

# Acid News

A Newsletter from the Swedish and Norwegian NGO Secretariats on Acid Rain



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## CITY TRAFFIC

# Doing something about it

The ever increasing density of road traffic is a problem in most countries, and it is especially marked in the larger cities. In many places it has become so acute that means are being sought to curb the use of cars and reroute freight traffic.

In Sweden a parliamentary commission has recently proposed that municipalities should be given the right to impose road charges as a means of mitigating the problem. The aim would be on the one hand to reduce the volume of traffic and on the other to provide funds for improving public transport. The proposal is now being circulated for comment, and is likely to be incorporated in legislation in the spring.

In Stockholm, where city traffic has increased by 25 per cent in the last five years alone, a system of road charges will be introduced as soon as the law permits. Car owners wishing to enter the central parts of the city will have to buy a monthly ticket and display it on the windscreen. The tickets, which will be sold from local public transport offices, will also be usable for journeys on the public system in the same way as the present monthly tickets, but will cost 50 per cent more.

Since the cost of the tickets will still be relatively low (300 kronor a month), this arrangement will have little effect on the volume of traffic, which is only expected to drop by 2-

6 per cent. Its advantage is however that it will provide the public transport company with an extra 350 million kronor a year with which to extend its services while a more effective system of road tolls is being developed. In its present state the public network could not accommodate any marked increase in the number of passengers.

The toll system that is intended for introduction a few years hence will involve a daily charge of 25 kronor, with automatic electronic control. This is calculated to reduce traffic by 15-25 per cent. Gothenburg, Uppsala, and several other cities in Sweden are also planning

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# Acid News

A newsletter from the Swedish and Norwegian Secretariats on acid rain.

ACID NEWS is a joint publication of the two secretariats, 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 secretariats at either of the addresses below. All requests for information or material will be dealt with to the best of our ability.

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

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- The Environmental Federation (Miljöförbundet)
- The Swedish Anglers' National Association (Sportfiskarna)
- The Swedish Society for the Conservation of Nature (Naturskyddsforeningen)
- The Swedish Youth Association for Environmental Studies and Conservation (Fältbiologerna)

Address and telephone: see above.

The Norwegian secretariat, "The Stop Acid Rain Campaign/Norway," is organized by five non-governmental organizations concerned with the environment:

- Nature and Youth (Natur og Ungdom)
- The Norwegian Forestry Society (Det Norske Skogselskap)
- The Norwegian Association of Anglers and Hunters (Norges Jeger- og Fiskeforbund)
- The Norwegian Society for Conservation of Nature (Norges Naturvernforbund)
- The Norwegian Mountain Touring Association (Den Norske Turistforening)

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## EDITORIAL

# At the crossroads

In the countries of the OECD group, road traffic accounts for about half of the emissions both of nitrogen oxides and hydrocarbons – pollutants which, along with sulphur dioxide, are slowly but surely suffocating us and our environment.

This summer, on June 9, the Community ministers for the environment agreed on emission standards for small cars, which will mean in effect that as from 1993 all such cars will have to be equipped with catalyzers (probably for the most part of the three-way type with fuel-mixture control). Medium-sized and large cars will also be so equipped.

Standards equivalent to the US-83 ones are already applicable to all new cars in Switzerland, Austria, Sweden, and Norway, and will be shortly in Finland as well. On the assumption that the catalyzer is kept properly functioning, the emissions of nitrogen oxides, hydrocarbons, and carbon monoxide will be reduced by 70-90 per cent in the course of a car's lifetime.

Many people seem to think that the problem of road traffic in regard to the environment has now been largely solved. Articles and advertisements can often be seen describing some car as "clean," "green," or even "environmentally friendly." The fact is however that motor vehicles will continue to be a cause of environmental problems for several decades.

Since it would be impossible to consider all the environmental effects of road traffic within the space of this column, let us concentrate on air pollution in a few selected aspects.

• For at least 10-20 years millions of old vehicles will still be on the roads, spewing out pollutants in great volume. The emissions from many of these could be halved by fitting a simple catalyzer, but very few countries are actually encouraging this today.

• The emissions from diesel vehicles, mostly trucks and buses, are still very large – a problem that will increase relatively when more and more cars become equipped with catalyzers. Only a few countries in

Europe are set to impose stricter controls (in line with US requirements) on this type of vehicle.

• Unless proper programs are instituted for annual testing of vehicles' emissions, there will be a great danger of the actual cleaning effect being very much less than expected.

• When starting a car from cold, and in urban driving – that is to say, on short runs – the cleaning effect of a catalyzer will be less than that stated above, since it will less often reach ideal working temperature.

• The actual and expected increase in road traffic will "eat up" a lot of the cleaning effect. In many countries traffic has recently been increasing by 3-5 per cent every year. Forecasts in the Netherlands, for instance, have indicated a rise of 70-80 per cent between 1986 and 2010, if nothing were to be done. In the United Kingdom the Department of Transport has forecast increases of up to 142 per cent by 2025.

• Catalyzers do nothing to stop the emissions of carbon dioxide, the chief greenhouse gas. Research in Sweden and elsewhere has moreover indicated the emissions of nitrous oxide (N<sub>2</sub>O), another greenhouse gas, to be greater from cars that are equipped with catalyzers than from those that are not.

The conclusion most therefore be that while catalyzers will in time make petrol-driven cars less environmentally hostile, much greater changes will be required in the vehicles themselves, as well as in the whole transportation system, before the transport sector can be regarded as "clean" from the environmental point of view.

If the depositions and concentrations of airborne pollutants are to be brought down to levels that will be continuously acceptable – to below critical loads and levels as described in Acid News 2/89 – the overall emissions of nitrogen oxides and hydrocarbons will have to be reduced by at least 80-90 per cent. And road traffic must be made to answer for its share.

Christer Ågren

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to introduce charges before long, and some are considering closing off the city centres to cars entirely.

Bordeaux, the fourth largest city in France, has adopted a program that will lead within ten years to only 25 per cent of the streets being open to car traffic – and with the speed limit reduced from 60 to 50 kph. A further 25 per cent of the streets will be open only to delivery and public transport vehicles, with the speed limited to 30 kph. The remaining 50 per cent of the streets will be reserved entirely for pedestrians and cyclists. A parallel devel-

opment will be the construction of an underground railway system and numerous cycle tracks.

Developments in Bordeaux are being followed with great interest in the French capital, where the traffic situation now calls for rapid action. Currently the equivalent of about £700 million is being spent on an accelerated extension of the Parisian public transport system, in part through further underground railway lines.

A radical scheme adopted in Florence last spring has aroused interest throughout Italy. In common with most Italian towns, Florence

has a medieval street plan which is altogether unsuitable for intense motorized traffic. As a trial following a referendum in 1988, cars have been totally banned from the central parts. Manual control has been adopted, only inhabitants' cars and utility vehicles being admitted. As a result, traffic has been reduced by 20 per cent. Shortly, too, battery-driven buses will be put into use as a means of improving air quality still further. Other Italian cities where similar schemes are being adopted or planned are Bologna and Milan.

Per Elvingson

## SWEDEN

# Lowering speed limits

Environmental considerations have led to a lowering of the speed limit on some of Sweden's motorways from 110 to 90 kph. The total length of motorway so affected is only 620 kilometres, but it comprises stretches with exceptionally heavy traffic, in parts of the country that are most exposed to pollution.

During the summer a temporary limit of 90 kph was imposed on all roads where it would normally be 110 kph. The reason given was safety, but in regard to the stretches where there is now a permanent 90-kph limit it is said to be on account of reduced exhaust emissions. The reduction of nitrogen oxides will amount, according to the National Environmental Protection Board, to 1500-2000 tons per annum.

The NEPB bases its figure on a report\* showing that the emissions of nitrogen oxides from a car without a catalyzer will rise by 65 per cent if

the speed is increased from 90 to 110 kph. Fuel consumption, and thus the emission of carbon dioxide, will increase by 34 per cent. See table.

A reduction of 2000 tons per annum is of course small in relation to the total of nitrogen-oxide emissions from traffic in Sweden, which amount to 170,000 tons a year. Compared with other methods, however, lowering the speed limit is a very simple means of bringing about a reduction of emissions and improving

safety. The measure has nevertheless come in for very heavy criticism, especially from automobile organizations and manufacturers.

Although they have been pressing hard for such a step for a long time in the face of strong opposition, the environmental organizations are also critical. "The politicians want to show that they are capable of action, but from the environmental point of view this is a half-measure," says a spokesman for the Swedish Society for the Conservation of Nature. The Society would like to see a limit of 90 kph on all roads, at least in southern and central Sweden, where it is now 110 kph, and a reduction to 80 instead of 90 kph.

