

Acid News

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



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AIR POLLUTION

New protocol signed

ONE MORE GENERAL agreement for curbing emissions of border-crossing air pollutants has now been signed (November 19). In the form of yet another protocol to the UN ECE Convention on Long Range Transboundary Air Pollution, this concerns VOCs, volatile organic compounds. The prime aim is to reduce the magnitude and the number of episodes with high concentrations of ozone.

Ozone is formed in the troposphere as a result of reactions between nitrogen oxides and VOCs in the presence of sunlight. Ozone is

naturally present in the air, but in the present century the so-called background levels of ozone have doubled in Europe, most probably because of the increased emissions of nitrogen oxides.

On top of the increasing background levels, short periods of highly elevated concentrations – known as episodes – occur in summer. Polluted air masses can be transported thousands of kilometres by the winds, thus giving rise to elevated levels of ozone over large areas of Europe. It is thought that episodic peaks in tropospheric ozone can be

more efficiently reduced by controlling the emissions of VOCs rather than those of nitrogen oxides.

Under the ECE Convention there are already protocols for limiting the emissions of sulphur and nitrogen oxides. This new one, which is the outcome of almost three years of negotiation, means in essence that the signatories commit themselves to reducing their emissions of VOCs by at least 30 per cent by 1999, using 1988 as a base year. The nations that have agreed to do so unconditionally are: Austria, Belgium, Fin-

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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 Nature Conservation (Naturskyddsföreningen)
- The Swedish Youth Association for Environmental Studies and Conservation (Fältbiologerna)

Address and telephone: see above.

The Norwegian Secretariat, "The Norwegian Clean Air Campaign," 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)
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EDITORIAL

At least a start

THE PROTOCOL ON VOCs which is also the subject of an article in this issue, forms a welcome supplement to the UN ECE Convention on Long Range Transboundary Air Pollution. It cannot however be regarded as anything other than a first step in the right direction, since the limits on emissions that have been agreed upon are clearly inadequate for the protection of ecosystems or even of human beings.

If the formation and presence of tropospheric ozone (that which occurs near the ground) are to be lessened in Europe, the emissions of VOCs as well as of nitrogen oxides will have to be greatly reduced. Computer modelling has shown that a reduction of at least 75 per cent will be needed in both cases if internationally agreed critical concentrations are not to be exceeded.

These critical concentrations are based on scientific data concerning the sensitivity of various species and ecosystems to airborne pollutants. In the case of vegetation the critical concentrations are 150 micrograms per cubic metre as a one-hour mean value, and 50 $\mu\text{g}/\text{m}^3$ for a seven-hour mean per day during the vegetation period in summer. If these concentrations are exceeded, there is likely to be damage to sensitive vegetation, including some crops.

As compared with vegetation, human beings are usually thought to be less sensitive to the effects of ozone. A guideline from the World Health Organization sets the one-hour average at 150-200 $\mu\text{g}/\text{m}^3$, and the eight-hour at 100-120 $\mu\text{g}/\text{m}^3$. These limits are intended to obviate acute short-term health effects. The possibility of chronic long-term ef-

fects is mentioned, but no guidelines are given.

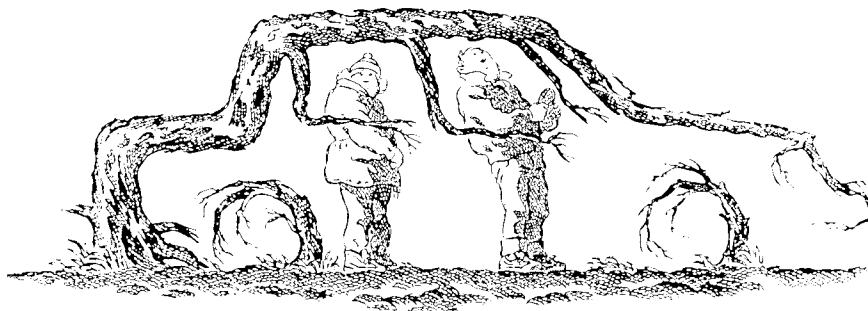
A report from the Nordic Council of Ministers, entitled Photochemical Oxidants in the Atmosphere, says however: "Recent investigations indicate that humans may have a higher sensitivity to ozone than previously observed. In fact some studies indicate increased health risks at such low values that any increase above the natural background (level) should be avoided."

If that conclusion is correct, it would mean that to avoid their consequences to health, the anthropogenic emissions of VOCs and NO_x should in effect be eliminated.

