60. Local authorities, health and environment briefing pamphlet series No. 19. Can be ordered from Chartered Institute of Environmental Health, Chadwick Court, 15 Hatfields, London, England SE1 8DJ.

CORINAIR 90 Inventory. Emissions in 10 PHARE Countries (1996)
The CORINAIR project is intended to build up a common data base for emissions of air pollutants in the European Union. This report gives data for the ten eastern European countries that have applied for membership of the EU, as well as comparisons between those countries and the rest of Europe.

48 pp. Available from European Environment Agency, Kongens Nytorv 6, DK-1050 Copenhagen, Denmark. Fax. +45-33 36 71 99. E-mail: eea@eea.eu.int.

Air Pollution in the Slovak Republic 1995 (1996)
Presents the results of monitoring air quality and the depositions of air pollutants, together with estimates of emissions and assignments to various sources.

126 pp. Published by the Ministry of Environment, Hlboká 2, 812 25 Bratislava, the Slovak Republic.

Environment-friendly shipping (1997)
Summarizes the effects of shipping on the environment and the efforts of Swedish authorities to deal with this problem, both at the national and international level.

26 pp. Can be ordered from The Shipping Administration, S-601 78 Norrköping, Sweden. Fax. +46-11-10 19 49. E-mail: sjofartsverket@shipadm.se.

Volatile Organic Compounds and Oxides of Nitrogen (1997)
Charts Swedish emission trends and the possibilities of reducing the emissions of volatile organic compounds by 50 per cent between 1988 and 2000 (the parliamentary target), and those of nitrogen oxides by 50 per cent between 1985 and 2005.

108 pp. Report 4689. Can be ordered from the Swedish Environmental Protection Agency, S-106 48 Stockholm, Sweden. Fax. +46-8-698 1515. E-mail: kundtjanst@environ.se.

Coming events

Ad Hoc Group on the Berlin Mandate. Bonn, Germany, October 20-31, 1997.

NGO **Strategy Meeting on the Road to Århus. Lake Bled, Slovenia, November 7-8, 1997.** Preparation of Århus '98 European Energy Conservation Strategy. *Inquiries*: The European Ecoforum Secretariat, P.O. Box 4440, Metelkova 6, 1000 Ljubljana, Slovenia. Fax. +386-61 1337029.

NGO **Conference on Transport and Environment. Vienna, Austria, November 10, 1997.** *Inquiries*: European Federation for Transport and Environment, Boulevard de Waterloo 34, 1000 Brussels, Belgium. Fax +32-2-502 99 08.

Regional Conference on Transport and Environment. Vienna, Austria, November 13-14, 1997. *Inquiries*: UN ECE. Fax. +41-22-917 0123.

Baltic Sea Region Agenda 21, Energy Workshop. December 8-9, 1997. *Inquiries*: Danish Energy Agency, att. M.L. Lemgart, Amaliegade 44, 1256 København K, Denmark. Fax +45-3311 4743.

Third Conference of the Parties to the UN Framework Convention on Climate Change. Kyoto, Japan, December 2-13, 1997. *Information*: Secretariat for the Framework Convention on Climate Change, P.O. Box 260124, D-53153 Bonn, Germany. Fax +49-228-815 1999. E-mail: secretariat@unfccc.de

Executive Body for the Convention on Long Range Transboundary Air Pollution. Geneva, Switzerland, December 8-12, 1997.

World Energy Efficiency Day. Wels, Austria, March 5, 1998. The seminar is followed by an "Energiesparmesse" that will take place on March 6-8. *Inquiries*: O.Ö. Energiesparverband, Landstrasse 45, A-4020 Linz, Austria. Fax +43-732-6584 4383.

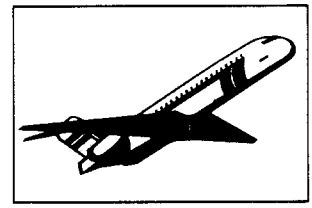
Environment for Europe. 4th Pan-European Conference of Environment Ministers. Århus, Denmark, June 23-25, 1998. *Information*: Danish Environmental Agency, Strandgade 29, 1401 København K, Denmark. Fax +45-3266 0296. Internet: www.mst.dk/aarhus-conference

DEBATE

Fair is fair

Even though aircraft should be responsible for only a small part of the emissions of pollutants to the atmosphere, that is no reason for airlines to be exempted from the environmental requirements that are laid on other sectors of the economy, writes Per Kågeson, one of the members of the T&E scientific committee.