According to NEPB calculations, lowering the speed by 10 kph on all roads with present limits of 110, 90, and 70 kph would reduce the emissions of nitrogen oxides by 18,000 tons a year.

Per Elvingson

**Pollutant emissions and fuel consumption at different speeds, as recorded for petrol-driven cars of makes common in Sweden, year models 1977-1987, not equipped with catalyzers. From NEPB Report No. 3276.**

Constant speed kph	CO g/km	HC g/km	NO <sub>x</sub> g/km	Fuel consumption litres/10 km
70	5.94	0.54	1.04	0.58
80	5.42	0.53	1.39	0.58
90	5.56	0.56	1.87	0.62
100	6.19	0.62	2.43	0.70
110	7.57	0.71	3.09	0.83
120	9.52	0.83	3.82	1.00

\* Hastighet, föroreningsutsläpp: bensindrivna bilar. NEPB Report No. 3276. A digest of the findings appeared in Acid News 1-2/87, pp 16-17.

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# The competition for freight

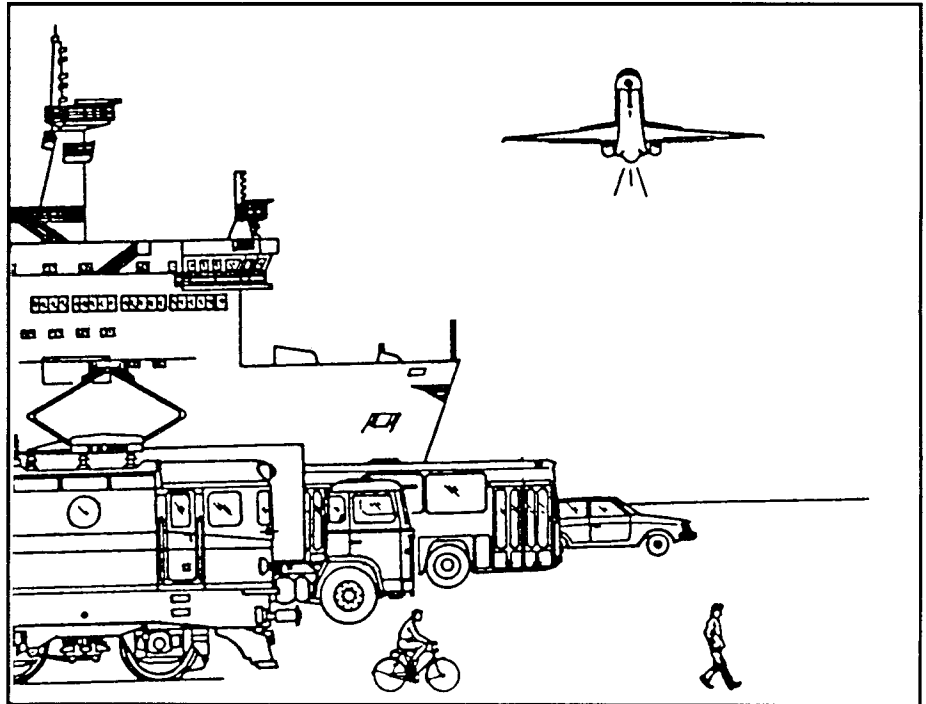
Although the need of a common transportation policy for Europe had been written into the Treaty of Rome in 1957, for almost thirty years very little had been done about it. Only when the European Parliament started to rap the Council of Ministers for inactivity, in 1985, did things begin to happen. Then the European Court of Justice quickly reproved the national ministers of transport for having done nothing to bring about a free market for transportation services within the Community.

Many of the restrictions and quotas, with which European transport undertakings have had to contend, were declared to be inadmissible. Free trade for such services, the court said, should imply equal treatment both for resident and non-resident carriers – in other words, transport companies should be allowed to operate freely in other member countries besides their own. Up to then great parts of the transportation market had been partitioned off against what was considered undesirable competition.

Impelled by this judgement, a month later, in June 1985, the Community prime ministers declared the creation of a free market and freedom of establishment in any country to be prime objectives of policy. This aim was subsequently underscored in November of that year by the EEC ministers of transport calling for

- The creation of a free market for transportation services, without any quantitative restrictions, at the latest by 1992.
- Adaption during the transition period of bilateral quota systems to a non-discriminatory basis, together with simultaneous development towards a Community quota system.
- Ending of distortions to competition as well during the period of transition.

At present the conditions for competition vary from country to country. The West German carriers, in particular, now fear being put at



a disadvantage compared with their European competitors. Reductions of 20-40 per cent in the charges for various types of freight are considered a possibility – although it is still being debated whether this will lead to a price war, with a consequent lowering of safety standards.

According to estimates of the Federal Ministry of Transport, liberalization will cause the German state railways to lose up to DM700 million a year in freight income, while the railway company itself considers about double that figure to be more likely. The reason is primarily an expected lowering of charges by road carriers, which the railways would have to counter in similar fashion.

There is also a fear of freight being switched from the railways to the roads, with a reduced market share for the railways, if carrying by road should increase, as is forecast here and there, by 40-60 per cent. The main cause of the trucking “avalanche,” which is now rolling ever faster, undoubtedly lies in EEC economic policy. An increasing division of labour, combined with geographical spread of markets, and continuing economic integration, as well as the strongly export-oriented

economies within the Community, will inevitably lead – together with in-company rationalization (getting away from stockholding) and greater adoption of the “just-in-time” method – to ever increasing freight movements.

The result will be ever increasing pressure on the environment, but also further calls for more and better highways.

In all official planning, the railways at any rate tend to given a subordinate role. Instead of encouraging, by suitable measures, the switch from road to rail that would be desirable from the point of view

In the Federal Republic of Germany, trucks, with 8.5 per cent of the total traffic work, are responsible for

- 31 per cent of the nitrogen emissions from all road traffic, or 83,000 tons per annum.
- 62 per cent of the sulphur dioxide emissions from all road traffic, or 42,000 tons per annum.
- 75 per cent of the emissions of particulates from all road traffic, or 50,000 tons per annum.
- 23 per cent of the energy consumed in road traffic.

of the environment, there is talk of dirigism and "free choice of the means of transport."

Apart from a marked tightening of the exhaust emission standards for trucks, so as to correspond at least to those of the United States, one of the essential aims of transport policy must be to shift freight in considerable amounts from the roads to the railways. This is desirable on account of social and economic considerations, as well as being an environmental necessity. This would require in general

- Bringing the rules under which enterprises have to compete up to the relatively high level of those in the Federal Republic.
- Technical restriction on the highest permissible speed (automatic speed control).
- Introduction of a loading charge on heavy vehicles, sufficient to cover at least part of their real cost to society. The mileage taxes proposed by the West German Minister of Transport Wanke would seem unacceptable from the environmental point of view, since on the one hand they would be too low, and on the other the financial burden, at least for West German carriers, would remain as it is instead of rising.
- A trial prohibition of night traffic for trucks.
- Greater encouragement of container and combined road-rail traffic.
- Reducing the weight limit for trucks from the present 40 to 28 tons (following the Swiss example).
- Making the German state railways more attractive through reorganization and new investment – particularly with regard to trans-border traffic.
- Compulsory use of the railways for certain types of freight when transported over distances of more than 100 kilometres (corresponding to the rule applying for hazardous goods).
- No further improvement of facilities for road traffic (stop to the construction of motorways).
- Development of the idea of reducing freight movements generally (decentralization of manufacturing).

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## Truck emissions

The emissions standards for trucks that will shortly be coming into force will not bring any improvement as far as the Federal Republic is concerned. The expected increase in the number of technically inferior foreign vehicles on the road is, on the contrary, likely to lead to an increase in pollutant emissions as well.

### Present and coming emission limits for trucks

	ECE standard 49	ECE R49 -20% (for NO <sub>x</sub> )
CO	14 g/kWh	11.2 g/kWh
HC	3.5 g/kWh	2.4 g/kWh
NO <sub>x</sub>	18 g/kWh	14.4 g/kWh

Measuring in g/kWh, as laid down for the EEC, is moreover doubtful. While emissions per kilowatt hour are supposed to decline, with power increases the total will remain the same or may even rise.

The new Community standards (ECE 49 less 20 per cent, with reference to nitrogen oxides), which from October 1990 will apply to all new models, sound good but are not. They cannot compare with the stricter US standards that will also be applicable from October 1, 1990 (from 1991 year models). The US requirements for nitrogen oxides will correspond to 5.5 to 7 g/kWh, measured in accordance with the European test cycle. These new requirements may cause trouble for European manufacturers exporting to the United States, but are said to be attainable.