When signing the protocol last November 19, several countries – among them Germany, the Netherlands, Sweden, Denmark, and Austria – declared their aim to be at least a halving of VOC emissions before the end of the century. Since it is evidently politically as well as practically possible to reduce emissions by more than half within ten years, there seems to be no reason why all the other European countries should not also make this their minimum aim. Each country should moreover start making detailed plans as soon as possible for reducing emissions of VOCs and NO_x by at least 75 per cent.

Ratification by at least sixteen countries is required if the protocol is to come into force. This ought to be done without delay, so that a beginning can be made as soon as possible in applying "the best available technologies that are economically feasible," as well as promulgating emission standards.

CHRISTER ÅGREN



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land, France, Germany, the Netherlands, Spain, Sweden, and the United Kingdom.

Alternatively, countries can however choose any year between 1984 and 1990 as their base year, instead of 1988, and the following have done so: Denmark (1985), Italy (1990), Liechtenstein (1984), Luxembourg (1990), Switzerland (1984), and the United States (1984).

For some countries there will be the possibility of confining their 30-per-cent reduction to certain specified areas – so-called Tropospheric Ozone Management Areas (TOMAs) – within their country. This would be allowable if it is only from these areas that the VOC emissions contribute to the concentrations of ozone in other countries. Emissions in the other, exempted, areas can increase, so long as the total national emissions do not.

Among those that have opted for a TOMA are Canada (base year 1988) and Norway (base year 1989). Norway has defined its TOMA as the area lying south of latitude 62°N, for the reason that it wishes to allow for the possible development of oilfields to the north of that line. The Ukraine also signed the protocol with reference to Article 2b, thus taking the TOMA alternative too. Since however the proposed TOMAs had not been discussed with neighbouring countries, it is uncertain whether the signature will prove to be valid in this case.

Then again the protocol gives a possibility for certain countries to undertake only to freeze emissions, in other words to ensure that at latest by 1999 their annual emissions of VOCs do not exceed the 1988 levels. This would apply to so-called small emitters, that is countries whose annual emissions of VOCs in 1988 were less than 500,000 tons, and 20 kilograms per capita, and 5 tons per square kilometre. The following countries coming under this category have signed the protocol

accordingly: Bulgaria, Greece, and Hungary.

A total of twenty-one countries have thus signed this protocol. In addition Portugal, Ireland, and the

into account will be scientifically determined critical loads, internationally agreed target loads, and the role of nitrogen oxides in the formation of photochemical oxidants.

Protocol to the 1979 Convention on Long Range Transboundary Air Pollution concerning the control of emissions of volatile organic compounds or their transboundary fluxes.

Extract from Article 2; Basic Obligations:

1. The Parties shall control and reduce their emissions of VOCs in order to reduce their transboundary fluxes and the fluxes of the resulting secondary photochemical oxidant products so as to protect human health and the environment from adverse effects.

2. Each Party shall, in order to meet the requirements of paragraph 1 above, control and reduce its national annual emissions of VOCs or their transboundary fluxes in any one of the following ways to be specified upon signature:

a) It shall, as soon as possible and as a first step, take effective measures to reduce its national annual emissions of VOCs by at least 30 per cent by the year 1999, using 1988 levels as a basis or any other annual level during the period 1984 to 1990, which it may specify upon signature of or accession to the present Protocol; or

b) Where its annual emissions contribute to tropospheric ozone concentrations in

areas under the jurisdiction of one or more other Parties, and such emissions originate only from areas under its jurisdiction that are specified as TOMAs in annex I, it shall, as soon as possible and as a first step, take effective measures to:

- Reduce its annual emissions of VOCs from the areas so specified by at least 30 per cent by the year 1999, using 1988 levels as a basis or any other annual level during the period 1984-1990, which it may specify upon signature of or accession to the present Protocol; and

- Ensure that its total national annual emissions of VOCs by the year 1999 do not exceed the 1988 levels.

c) Where its national annual emissions of VOCs were in 1988 lower than 500,000 tonnes and 20 kg/inhabitant and 5 tonnes/km², it shall, as soon as possible and as a first step, take effective measures to ensure at least that at the latest by the year 1999 its national annual emissions of VOCs do not exceed the 1988 levels.

European Community have declared an intention of signing it in a near future.

In addition to their general commitments, the signatories shall, within two years of the protocol's coming into force, have introduced emission standards for new stationary and mobile sources. No precise levels or techniques are prescribed. Instead there are recommendations in two technical annexes.

It has been agreed that in the next stage measures shall be taken to reduce emissions of VOCs still further. Among the things to be taken

Negotiations to such effect are to start within six months of the protocol's coming into force (which usually means two or three years after signing).