EUROPEAN AVIATION is growing at an annual rate of around 5 per cent, reflecting a human tendency to travel longer and at higher speeds with rising income. Per passenger kilometre, aviation causes considerable emissions of carbon dioxide, water vapour, and nitrogen oxides, all of them greenhouse gases. Moreover, at flying altitude nitrogen oxides are a very potent precursor of ozone. Other environmental concerns connected with aircraft operations are noise and high-altitude emissions of sulphurous particles.



Airlines often maintain that aircraft are responsible for only a tiny fraction of the overall emissions of air pollutants, usually putting it at 2-3 per cent. They therefore suggest that politicians should not make environmental demands on the air industry. This attitude is clearly wrong. Society should apply the same restrictions and taxes on aviation as it does on other modes of transport and on stationary sources. Abatement at least cost is achieved when the marginal costs of emission control are equal for all sectors. The share of overall emissions that can be attributed to a single mode is not relevant in this context.

Here environmental charges or taxes offer a great opportunity, and tax levels should reflect the marginal costs of bringing damage and/or emissions below targets based on the concept of critical loads and limits. The shadow price of enforcing the EU's proposed emission limit values for cars (NOx+hydrocarbons) is about 7.7 ecus per kilogram. This incremental cost reflects the current willingness of the European Union to reduce these emissions. If applied on existing aircraft, it would mean 0.3-0.5 ecu cents per passenger kilometre, or 3-5 ecus per passenger on a 1000-km flight.

An energy/carbon tax on European aviation should at least equal the average tax applied on petroleum products in the domestic sector, though the tax on international flights (outside the EU) could be refunded. With a 65-per-cent seat occupancy, this rate would equal 6.39 ecus per passenger for a 1000-km flight in a MD82. Passengers flying in DC-9s and F28s would have to pay 7.56 and 8.36 ecus respectively, on account of the higher specific fuel consumption of these planes. Future, more efficient aircraft will enable this tax to be reduced to levels below 4.5 ecus per passenger per 1000 km. A new European carbon tax would on the other hand raise the long-term level of the tax.

Would these taxes pose a threat to the growth of air transport? Not really. The aviation industry will respond primarily by becoming more efficient – with larger planes, more seats, higher load factors, lower air resistance, lower weight, and improved engines, as well as cleaner aircraft (by upgrading existing engines). The specific fuel consumption (per passenger-kilometre) has been reduced by around 50 per cent in the last 30-40 years, and there is still a surprisingly large potential for further reductions.

There would, however, be some reduction in demand for the airlines. Yet it is only a matter of a reduction in the annual growth rate of about 1 per cent – from the current 5 per cent to 4 per cent – which would result from environmental taxes and a simultaneous introduction of VAT on intra-European flights. Few other industries can look forward to such a bright future.

PER KÅGESON

EAST ASIA

Network for monitoring air pollution

THE Atmospheric Action Network of East Asia was established in August 1995 by NGOs from seven East Asian countries or regions to address local and transboundary air pollution, acid rain, and the problems associated with global climate change. By thus instituting cooperation, the AANEA aims to work toward more effective solutions to these problems in East Asia.

One of the AANEA initiatives is a citizen air-monitoring program. Up to January 1997 air-monitoring projects had been carried out by AANEA members in Japan, South Korea and Hong Kong, with particular attention to sulphur dioxide and nitrogen dioxide. The Japanese NGOs have had more than fifteen years of experience in this respect, and the South Koreans more than three years. In Hong Kong the NGOs started their first project in 1996. Also taking part in the monitoring program in the near future will be NGOs from Mongolia, Russia, China, and Taiwan.

One advantage of the citizen monitoring program is that it measures the local atmospheric environment rather than the total ambient, and so gives a better indication of the level of pollution that the general public is exposed to. Long experience of this type of monitoring has enabled the Japanese NGOs to analyze air pollution trends, as well as providing an alternative source for local air pollution data and guidance for others on the technical aspects of a monitoring program.

The Hong Kong NGOs have adapted the method to measuring citizens' exposure to air pollution during a single day. Instead of being placed in a fixed location, the measuring equipment is attached to individuals, thus giving better information as to the levels to which citizens are actually exposed.

In future, when monitoring experience has been accumulated and documented, the East Asian NGOs may compile and compare data of local air pollution in order to get a better understanding of the problems they are facing and the ways some of them may be tackled.