From October 1, 1991 the limit in Switzerland for nitrogen oxides will

be 9 g/kWh, and for particulates 0.7 g/kWh. For the latter there are so far no requirements in the Community, the member states having been given to the end of 1998 to make proposals. Shortly after the Swiss had made their decision, the EFTA countries proposed an even stricter requirement of 0.35 g/kWh, and according to the West German Ministry of the Environment there are already engines that can meet it.

Particle filters are still not required, but here again the United States is taking the lead. The requirements set in the US for 1994 year models are expected to be met mainly by equipping vehicles with filters. Such equipment, which will catch 50-80 per cent of the soot particles, is likely to be imposed on buses and trucks in urban traffic already from October 1990. With its present policies, the EEC will not get as far as that until after the end of the century.

Whereas there will be a move in the next few years – albeit too little and far too slow – towards reducing the emissions from cars, the problem of those from trucks will tend if anything to worsen. According to estimates made by the Federal Ministry of the Environment in January 1989, the emissions of nitrogen oxides from trucks will develop as in the table below.

Thus even with stricter requirements (11.5 g/kWh amounts to a lowering by 20 per cent, while the lowest limit corresponds to that applicable in the United States from 1990) the emissions of nitrogen oxides from truck traffic will continue to increase – unless political measures are taken to move freight off the roads onto the railways.

### Emissions from trucks. Basis year 1985: 476 kt NO<sub>x</sub> (=100%)

Forecast 1998	Alternative 1	Alternative 2
Status quo	688,000 (144%)	767,000 (161%)
Limit of 11.5 g/kWh	635,000 (133%)	709,000 (149%)
Limit of 9.0 g/kWh	573,000 (133%)	638,000 (134%)
Limit of 7.0 g/kWh	531,000 (111%)	591,000 (124%)

Alternative 1 is a forecast for the present fragmented market, Alternative 2 for a fully unified European one.

# Older trees are worse off

The health of Europe's forests did not, according to the latest survey presented by Economic Commission for Europe, in general undergo any significant changes between 1987 and 1988 – except in the case of oaks, where there was a marked increase in damage to older trees.

The survey, published last July, is the third all-Europe assessment of tree damage that has been coordinated by the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests. This time it covered twenty-five countries, three more than in 1987. Twenty-one countries (see table) made nationwide surveys, while four restricted themselves to select regional areas.

The 106 million or so hectares that were surveyed comprise about two-thirds of the total forested area of Europe, excluding large parts of the European USSR. Still not entirely covered are some sections of broad-leaved forest, mostly in Scandinavia, and the low-growing broad-leaved evergreens (maquis) in Mediterranean areas.

The method has been to assess sample trees for damage in accordance with a five-class system, putting 0-10 per cent defoliation in Class 0, 11-25 per cent in Class 1, 26-60 per cent in Class 2, more than 60 per cent in Class 3, and dead trees in 4.

Oak trees (*Quercus robur*) more than 60 years old were found to have suffered particularly. In the UK, for instance, 63 per cent of the older trees were classified as moderately to severely damaged (Classes 2-4). In the Netherlands and Czechoslovakia the percentages were 49 and 40 per cent respectively.

In most countries there was a slight recovery, on the other hand, for Norway spruce (*Picea abies*), although here too trees over 60 years old are considerably more defoliated than younger ones, and in several countries more than 25 per cent of such trees were placed in Classes 2-4. While Scots pine (*Pinus sylvestris*) recovered in some countries, in others it deteriorated. Fir (*Abies*

*alba*) in general recovered, but still remains the most affected species. In the Federal Republic of Germany 64 per cent of the fir trees over 60 years of age were found to be moderately to severely defoliated.

The improved state of common beech (*Fagus sylvatica*) in several countries can probably be ascribed to a decline of the attack of *Rhynchaenus fagi*. Mediterranean oaks (*Quercus ilex* and *Q. frainetto*) show

a considerable level of defoliation in Italy (Tuscany), Greece, and Spain.

Since it is generally agreed that the direct and indirect effects of air pollution are a major cause of the widespread damage to European forests, there is clearly an urgent need for a drastic and rapid reduction of the emissions of polluting substances.

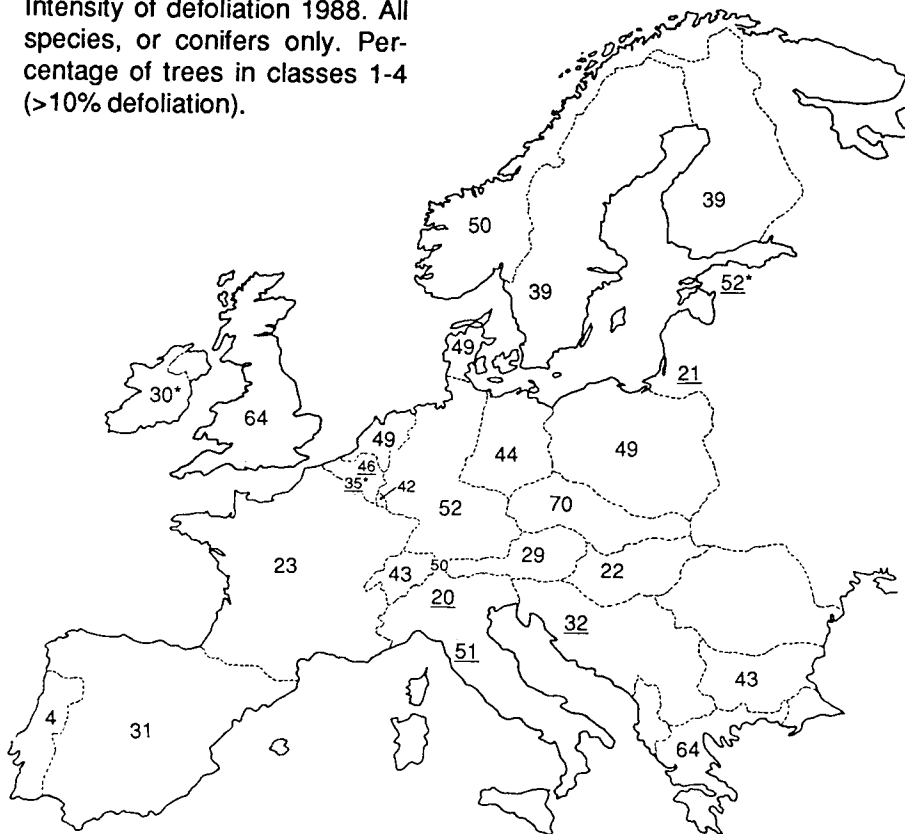
Christer Ågren



According to the survey recently presented by the UN Economic Commission for Europe, older oak trees in particular are showing increased damage.

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Intensity of defoliation 1988. All species, or conifers only. Percentage of trees in classes 1-4 (>10% defoliation).



Except when underlined (regional) the figures represent nationwide surveys.  
\* Conifers only. Source: UN ECE/ICP Forests (1989).

**Intensity of defoliation in 1988, in per cent of trees affected. For all tree species, unless marked \* for conifers only. Based on nationwide (N) or regional (R) surveys.**

Country	No defoliation (Class 0)	Slight to severe (Classes 1-4)	Moderate to severe (Classes 2-4)
Portugal (N)	96.5	3.5	1.3
Italy-Bolzano (R)	79.8	20.2	5.2
USSR-Lithuania (R)	79.0	21.0	3.0
Hungary (N)	78.5	21.5	7.5
France (N)	77.3	22.7	6.9
Austria (N)	71.2	28.8	3.6
Ireland* (N)	69.9	30.1	4.8
Spain (N)	68.6	31.4	7.0
Yugoslavia (R)	67.6	32.4	10.0
Belgium-Wallonia* (R)	65.0	35.0	11.0
Sweden (N)	61.3	38.7	10.6
Finland (N)	61.2	38.8	16.1
Luxembourg (N)	57.6	42.4	10.3
Bulgaria (N)	57.0	43.0	8.1
Switzerland (N)	57.0	43.0	12.0
German Democratic Republic (N)	55.6	44.4	13.8
Belgium-Flanders (R)	53.8	46.2	10.4
Denmark (N)	51.0	49.0	18.0
Netherlands (N)	50.9	49.1	21.0
Poland (N)	50.6	49.4	20.4
Liechtenstein (N)	50.0	50.0	17.0
Norway (N)	49.7	50.3	20.8
Italy-Tuscany (R)	48.9	51.1	18.7
USSR-Estonia* (R)	48.0	52.0	9.0
German Federal Republic (N)	47.6	52.4	14.9
Greece (N)	36.0	64.0	17.0
United Kingdom (N)	36.0	64.0	25.0
Czechoslovakia (N)	29.5	70.5	27.4

## Recent publications

### Luftmiljøet (1989)

Booklet telling of the emissions of air pollutants that are of concern in northern Europe, and describing their effects on the natural environment as well as on human beings. There are also short sections dealing with action so far taken and the further measures that will be necessary. 80 pp. Price 40 kroner. Published by Danmarks Naturfredningsforening, Nørregade 2, DK-1165 København K, Denmark.