CHRISTER AGREN

The Convention on Long Range Transboundary Air Pollution under the United Nations Economic Commission for Europe (ECE) was signed in November 1979 and entered into force in March 1983. It embraces 34 parties, including all the European countries, the European Community, the United States, and Canada.

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Forest damage goes on

MOST OF THE countries of Europe are reporting an increase in damage to their forests, with spruce, fir, and oak as the most heavily affected species. Only in a few countries has its extent been found to be unchanged or less than in the previous ECE survey.

The European forests have been surveyed for damage by a common procedure every year since 1986. The 1990 survey covered 130 million hectares, or about 76 per cent of the continent's total forest area. While most of the twenty-six participant countries made nationwide surveys, in the European parts of the Soviet Union the surveys were regional (see table). Information was altogether lacking only from Romania and parts of Yugoslavia.

The procedure is to estimate defoliation from a random selection of trees. Each tree is graded according to the degree of defoliation in one of five classes, those with 0-10 per cent defoliation being placed in Class 0, with 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 Class 4. Ratings are shown for different species and age groups of coniferous and broadleaved trees.

Intensity of defoliation is used as the means of showing the trees' general state of health. It is difficult however to determine just when a tree is to be regarded as damaged. Some scientists for instance think that Class 1 should be considered as an early warning stage. In the table the extent of damage is shown in two ranges: moderate to severe (Classes 2-4), and the other slight to severe (Classes 1-4).

The results, when seen over the whole period of the surveys from 1986 to 1990, reveal great variations from one year to another. This is as might be expected, since the various factors affecting the trees' vitality – drought, wind, frost, air pollution, etc. – will also vary greatly from year to year. In general it can be said that aged trees and trees standing on high ground will be the worst affected.

Although in general a five-year period will not permit any far-reach-

ing conclusions, there seems to be an evident trend in eastern Europe, where there is a great increase in reported damage. Some of this increase may of course be due to more careful surveying, as well as to the lifting of censorship. In the adjoining areas of Austria and western Germany, for instance, the intensity of defoliation has remained relatively unchanged. On the other hand the air-pollutant load on eastern Europe is extremely high.

As for the west, a marked increase in damage has been noted in the

United Kingdom and Portugal. In the former at least part of this must be attributable to air pollution, although the British authorities are inclined to belittle the connection.

In submitting the 1990 survey to the UN ECE Working Group on Effects, the Programme Task Force of ICP Forests expressed concern over the continuing decline of the forests and the acidification of forest soils in Europe, and emphasized the need for further measures to reduce air pollution.

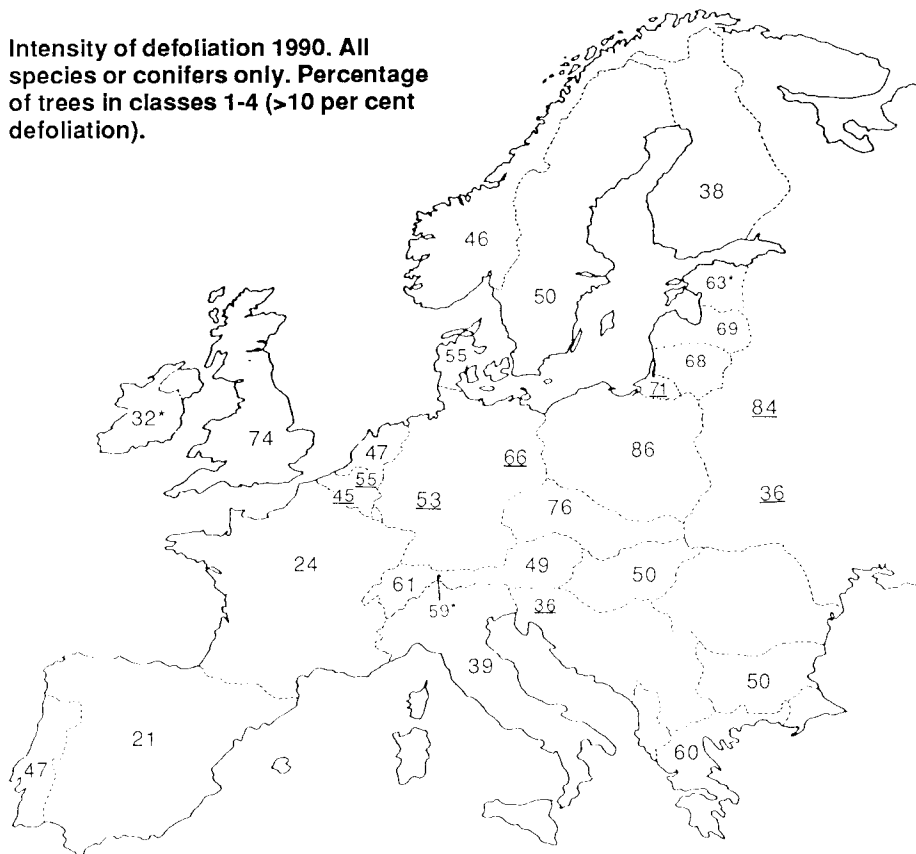
PER ELVINGSON



Dead forest in the Karkonosze National Park in southern Poland.