GORDON NG

Dr Gordon Ng is Steering Committee member of the network. His address is c/o The Conservancy Association, 7B Capri Building, 130 Austin Road, Tsim Sha Tsui, Hong Kong SAR, China. E-mail: cahk@netvigator.com.

CRETE

Ambitious plan for solar energy

ONE EIGHTH of Crete's population, or 100,000 people, will probably be getting solar-generated electricity. In June the Greek government gave its approval for the first 5 megawatts of a proposed 50 MW solar power project. The government will, together with the European Union, pay 55 per cent of the capital cost. Altogether US$17.75 million will need to be invested in the project. In a plan submitted to the Greek Government, Enron Solar, an American company, has proposed constructing 9 MW a year so as to arrive at 50 MW by 2003.

With a capacity of 50 MW, the Cretan plant would be fifteen times as big as the present largest photovoltaic power station, a 3.3 MW plant in Italy, and produce electricity at a price equal to only a quarter of that from current solar power generation. Greenpeace, which itself has been pursuing a campaign for a "fossil-free Crete" (see AN 2/97), views a 50 MW plant on Crete as possibly starting a worldwide commercial breakthrough for solar-cell technology, saying in a recent report: "If the world builds the equivalent of eight of these solar power stations, we can create a $27 billion market for solar PV and create several 100,000 jobs."

For further information, look in on Greenpeace at internet: www.greenpeace.org/catm.html, or contact Stelios Psomas, Greenpeace Greece, tel. +30 1 380 6375, fax +30 1 380 4008.

Publications from the Secretariat

Still with us? (1997)
By P. Elvingson and C. Ågren. Acidification is still going on and here is an in-depth examination of the whole problem as well as the other effects of air pollution. The viable countermeasures are described, as are the political aspects of the matter.

Better together? (1996)
By F. Lundberg. A discussion paper on a common Nordic-Baltic infrastructure for energy. Describes the present energy situation and the possibilities for development in the region, such as by bringing about a more efficient use of energy. Also considers the advantages and disadvantages of natural gas and the consequences of a deregulated market for electricity.

Attacking air pollution. Critical loads, airborne nitrogen, ozone precursors (1996)
A state-of-the-art presentation of scientific knowledge concerning the critical loads for acidifying and ozone-forming air pollutants.

Doing more than required. Plants that are showing the way (1996)
By A.-K. Hjalmarsson. Survey revealing that in many cases the emission requirements are already being met at large European combustion plants, and even by a wide margin. These plants are now being held up as examples of "best available technique" in the discussions for a revision of the EU directive on large combustion plants.

The 100 worst sulphur emitters (1995)
By M. Barrett and R. Protheroe. A study mapping the 100 largest point sources of emissions of sulphur in Europe.

To clear the air over Europe (1995)
By M. Nilsson. Besides surveying the present situation, the report puts forward proposals for revision of the system of guidelines and standards for air quality, as well as proposing a general tightening of air-quality standards in order to ameliorate the effects on health and the environment.

Large combustion plants. Revision of the EC directive (1995)
By F. Lundberg and C. Ågren. In this report the 1988 directive on large combustion plants is critically examined, and proposals made, on the basis of the best available technology, for the admission of stricter standards both for new and existing plants.

Single copies of these reports can be obtained free of charge from the Secretariat. Please call for quotation if more copies are required.