### OECD Environmental Data – Compendium 1989

The publication, which is updated every two years, relates statistics on pollution and natural resources to such areas of economic activity as energy, transport, industry and agriculture. 328 pp. Price £26.50. Obtainable from OECD Publications, 2, rue André-Pascal, F-75775 Paris Cedex 16, France.

### International Environmental Diplomacy (1988)

Environmental diplomacy has become a matter of foremost importance, especially in regard to transboundary transports of pollutants. Besides a general section, this book comprises two case studies, one concerning acid rain in Europe and North America, the other pollution of the marine environment. Edited by John E. Carroll. 290 pp. Price £35.00. Published by Cambridge University Press; Cambridge, England CB2 2RU.

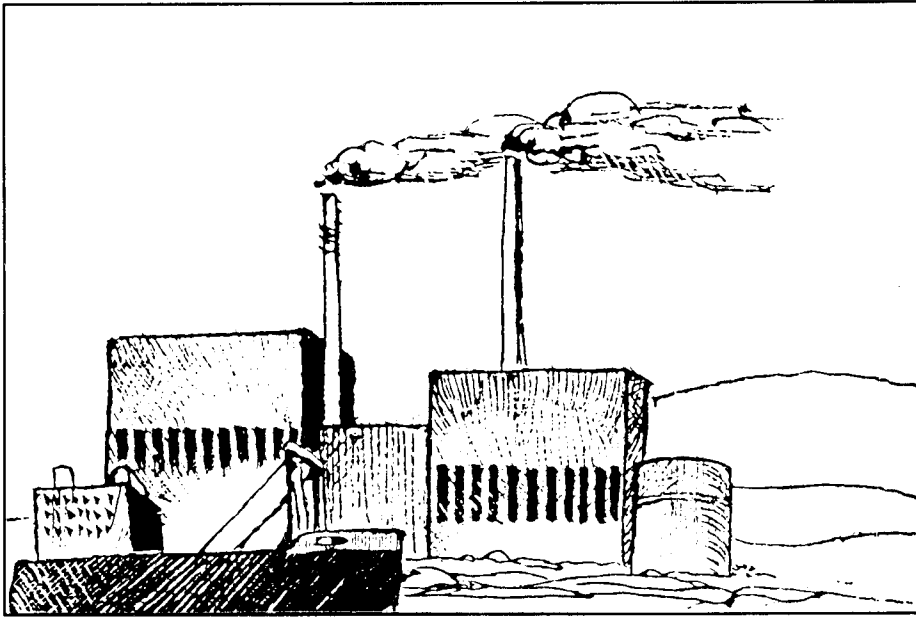
### Acidification Trends in Swedish Groundwaters (1989)

Report by Ulf von Brömsen reviewing data that reflects changes in the chemistry of groundwater in Sweden as it relates to acidification. The time series cover the period from 1950-1985. Different approaches are applied and discussed to reveal acidification trends in groundwater. 68 pp. Report No. 3547. Published by the National Environmental Protection Board, Information Section, Box 1302, S-171 25 Solna, Sweden.

### Atmospheric Pollution (1987)

Study by Derek Elsom examines the nature and sources of atmospheric pollution and its effects before proceeding to discuss possible strategies for tackling the problems. The author compares the pollution control policies of several countries and exposes the differences between socialist and capitalist states and between developing and developed countries. The final chapter looks at the progress towards international collaboration on pollution control. 352 pp. Price £12.95 (paperback). Published by Basil Blackwell, Oxford, England.

# Rare gas seen contributing to the damage to forests



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It has now been proved that at nuclear plants, such as that at Fessenheim/Elsass, releases of radioactive gas take place which indicate air ionization effects far and away above natural levels. At these elevated levels ordinary air pollutants, as well as other chemical components of the air, can become rapidly converted into air radicals and acid particulates (aerosols). These are a well known cause of damage to trees and other vegetation, structural materials, and human health.

This "luftchemische Wirkungshypothese" has been confirmed as a result of extensive research carried out by the environmental physics scientist and radiation ecologist Roland Kollert, of Bremen, with support from the Bund für Umwelt und Naturschutz Deutschland.

The "air-chemical hypothesis" provides an essential link in the chain of effects between releases of radioactive gas and damage for instance to forests.

Through Kollert's evaluation\* of the official series of measurements made around the nuclear plants at Fessenheim/Elsass (FRG) and at Mühleberg (Switzerland) as well as in the United States, it has become clear that as a result of radioactive

releases during routine operation the level of natural air ionization owing to radioactivity will be exceeded, either briefly or for extended periods, ten to one hundred times. Brief releases had previously not been reported by plant owners, nor had they been made available for study, having been considered to be business secrets.

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## *Bound to be a dangerous combined effect of nuclear plant emissions and those of industry*

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In the case of Fessenheim (blocks 1 and 2), between 1977 and 1985 and when the wind was in the right quarter, seven distinctly high releases and more than a hundred minor ones of the radioactive rare gas Xenon-133 were recorded at Freiburg/Breisgau (Black Forest). From the measurements made by the Institut für Atmosphärische Radioaktivität (Freiburg) it appears that there will be four to five releases of rare gas per block per annum.

Kollert's study should in the opinion of the BUND be taken into consideration in the redrafting of the decree that concerns protection against radiation. It reveals an indirect radiation effect, resulting especially from brief peak releases of radioactive gas, which has hitherto gone unobserved in official circles.

It has been shown by experiments in the laboratory that these brief releases can start off air-chemical chain reactions which will result for instance in large-scale conversion of sulphur dioxide and nitrogen oxides to much more harmful aerosols. In the presence of other atmospheric pollutants, such as ozone, ethylene, and probably other hydrocarbons, the formation of air radicals and acidic particles through radiation chemistry can take place much more rapidly than otherwise.

There is thus bound to be a dangerous combined effect from the emissions of the nuclear plant and those of industry around Basel and southwest of Fessenheim.

As addition to a drastic reduction of the permissible level of radioactive release, the BUND is demanding that the artificial rate of ionization in the releases of gas from atomic plants should not be allowed to exceed the natural average, even briefly, by more than 50 per cent. Plants that are unable to achieve this should be shut down.

The combined air-chemical effect is especially strong when there are elevated radiation levels together with ethylene. The latter is given off mostly from motor vehicles, but also from vegetation under stress. Sulphur dioxide has been shown in experiments to convert very much more actively to acidic particles when ethylene is present.

This indicates the extent to which the nuclear plant at Fessenheim may contribute to the damage to vegetation that has previously been ascribed to ordinary pollutants.

BUND  
Bund für Umwelt und  
Naturschutz Deutschland  
Press release June 1989

\* Luftchemie und Radioaktivität. Entgegnungen und Analysen um "Waldschäden durch Radioaktivität." Available from BUND LV Baden-Württemberg, Erbprinzenstr. 18, D-7800 Freiburg, FRG.



## Doing without nuclear power

Thomas B. Johansson, professor of Energy Systems Analysis at the University of Lund, has long maintained that the need is not to generate more electricity, but to use less of it. In a report entitled *Energy for a Sustainable World*, published by the World Resources Institute, Washington DC, in 1988, he and other internationally recognized experts showed how living standards might be raised in the developing world while growth continued in industrialized countries – yet with an increase in total energy use of only 10 per cent.

This could be achieved largely through the use of more efficient technology in the end-uses of electricity. The argument has now been further developed in a 1000-page volume,\* edited at Lund and embodying contributions by scientists from all over the world. Here practically all the possible end-uses of energy are examined in turn – in the home, in industry, and in public buildings. Some simple examples in

regard to domestic use alone indicate remarkable possibilities.

There are now, for instance, light bulbs on the market that require only 20-40 per cent of the electricity needed for a bulb of the conventional incandescent type. The electricity consumption of one Danish-made refrigerator is only a quarter of the general average, and only half that of the next-best model. And the most efficient one doesn't even cost more.