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Intensity of defoliation 1990. All species or conifers only. Percentage of trees in classes 1-4 (>10 per cent defoliation).



Except when underlined (regional) the figures represent nationwide surveys. *=conifers only. Source: United Nations ECE, ICP Forests (International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests).

Intensity of defoliation in 1990, in per cent of trees affected. For all tree species, unless marked * for conifers only. Based on nationwide (N) or regional (R) surveys.

Country	Moderate to severe (Classes 2-4)	Slight to severe (Classes 1-4)
USSR-Byelorussia (R)	54.0	84.0
Czechoslovakia (N)	46.6	76.3
United Kingdom (N)	39.0	74.0
Poland (N)	38.4	85.7
Latvia (N)	36.0	69.0
Germany (former East)	35.9	65.7
Portugal (N)	30.7	46.9
Bulgaria (N)	29.1	50.3
USSR-Kaliningrad (R)	22.5	70.9
Hungary (N)	21.7	50.4
Denmark (N)	21.2	54.7
Lithuania (N)	20.4	68.5
Estonia* (N)	20.0	63.0
Belgium-Wallonia (R)	19.1	45.4
Yugoslavia-Slovenia (R)	18.2	35.7
Netherlands (N)	17.8	46.8
Greece (N)	17.5	60.5
Finland (N)	17.3	37.8
Norway (N)	17.2	46.2
Switzerland (N)	17.0	61.0
Sweden (N)	16.2	49.9
Germany (former West)	15.9	52.9
Italy (N)	14.8	38.6
Austria (N)	9.1	49.2
Belgium-Flanders (R)	8.3	54.9
France (N)	7.3	24.0
Liechtenstein* (N)	7.1	59.0
Ukrainian SSR (R)	6.4	35.9
Ireland* (N)	5.4	32.5
Spain (N)	3.8	20.8

COMMUNITY

Sulphur move

A PROPOSAL for a directive to limit the sulphur content of diesel fuel and gasoil was approved by the European Commission on April 30, 1991. As regards diesel oil, the Commission proposes to set the maximum limit at 0.2 per cent by weight as from October 1994, and 0.05 per cent from October 1996. Tax incentives could be introduced in 1992 to encourage the use of low sulphur diesel fuel (with 0.05 per cent sulphur), and it is also proposed that such fuel shall be made widely available in all member states already from October 1995.

The sulphur content of heating, industrial, and bunker gasoils would be limited to 0.2 per cent from October 1994, and 0.1 per cent from October 1999.

At present there is a limit of 0.3 per cent for sulphur, but under certain conditions the member states are allowed to require 0.2 per cent.

Source: Europe Environment Fortnightly, No. 364, 1991.

SWEDEN

Better diesel oil

IN SWEDEN diesel oil may contain at most 0.2 per cent sulphur by weight, and since 1990 there has been a classification system providing economic incentives to increase the use of oil with a lower content of sulphur as well as aromatic hydrocarbons. Class 3 is for a standard fuel (usually containing 0.1 per cent sulphur and 25-30 per cent by volume of aromatics). For Class 2 diesel oil the limits are 0.02 per cent for sulphur and 20 per cent for aromatic hydrocarbons. For Class 1 they are 0.001 per cent and 5 per cent respectively.

In the country's two largest cities, Stockholm and Göteborg, the environment-and-health authorities have just decreed that as from November 1 no diesel oil may be sold unless it conforms at least to the requirements of Class 2. Emissions of sulphur, particulates, hydrocarbons, nitrogen oxides, and smoke are expected to drop as a result of this measure.

Source: Notiser, No. 3, 1991

Curbing CO₂ from cars

CARBON DIOXIDE emissions from cars could be stabilized in the UK by 1993-94, and reduced by 30 per cent by 2005, according to a recent study* by Friends of the Earth. The prerequisite for the achievement of the first aim would be the introduction of tax incentives to favour energy-efficient cars, backed by public education campaigns. The second stage would require a reduction of traffic growth.