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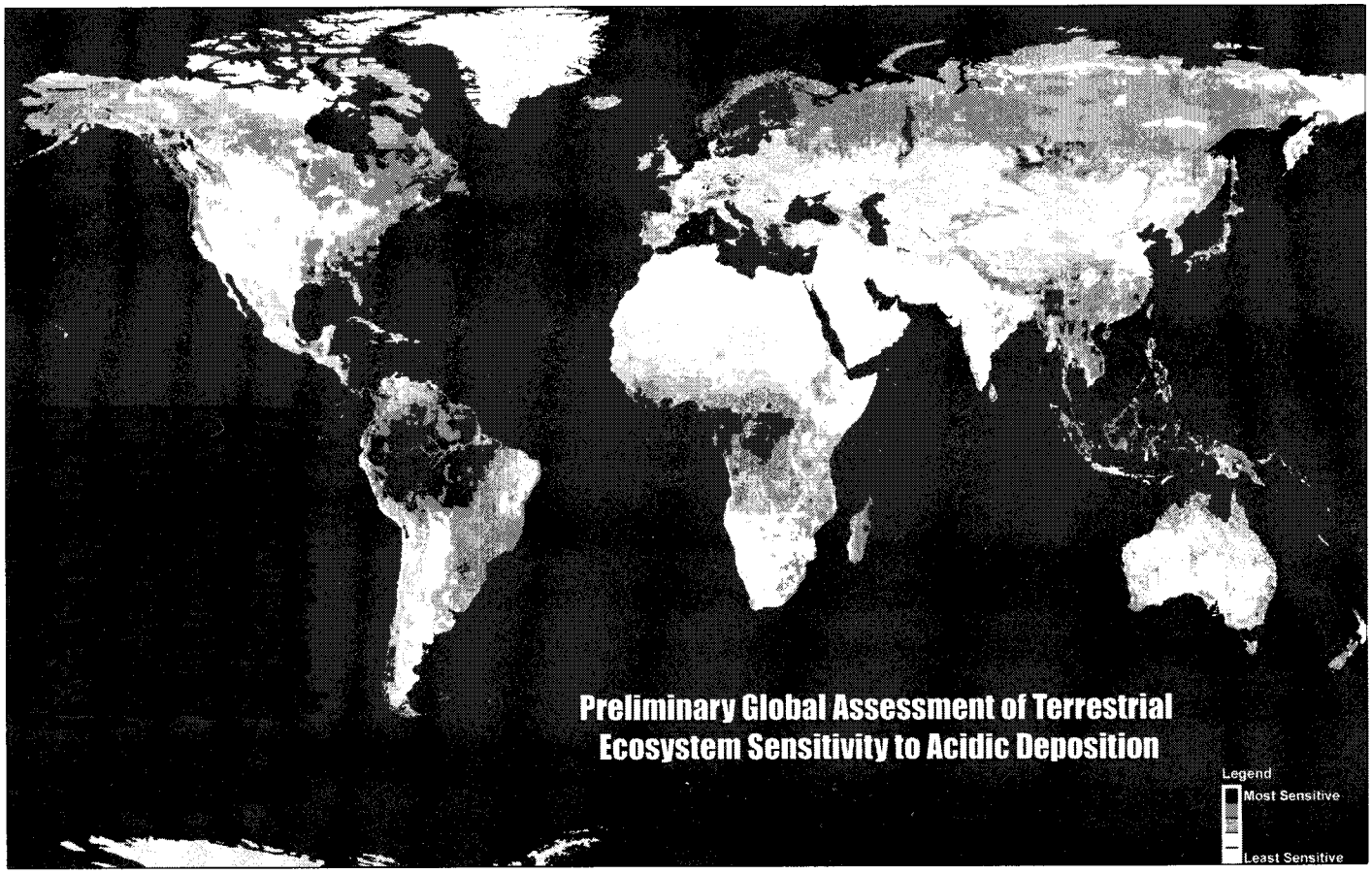

ACIDIFICATION

Sensitivity the world over

ACIDIFICATION is not only a problem in Europe and North America. The ability to resist depositions of acid is low in many other parts of the world as well – as has been made plain by the map resulting from a survey by the Stockholm Environment Institute, partly financed by SIDA, the Swedish International Development Cooperation Agency.

The survey, entitled Preliminary Global Assessment of Ecosystem Sensitivity to Acidic Deposition, took account of three variables: land cover and sensitivity of the vegetation; soil and the soil's buffering ability; and climate (precipitation and potential evapotranspiration ratio). The results are shown on a map in five classes of sensitivity.

While emphasizing that the map is only preliminary, representing the results of a broad survey, the Institute hopes that it may yet be of use, noting that "if risks associated with increased emissions can be illustrated now, then steps may be taken to reduce potential damage in the future."

The four-colour map, which is available both in poster and postcard form, can be obtained free of charge from the Stockholm Environment Institute, Box 2142, S-103 14 Stockholm, Sweden. Fax. +46-8-723 0348. The map can also be seen and ordered on internet at the Institute's address: www.sei.se.

Action Day on Aviation

UNDER THE HEADING "Right prices for air travel," Friends of the Earth Europe has just started a campaign aimed at getting taxes and environmental charges put on air transportation in Europe. The idea is that this mode, the most polluting of all, is heavily subsidized in most of the countries of Europe. Low prices are allowing air traffic to grow rapidly, causing severe environmental problems.

The first European Action Day on Aviation has been announced for December 5-6. There will be actions at local and national airports.

For further information, apply Paul de Clerck, FoE Netherlands, P.O. Box 19199, 1000 CG Amsterdam, The Netherlands. Tel. +31-20-622 1366. E-mail: paul@foenl.antenna.nl.