After having examined the available technologies for the generation as well as the end-uses of electricity, the writers turn to the matter of nuclear power – currently at the centre of environmental debate in Sweden. Reactors now supply half of the country's electricity, and the question is whether it will be possible to close them down, maintain economic growth, and avoid power shortages – yet without causing an increase in the emissions of acidifying substances and carbon dioxide.

Five scenarios are presented, representing successive steps towards

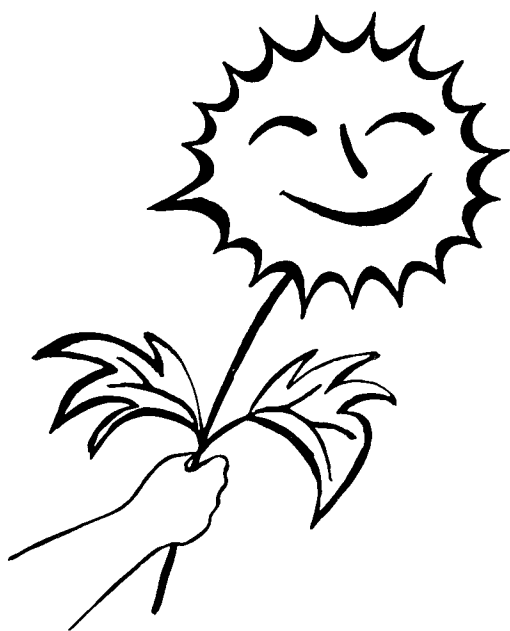
more efficient end-uses of electricity. It is claimed that even assuming the second most advanced, a "high efficiency" scenario, it would be possible to abolish nuclear power while lowering the emissions of carbon dioxide and acidifying substances, and also avoiding the damming of any more rivers. And still be able to price electricity services lower than at present.

The key lies in more efficient end-uses, together with a greater use of bio-fuels and to some extent wind power for generation. Energy-saving investments would, it is said, amount per kilowatt hour to considerably less than the marginal cost of any new generating facilities.

G Howard Smith

From an article by Tomas Kåberger

\* *Electricity – Efficient End-Use and New Generation Technologies and their Planning Implications*. Thomas B. Johansson, Birgit Bodlund, and Robert Williams, editors. Lund University Press, 1989.



*Main theme:*

*Energy Saving Strategies*

First announcement

**INTERNATIONAL  
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# To fund or not to fund

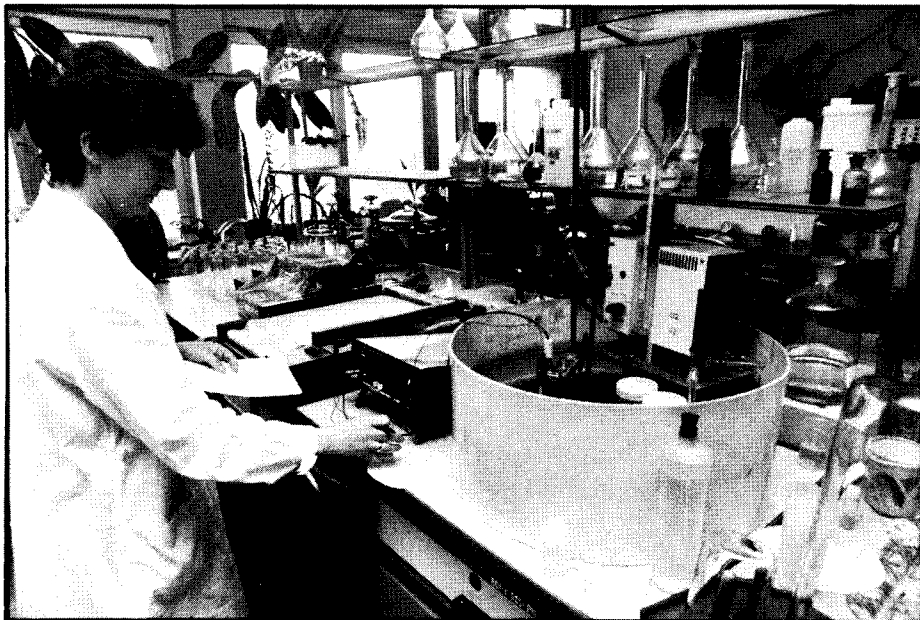
Following Helmut Schreiber's article on East-West cooperation in *Acid News* 2/89, we have received a letter with general and specific comment from Andrzej Gerhardt, Head of the Foreign Department at the Ministry for Environment Protection and Natural Resources in Poland.

We cite here some of the more specific passages in Mr Gerhardt's letter, together with Helmut Schreiber's reply.

In explanation of the present situation arose in Poland, Mr Gerhardt writes: "(Schreiber) concentrates on a description of the present state of the environment, without mentioning any of the factors that caused it. Following the active East-West cooperation of the 1970s, there came a period of political tension, mainly due to the arms race. Environmental problems in Eastern Europe were then aggravated by economic difficulties. Trade transactions were reduced, foreign indebtedness increased, and the technological gap widened. On account of these constraints, the largest source of pollution – industry – was not modernized."

He notes that Poland is also a recipient of airborne pollution from abroad, and particularly from the southwest, while admitting that the country itself is a serious polluter. He says that the Polish government is however making "systematic efforts towards improvement of the situation within the limits of its budgetary possibilities," and that "environmental protection is one of three policy priorities along with agriculture and housing."

As regards international cooperation for ecological improvement, Poland would favour, Mr Gerhardt says: 1. Unrestrained transfer of environmentally sound technologies. 2. The development of industrial and economic cooperation with Western countries in the production of facilities for environmental protection, including joint ventures. 3. A search for modern mechanisms



*Poland needs new monitoring equipment, but the country lacks the hard currency that will be necessary for buying it.*

© ANDRE MASLENNIKOV

of cooperation for funding investments in the environmental field.

In his article, Helmut Schreiber had written: "The basis for any successful environmental policy is the analysis of the existing situation. Without such a diagnosis it seems to be impossible to set up a strategy. It is therefore very important to improve the monitoring equipment in these (Eastern) countries."

Mr Gerhardt agrees, but points out that "the equipment based on the newest technologies and computer techniques is available only for hard currency, which is lacking in the debt-ridden Eastern European countries." He adds that reports that some countries were planning to help Poland in this respect still had to be confirmed.

With reference to the proposed European Fund for Environmental Protection, Mr Gerhardt notes that while Sweden and Poland were its main advocates within the United Nations ECE forum, a number of other states, including Austria, Bulgaria, Hungary, and the Soviet Union, were strong supporters of the idea, and that a statement in favour had subsequently been made by the Minister for Foreign Affairs of the FRG, Dietrich Genscher.

Mr Gerhardt maintains that such a fund would not be beneficial exclusively to the socialist countries. He says, too, that it was not intended to be an unconditional and global fund, and adds: "Poland does prefer a modern and active fund based on market economy mechanisms, and is continuing its search for new methods of investment in the field of environmental protection."

The functioning of the proposed fund would not exclude, he says, "other bilateral or multilateral forms of cooperation for financing environmental investments on a regional or global scale," citing the Baltic Marine Environment Protection Foundation and other private foundations in which NGOs are engaged.

Poland, according to Mr Gerhardt, would certainly support special efforts, in regard to the ecologically endangered zones that have so far been identified on a regional scale, with the aid of international funds – as for instance the proposed European Fund. As an example he mentions the effort being made by Poland, Czechoslovakia, and the German Democratic Republic, which has led to a tripartite agreement for dealing with the ecologically endan-

gered zone where their state boundaries meet.

It is not true, Mr Gerhardt says, that the socialist countries have never been able to establish effective means of combatting pollution, and have not made any progress in regard to environmental protection. Poland's participation in many conventions and protocols, he says, denies this claim, adding however that the process of preventing environmental degradation depends to a great extent on coordinated international cooperation.

Contrary to Helmut Schreiber, Andrzej Gerhardt does not believe that tight national budgets in the West would hinder the assembling of the necessary resources for a European Fund. He notes the willingness of the Norwegian and Netherlands governments, for instance, to allot 0.1 per cent of GNP to a proposed international fund for climate protection. The Dutch government has moreover, he says, charged a group of experts with the task of consulting other governments with this in view – as a part of the preparations for the scheduled International Ministerial Conference on Atmospheric Pollution and Climate Change at The Hague.

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### *The East wants aid. But on what conditions should it be given?*

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Helmut Schreiber now writes that he has been talking to various environmentalists who were in favour of a European environment fund and had been critical of his article.