The transport sector makes a significant contribution to the build-up of carbon dioxide and other greenhouse gases in the atmosphere. In the UK it is now the largest single energy end-use sector, and the fastest-growing major source of carbon dioxide. Currently vehicles emit about 100 million tons of CO₂ annually, or about 20 per cent of the UK total. The contribution will grow sharply if the official projections for an increase in road traffic are realized. According to FoE, the current rate of traffic growth is incompatible with the aim of reducing CO₂ emissions from transport, and car use will therefore have to be curbed.

For examining the possibilities of reducing CO₂ emissions from cars the study uses two scenarios, one based on a rapid introduction of fuel-efficient cars, the other on a continuation of current fuel-economy trends.

In the first scenario, tax incentives would be among the means for promoting a rapid introduction of new fuel-efficient cars. The current average fuel economy of the national car fleet is 35.3 miles per gallon (mpg). In this scenario it would gradually rise to 49 mpg by the year 2000, and to 84 mpg by 2020. The average fuel economy of new cars would increase from today's 47.6 to 95 mpg by the year 2020. In this scenario "considerable effort by the motor manufacturers (would be required) and in order to meet these improvements in fuel economy, cars are likely to change radically in size, performance, passenger and luggage space."

As a result of such an improvement, CO₂ emissions could stabilize by 1993-94, and a 30-per-cent reduction could be achieved by 2005 if growth in car traffic were restricted to 16 per cent within that period (as compared to the 1990 level) and then stabilized. By then the best cars entering the market would have a fuel economy of around 100 mpg (2.8 litres/100 km).

With the target for 2020 set for a 70-per-cent reduction of CO₂ emissions, car traffic would have to be reduced by about one quarter, that is to the level of 1984. By that time the fuel economy of the best models would be around 140 mpg.

The second scenario involves a "business as usual" approach as regards improvements in fuel efficiency. This is expected to result in a bettering of the average fuel economy of the national car fleet to 39.3 mpg by the year 2000, and to 49.6 mpg by 2020, which is said to be an optimistic assumption. In order to stabilize CO₂ emissions by the mid-1990s, growth in traffic would have to be kept at 1990 levels. To meet the target of a 30-per-cent reduction by

the year 2005, traffic levels would have to be reduced to those of 1987. A 70-per-cent reduction in emissions by 2020 would mean bringing car traffic back to the 1964 level—in other words, reducing it by more than half.

According to the FoE there is a large number of policy options available for bringing down the emissions of CO₂ from cars. They recommend, among other things, that taxes should begin to reflect the environmental costs of motoring, and that the revenue so raised should be earmarked for investment in public transport. Fiscal measures can be used both to influence buying choice and to reduce car use.

Among the options assessed by FoE are higher taxes for gas guzzlers, increases in the price of fuel and parking charges, excise taxes based on fuel economy, and abolishing some company-car perquisites. The study also reviews a number of measures for restraining traffic, such as lowering speed limits, promoting car pooling, road pricing, and encouraging the use of public transport as well as walking and cycling.

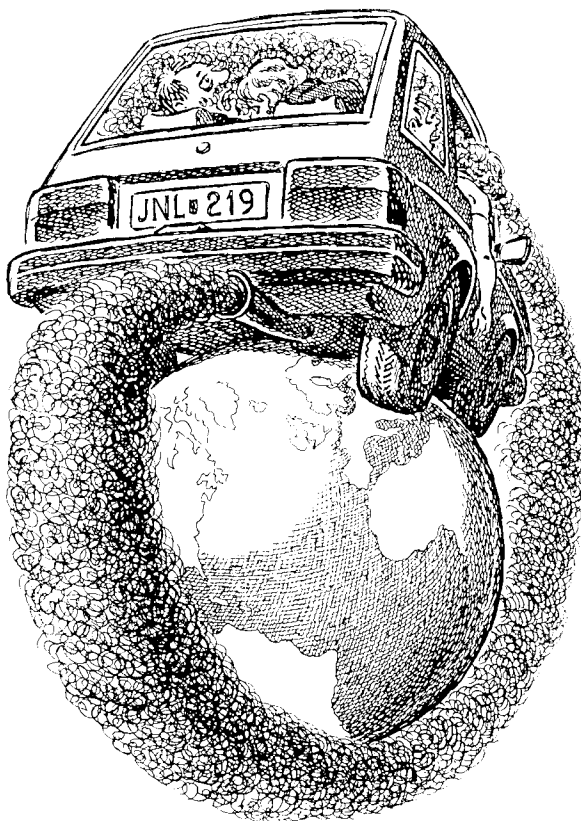
Both scenarios would, in the view of FoE, require government intervention. "Fuel efficiency advances can provide the breathing space required to radically reshape British transport policy," comments FoE air pollution campaigner Fiona Weir. "If the government fails to regulate the motor manufacturers, its options will narrow rapidly."

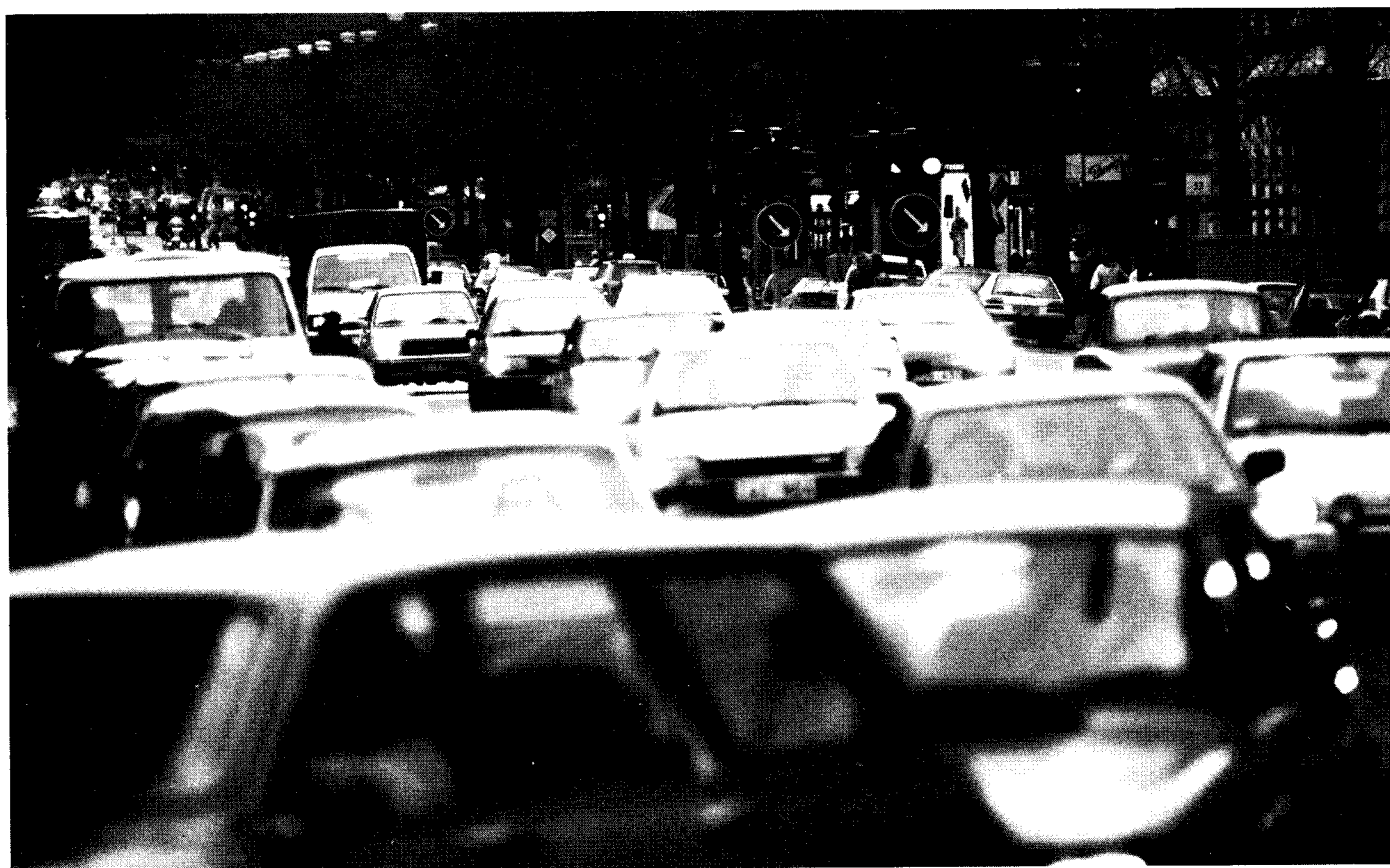
The conclusion is that initiatives for reducing carbon dioxide and other greenhouse gas emissions are urgently needed. The longer action is delayed, the more stringent the emission reductions will have to be.

CHRISTER ÅGREN

***Transport and climate change: Cutting carbon dioxide emissions from cars.** By C Holman. Price £6. Obtainable from the publisher: Friends of the Earth, 26-28 Underwood Street, London, England N1 7JQ.

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EUROPEAN COMMUNITY

The attack on CO₂

THE UN IS NOW nearing the stage where decisions will have to be made on international agreements for controlling the emissions of greenhouse gases – and the pressure to establish targets is coming principally from the EC Commission. In the case of CO₂ the Commission is proposing that by the end of the century all the industrialized countries should have stabilized their emissions at or below 1990 levels.