To make his attitude clear, he says that such a fund might well be a useful instrument for helping to save the environment, provided certain conditions were observed. For one thing it should not lead to the creation of huge bureaucracies, and for another it should maintain detailed control of spending and the way technologies are applied.

Schreiber emphasizes that the "polluter pays" principle should not be altogether abandoned – reiterating that the countries of eastern Europe have been heavily polluting the environment for decades, and in contrast to many West European

countries have failed to establish strong environmental policy instruments. They have been wasting their resources, he says, particularly in the energy sector.

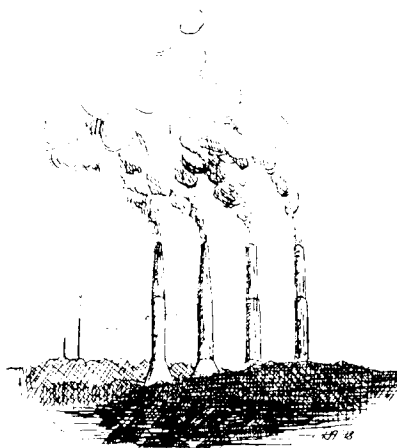
In Helmut Schreiber's view, to give "unconditional" money to these countries would be to reward a policy that violates basic environmental laws. Consequently the matching-fund principle should be applied, so that only those projects that are locally financed to at least 50 per cent would be eligible for aid from the fund. Moreover, only such parts of environmental technology as require foreign currency should be bought through the fund, the rest being paid for in local currency.

Since the prospect of unconditional assistance might lead to a cut-back of local measures for the protection of the environment, assurance would have to be obtained that this would not occur. Only projects over and above the already scheduled, Mr Schreiber insists, should be financed through the fund.

It also seems that as matters stand now, the proposed fund will be just one more organ financed and implemented by governments. Helmut Schreiber considers it crucial that NGOs should also be involved.

He concludes that even if West European countries decided on such a fund, it might take years before those that could provide the finance could agree on its structure and how the money was to be distributed. This might mean time lost as regards improving the environment. Therefore, says Helmut Schreiber, bilateral East-West cooperation should notwithstanding continue.

G Howard Smith



## **Further publications**

### **SPM Seminar on Swedish-Polish Environmental Cooperation (1989)**

Proceedings of a seminar held in February 1988 in Sweden, with more than 20 addresses by Swedish and Polish speakers on the subjects of environmental problems and possible cooperation. 146 pp. Copies can be obtained from Wistula Service, Box 440, S-101 25 Stockholm, Sweden.

### **Acidification (1989)**

Special issue of *Ambio*, published by the Royal Swedish Academy of Sciences, dealing with acid deposition and its effects in a global perspective. 56 pp. Obtainable from the Academy, Box 50005, S-104 05 Stockholm, Sweden.

### **The Air Around Us (1988)**

A 20-page booklet categorizing air pollutants, where they come from and what they do. Diverse topics such as air quality trends, forest decline, effects on human health, acid deposition, and the greenhouse effect, are covered in detail. Price \$9.95. Obtainable from The Acid Rain Foundation, Inc., 1410 Varsity Drive, Raleigh, NC 27606, USA.

### **Acid Rain and the Environment (1988)**

Bibliography compiled by Leslie Grayson updates the 1980-84 edition and reviews a substantial selection of the literature from all countries involved in acid rain research, published up to March 1988. 240 pp. Available from Technical Communications, 100 High Avenue, Letchworth, Herts, England SG6 3RR.

### **Acid Deposition – Sources, effects and controls (1989)**

This collection of papers, edited by James Longhurst, is meant to serve both as a course text for undergraduate studies and as a reference publication for libraries and researchers. It is divided into five sections: Acid deposition monitoring, freshwater acidification, soils and forest systems, structural materials, and control technologies. 344 pp. Available from Technical Communications, 100 High Avenue, Letchworth, Herts, England SG6 3RR.

### **Clean Coal Conference (1989)**

Proceedings of the Clean Coal Conference, held in London in June 1988 and organized jointly by Friends of the Earth, the International Coal Development Institute, and British Coal. Includes, besides 17 papers read at the conference, a report of the following debate. 170 pp. Published by Friends of the Earth Ltd, 26-28 Underwood Street, London, England N1 7JQ.

# Abatement targets set in acidification plan

At the end of May the Dutch government presented its National Environmental Policy Plan, which among other things envisages a reduction of the emissions of airborne pollutants by 80-90 per cent.

The plan is based largely on a report compiled by the Rijksinstituut voor Volksgezondheid en Milieuhygiene (National Institute for Public Health and Environmental Protection), a government institution, which sets forth in detail the various environmental problems besetting the Netherlands in their local, regional, fluvial, continental, and global aspects.\*

Acidification was later dealt with specifically in a special Acidification Abatement Plan, presented to Parliament in July by the Minister for the Environment Ed Nijpels. This aims at reducing the noxious effects to negligible proportions in the long term. It affirms that in the light of the latest scientific findings, the

harmful effects of acidification can be entirely avoided only if the deposition of acidifying pollutants is limited to 400-700 acid equivalents per hectare per year. That would be the so-called critical load for the Netherlands. The corresponding level for ozone is put at  $50 \mu\text{g}/\text{m}^3$  as the maximum daily average throughout the growing season, with  $120 \mu\text{g}/\text{m}^3$  as a maximum hourly average.

The measures needed to achieve these critical loads and levels are, according to the authors of the plan, so far-reaching as to be only possible of fulfillment sometime in the next century. Consequently interim objectives – so-called target loads, aimed at preventing the most serious damage – have been set for the years 1994, 2000, and 2010. See Table 1.

The abatement plan also outlines a large number of measures that will have to be taken in order to re-

duce the emissions of ammonia, nitrogen oxides, sulphur dioxides, and volatile organic compounds, and so reach the targets set forth in Table 2. Annual emission ceilings are proposed for the various pollutants for the years 1994 and 2000, both nationally and for individual sectors such as power plants, refineries, industry, agriculture, households, and mobile sources (passenger cars and heavy-duty vehicles).

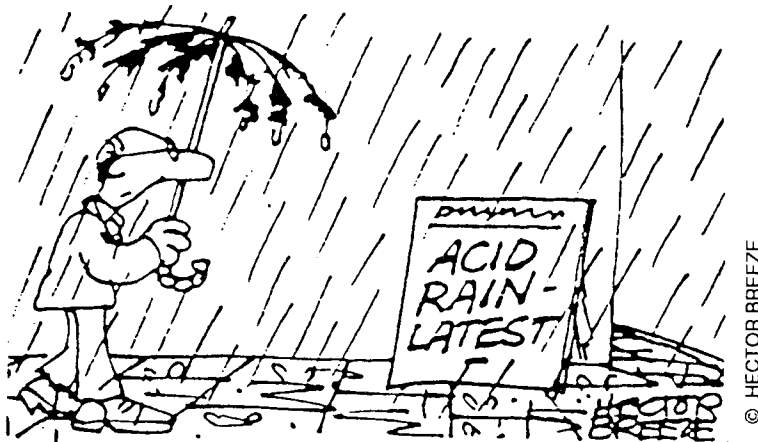
Among the measures specifically proposed are energy conservation and stricter emission limits for power stations, oil refineries, motor vehicles, as well as ways of checking the steady increase in road traffic. According to official forecasts, such traffic may be expected to increase by 70-80 per cent between 1986 and 2010. The measures proposed in the plan are intended to limit the increase to at most 55 per cent.

The cost of all these additional measures for curbing acidification is estimated to be 1.5 billion guilders for the year 1994. That would mean an extra monthly cost of 17 guilders for each household. The cost of the whole Environmental Policy Plan for the same year is put at 6.4 billion guilders, which would be about double the amount now being spent on environmental protection.

Since about 60 per cent of the fallout of acidifying pollutants over the Netherlands comes from abroad, a program has also been set up for attacking the problem internationally – the aim being primarily to reach agreements on the reduction of emissions within the spheres of the European Community and the UN Economic Commission for Europe, ECE.

Christer Ågren

\* An English version of the report, entitled *Concern for Tomorrow*, can be obtained from RIVM, PO Box 1, NL-3720 BA Bilthoven, The Netherlands.