The framework for a Climate Convention will probably be adopted at the UN Conference on Environment and Development (UNCED) in Rio de Janeiro this next June. Preparations have been going on within a working group under the name of International Negotiations on Climate Change, and a proposal is expected to result from two final meetings in Geneva this December and New York next March.

Attempts to include definite commitments for the reduction of greenhouse gases, in particular CO₂, have so far been blocked in the INC group by the US representatives as well as

those of other leading oil producers such as Saudi Arabia and the Soviet Union.

For their part the Japanese would like a “pledge and review” treaty, under which countries would agree to reduce their emissions (without however saying by how much), and then monitor the results.

At the second INC meeting in Nairobi last September, the EC Com-

mission was calling for an agreement to stabilize greenhouse gases at levels that “prevent dangerous anthropogenic interference with climate” and would “allow ecosystems to adapt naturally.” It was insistent on stabilization in industrialized countries by the year 2000 – despite

failure to get even its own member states to agree on specific targets.

The EC plan to freeze emissions of CO₂ at 1990 levels by the end of the century would allow poorer member countries to increase their emissions in proportion to the greater reductions that might be achieved by richer countries. Spain for instance is asking for a permitted increase of 36 per cent, whereas the Commission would only allow it 10-20 per cent.

With the removal of customs barriers and the creation of an internal market within the European Community area in January 1993 will come more trade, greater economic growth, and an increase in traffic. Unless accompanied by radical measures to protect the environment, this development will lead to increased emissions of greenhouse gases, and increased efforts are therefore being made to strengthen EC environmental policy.

Such efforts will be favoured to some extent as a result of the EEA agreement between the EC and the

*The Commission
would introduce
two main taxes*

mission was calling for an agreement to stabilize greenhouse gases at levels that “prevent dangerous anthropogenic interference with climate” and would “allow ecosystems to adapt naturally.” It was insistent on stabilization in industrialized countries by the year 2000 – despite

EFTA countries. Among the latter Switzerland and Sweden are regarded as leaders in environmental protection – a role that the EC would now like to take over. In this the principal instrument will be a system of tax reductions and direct taxes. In accordance with the “polluters pays principle,” households as well as vehicle owners and industries would be among the payers.

It is clear to the EC Commissioner for the Environment, Carlo Ripa di Meana, that the goal of stabilizing CO₂ emissions will be unattainable unless industry is forced to use energy more efficiently and to use cleaner fuel. Together with the Commissioner on Energy, Antonio Carduseo de Cuha, he has therefore proposed to the EC Commission a “Community Strategy to limit Carbon Dioxide emissions and to improve energy efficiency.”

Even while it was being prepared during the past year this proposal was subject to heavy criticism from several member states and industrial lobby groups. Consequently when presented to the EC Council of Ministers on September 25, 1991, it was only in the form of a discussion document. The Commission is waiting with the usual draft legislation until the member states have given their formal responses to the proposal.

The Communication (proposal) from the Commission to the Council of Ministers would introduce two main taxes in 1993. One would be a uniform tax on energy from every source except renewables, and the other a tax set according to the carbon content of individual fuels. The exact form of these taxes was long uncertain. While Ripa di Meana favoured dividing them, with 25 per cent falling on emissions of CO₂, and 75 per cent on energy use, and Carduseo de Cuha wanted both to be equally taxed, the Commissioner for the Internal Market, Martin Bangemann, was proposing that it should all be laid on CO₂.

In fact the Internal Market Commissioner would rather have no fiscal measures, preferring voluntary energy-saving programs such as are proposed by industry. The “Greens” in the European Parliament had in any case criticized his idea of a tax as being “in the interest of the nuclear industry.” Not being affected by a tax on carbon dioxide, nuclear

energy would become more competitive.

The countries of southern Europe see an energy tax as contradictory to the concept of an internal market. Hoping to attain the same economic standard as the rest of the Community, they would like to be able to increase their energy use during the transition period.