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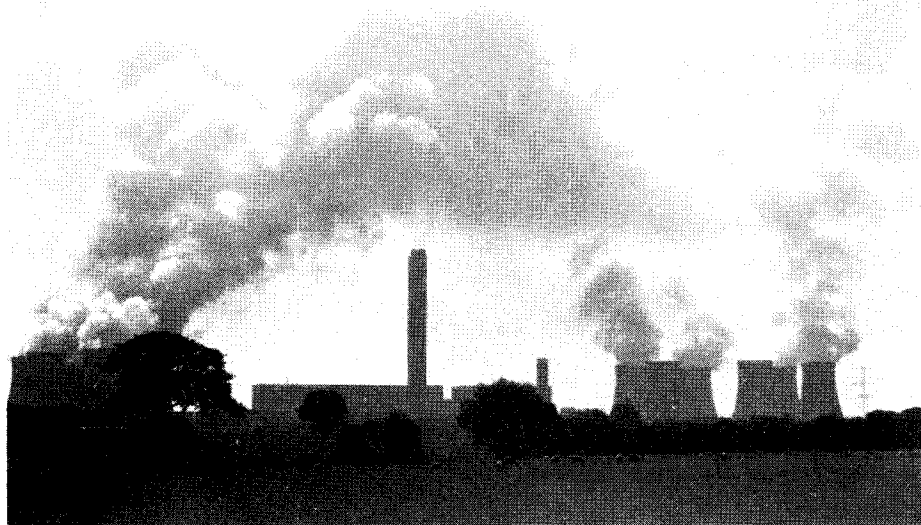
**Table 1**  
Objectives for Netherlands acidification abatement policy.

	1980	1994	2000	2010	Critical load/level
Acid deposition (acid equivalent/ha/year)	5800	4000	2400	1400	400
Ozone ( $\mu\text{g}/\text{m}^3$ )					
– maximum hourly average	240	—	240	240	120
– growing-season average	100	—	100	100	50

**Table 2**  
National objectives for the reduction of emissions from 1980 base levels.

	1994	2000	Needed reduction 2010
NH <sub>3</sub>	30%	70%	80 á 90%
NO <sub>x</sub>	20%	50%	80 á 90%
SO <sub>2</sub>	60%	80%	80 á 90%
VOCs	30%	60%	80%

# Sulphur clean-up starting



Until it has been equipped for flue gas desulphurization, the power plant at Drax may be emitting as much sulphur dioxide as that from the whole of Sweden and Norway.

Equipment to remove 90 per cent of the sulphur dioxide from the flue gases is now being installed at one of the world's largest coal-fired power plants, at Drax in North Yorkshire, England.

This plant is capable of burning up to 13.5 million tons of coal a year. In the three years from 1986 to 1988, however, the figure has varied between 9.2 and 10.2 million tons. The sulphur content of the coal, which has also varied, now averages 1.55 per cent. The resulting emissions of sulphur dioxide amount to some 300,000 tons – which is about as much as the combined total from all of Sweden and Norway.

The calorific value of the coal is typically 23,200 KJ/kg, and the electricity output is about 23 terawatt hours (TWh) per annum. There are six boilers at Drax, each with a capacity of 660 megawatts (MW), which means a total electrical capacity of close on 4000 MW.

There are several methods for flue-gas desulphurization (FGD), and that chosen for Drax by the owners, the Central Electricity Generating Board, is the limestone-

gypsum one. The reason given is that it is both a proven and efficient method and yields a saleable byproduct in the form of gypsum, which goes to making wallboard, plaster, and cement. Any surplus gypsum can be used for landfill or land reclamation.

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## *Meeting the EEC directive will put 2 per cent on the bills for electricity*

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The process may be described briefly as follows: The sulphur dioxide in the flue gases is absorbed in a slurry of crushed limestone (calcium carbonate) and water, producing calcium sulphite, which is then oxidized to calcium sulphate, or gypsum. A prescrubber is required to take out most of the chloride and fluoride present in the flue gases. More than 90 per cent of the sulphur dioxide is removed in the process, to do which at Drax will require about 600,000 tons of limestone a year.

The output of gypsum will amount to some 800,000 tons.

The permit to build the FGD installation was only granted in February this year. The plant will be phased in gradually in stages, the first one third being scheduled to be ready for operation towards the end of 1993, a second third in 1995, and the last in 1996.

The cost of installing the FGD equipment at Drax is put by the CEGB at about £500 million. It will require a peak work force of about 600 during construction, and will create up to 100 new permanent jobs. The annual operating costs of the power plant as a whole are estimated to increase by about £30 million, or about 10 per cent of the unit cost of electricity production. This will result from increased costs for manning, maintenance, and consumables. There will also be a generation loss, amounting to about 73 MW.

The installation at Drax is part of a larger FGD retrofitting program, itself a consequence of an EEC Directive on large combustion plants dating from November 1988. According to that directive, the Community as a whole will have to reduce the emissions of sulphur dioxide from existing plants (>50 MW thermal effect) by 23 per cent by 1993, 42 per cent by 1998, and 58 per cent by the year 2003 (see Acid News 2/89, p. 3). In the case of the United Kingdom, the figure will have to be 20, 40 and 60 per cent.

The CEGB calculates that it will have to install FGD on altogether 12,000 MW of capacity, if the required reductions are to be achieved by 2003, with Drax already accounting for 4000 MW. The estimated cost will be about 1.8 billion, requiring an increase of 2 per cent in electricity prices.

In 1987 the total emissions of sulphur dioxide from the United Kingdom amounted to 3.9 million tons, of which 3.3 million or 85 per cent, came from large combustion plants.

Christer Ågren

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# Aircraft and environment

The effects of air traffic on the environment have in general received little public attention. The emissions from aircraft are, in comparison with those from road vehicles, in any case relatively small – and in terms of the amounts of pollutant per passenger, a jet plane hardly emits more nitrogen oxides than a catalyzer-equipped car.

Unless something is done about it, however, the situation will only worsen. Air traffic is almost everywhere in a highly expansive stage, and the application of stricter controls on other sources will mean a relative increase in the proportion of emissions from aircraft.

The substances emitted from aircraft that cause the greatest environmental damage are nitrogen oxides, hydrocarbons, and carbon dioxide. According to preliminary figures from the Swedish Civil Aviation Administration, the annual emissions of nitrogen oxides from aircraft to the atmosphere of the northern hemisphere, mainly over North America and Europe, amount to something over one million tons, and those of hydrocarbons to 400,000 tons.

In an ordinary jet engine the fuel is burnt at a high temperature, and great amounts of nitrogen oxides

are formed, but less hydrocarbons. With the present tendency in jet-engine development towards even better combustion of the fuel, the emissions of nitrogen oxides will become still greater, while those of hydrocarbons will become less. Aircraft design and the high velocity of the exhaust gases from jet engines make catalytic cleaning impossible.

There are however ways of reducing the emissions of nitrogen oxides. It can be done automatically if less fuel is burnt. Propeller-driven planes consume less fuel than pure jets, but have not been able to attain the same high speeds. A solution is available however in the so-called UDF (unducted fan) engine, with an exposed propeller with scimitar-shaped blades behind the jet air intake. Aircraft equipped with UDF engines would be able to compete in speed, while burning 25 per cent less fuel, and the emissions of nitrogen oxides would be correspondingly reduced too – since the UDF engines are in other respects identical with ordinary jets.

Such engines are now fully developed, but it would require orders for at least a hundred aircraft to make them commercially worthwhile. Interest would certainly be greater however if fuel were to

become more expensive or stricter emission requirements were to be imposed.

There are also other ways in which emissions of pollutants could be reduced. One would be to build engines with more even distribution of heat in the combustion chamber. At present 90 per cent of the nitrogen oxides are formed in 10 per cent of the chamber where the temperature is higher than elsewhere. An evenly distributed temperature would give a reduction of emissions by 30 per cent.

While there are no technical obstacles to the construction of such engines, they would be more expensive than current jet types. They are thus unlikely to be built unless legal requirements are introduced to make it more or less compulsory.

It would theoretically be possible to reduce the emissions of nitrogen oxides from jets by up to 90 per cent if the fuel could be gasified before combustion. Although a solution does not appear impossible, in the view of experts it would take 10-15 years before such engines could be put into production – provided, too, there was the political and commercial pressure to develop them.

Jan Westerberg, expert on environmental effects at the Civil Avia-

tion Administration, does not believe that much can be done through technical measures to reduce the emissions of nitrogen oxides from aircraft during the next few decades. "If any real reduction is to take place, the volume of traffic will have to be reduced. There is no other way," he says.

Jet engines also pour out great quantities of carbon dioxides. In the case of aircraft the emissions per passenger-kilometre are however high, and at present this could only be counteracted by using UDF engines, with their lower fuel consumption.

Attempts are also being made to develop engines using hydrogen as fuel, which does not produce carbon dioxide. But neither will this provide any solution for some decades.

If global warming is to be avoided, it will be necessary, according to the Swedish meteorologist Henning Rhode, to limit the annual emissions of carbon dioxide everywhere to 1200 kilograms per capita (see Acid News 2/89, p.5). For Sweden and similarly developed countries this will mean reducing carbon dioxide emissions by 80-90 per cent. Only through a great decrease in the volume of traffic could aircraft in any way contribute to such reduction.

The curbing of aircraft emissions will call for two kinds of action.

1. The internationally agreed standards for NO<sub>x</sub> emissions from aircraft, which at present are distinctly lenient, will have to be tightened up. Sweden and West Germany have both been pressing for this in ICAO, the United Nations organization for civilian air traffic. It will be important to get as many other nations as possible to join them, since better aircraft engines are most likely to be developed as a result of stricter international requirements.

2. In view of the problem of carbon dioxide and the fact that it will take a long time before better engines can be in general use, the volume of air traffic will have to be cut down. Taxes on CO<sub>2</sub> and NO<sub>x</sub> emissions might be one way of bringing this about.

Per Elvingson

## UNITED STATES

# Bush plan to strengthen clean air requirements

On June 12, 1989, President George Bush presented a three-part plan for combatting acid rain and improving air quality in the US, thereby helping his claim to be the "environmental President." In a speech at the White House, Bush asked that the 1970 US Clean Air Act be amended to 1. abate acid rain by reducing sulphur dioxide emissions by nearly one-half, 2. combat urban smog through control of auto emissions, and 3. reduce industrial emissions of toxic air pollutants. Bush's initiative is expected to end the deadlock in Congress that has blocked any change in the Clean Air Act since 1977. It represents the first substantive antipollution action taken since 1980. The Reagan Administration (1981-89) opposed all efforts to impose antipollution requirements on industry.

The President's plans would impose costly measures to strengthen US clean air requirements. William K. Reilly, Administrator of the Environmental Protection Agency, estimated that the new plans could cost industry \$14 to \$18 billion a year when the program is in full effect.

Mr Bush's proposals would allow companies to buy, sell or trade the right to pollute: If they exceed the required reductions, they could sell rights to emit extra pollution to other companies or transfer rights to other plants within the same company, allowing the market to decide the cheapest way to contain smokestack emissions. The plan has met with widespread support.

Environmentalists remain concerned about the adequacy of the proposed emissions reductions. They also wonder whether the market approach will be equitable, particularly to high-sulphur coal regions, such as economically depressed West Virginia.

Opposition to the market approach is also expected from states that depend upon the sale of high-sulphur coal. Switching to low-sulphur coal would be far less expens-

ive than installing stack scrubbers. The United Mine Workers and coal-state legislators prefer a requirement for scrubbers over encouraging the use of low-sulphur coal. Senator Robert Byrd of West Virginia said the President's proposal would "decimate" the companies that mine high-sulphur coal. When Mr Byrd was Senate majority leader he effectively opposed acid rain legislation for many years and he remains a powerful voice on issues that affect the coal industry.

The first phase of required cuts would affect the 107 most polluting power plants in 18 states. These plants emit more than 2.5 pounds of sulphur for every million BTUs produced. Sulphur dioxide emissions would be reduced by 10 million tons, or 50 per cent, through restrictions on coal-burning power plants. Nitrogen oxide emissions would be cut by 2 million tons, or about ten per cent of current levels.

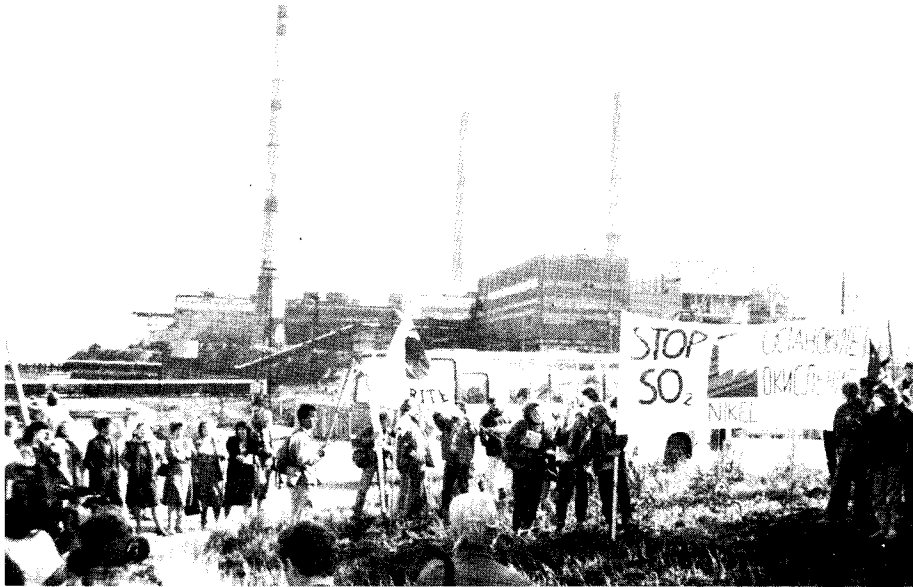
Half of the reductions would have to be accomplished by 1995 and the rest by 2000. Companies could reach the goal by using stack scrubbers, switching to low-sulphur coal, encouraging more effective consumption, or adopting new technologies. Those that choose the new technologies would have until 2003 to meet the final deadline.

The President's plan for reducing nitrogen oxide and hydrocarbon emissions to control urban air pollution includes stricter controls on automobiles. This will require gasoline refiners to reduce the volatility of their product. It will also require that a significant proportion of new automobiles sold in the nation's nine smoggiest urban areas be capable of burning methanol and other "clean" fuels. Notably absent from these measures intended to reduce nitrogen-oxide emissions is increased fuel efficiency standards.

Jay Lee

Pacific Energy and Resources  
Center, Sausalito CA USA

# Friendly at Murmansk



© KARIN NIELSEN

Although unaccountably unaware of the impending visit, the Nickel smelter management agreed to meet a delegation of activists from the Peace and Environment Festival.

Bare tree skeletons standing out against the sky. The ground blackened, lifeless. The train rumbles on endlessly through dead woodlands, in a dead landscape. An ecological catastrophe of unimaginable dimension is spreading out over the Kola peninsula, up by the Arctic Ocean.

Last July 1600 young Scandinavians journeyed to North Norway and Russia, to take part in the great event of the summer, the Peace and Environment Festival at Murmansk, organized jointly by the Scandinavian peace and environmental movement. On the peninsula are some of the worst emitters of noxious substances in Europe. Here the smelter at Nickel alone pours out more sulphur dioxide than is emitted from the whole of Norway.

What sort of reception did we expect to get on the other side of one of Europe's most closely guarded frontiers? As it turned out, the response from the Russians was tremendous – as was the concern they showed for the environment. Every day some 10,000 came to the festival ground on the outskirts of Murmansk.

The days were filled with seminars, hearings, and debates. At one seminar Russian experts argued with each other the extent of dead and damaged forest around the mining and industrial centres of the pe-

ninsula. According to forest scientists from Finland (also a near neighbour) the area of damage around Nickel alone amounts to about 2.5 million hectares.

Days made endless by the midnight sun saw get-togethers of a kind previously thought inconceivable. Friendships were forged, useful contacts made everywhere – all against a background of jolly cultural manifestations, from Russian folk dancing to Finnish rock.

Peter Martinsson, a member of the Swedish Youth Association for Environmental Studies and Conservation, has described a visit to the

Nikel smelter by a group of Swedish activists and members of the Norwegian Nature and Youth organization on their way to Murmansk.

“Never”, he says, “had I seen a plant making such a mark on its surroundings. Something I had never believed possible. Dead forests as far as the eye could see, all enveloped in a dirty grey atmosphere. The smelter at Nickel, a town of 30,000 population, pours out 220,000 tons of sulphur dioxide a year. An incredible figure.

“We told the management they ought to reduce it by 98 per cent. The Russians said they were aiming at a reduction of 50 per cent by 1993. As discussion proceeded, however, they agreed to try and make it 75 per cent by 1996.

“While talks were going on, some of us slipped away and climbed up on the plant to fix a banner, which unfortunately did not stay put. A few workers did however come out and make a show of approval.

“At the time of our visit the plant was only operating at half capacity, but from Norway the day before we had been able to see black smoke belching from its chimneys. Nevertheless the air was noticeably bad while we were there, and we had to shield our breathing as best we could.”

Reinhold Pape  
From an article in *Miljötidningen*



© NILS HEDFORS

Every day thousands of people from Murmansk and its surroundings came to the grounds of the Peace and Environment Festival on the outskirts of the city.