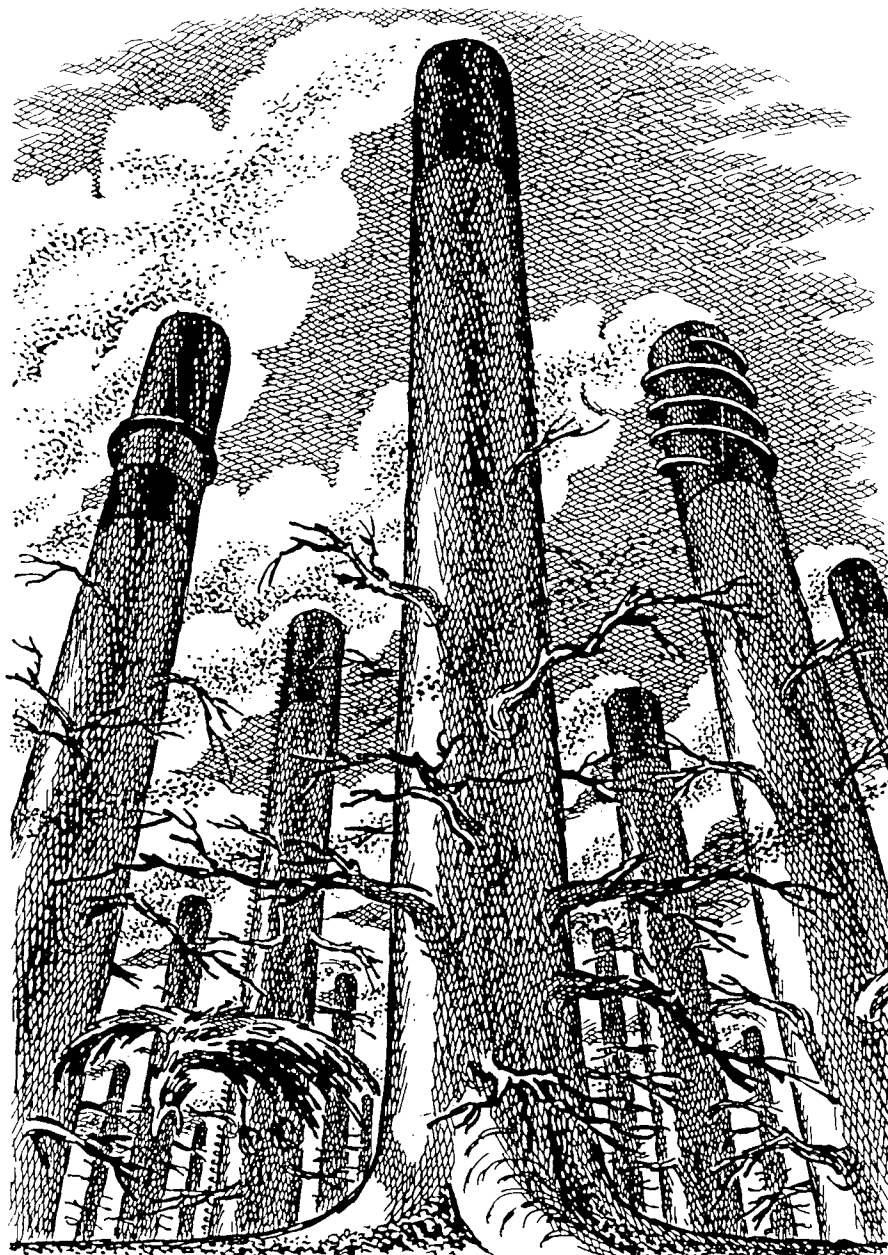
To avoid being put at disadvantage in world markets, the manufacturers of such things as chemicals, steel, aluminium, glass, and ceramics want any measures to be worldwide. They are also demanding compensation in the form, for instance, of tax reductions when they introduce more energy-efficient methods of production.

Several countries have plans for taxing carbon dioxide, and Sweden is already doing so. Since January 1,

1991, in that country there has been a tax on each ton of emitted CO₂ corresponding to about \$18 per barrel of oil. Denmark has also decided to introduce CO₂ taxes, and Germany is planning to do it.

The Commission has however now come down in favour of a 50/50 formula for taxing CO₂ emissions and energy use in equal proportions. It is recommending an overall energy tax based on the yardstick of an extra \$10 on the price of a barrel of oil, to be introduced by the turn of the century. Starting in 1993 from the equivalent of \$3 on a barrel of oil, it would be increased at the rate of \$1 per year up to 2000. The effect by that year would be \$14 for coal and \$5 for nuclear energy.

The Commission's calculations indicate that the tax would, on the basis of a 25-per-cent carbon formu-



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la, raise coal costs by 30 per cent by 1995 and 61 per cent by 2000. Also by 2000 the cost of electricity is likely to have risen by 16 per cent, that of heavy fuel oil by almost 40 per cent, of petrol by 6 per cent, and natural gas by 31 per cent. On account of differences in national tax regimes and other variables, these figures would however not be consistent throughout the Community. With the higher carbon component that the Commission has opted for, the price rises would be still greater.

Energy-intensive industries with a large involvement in international trade would, according to the proposal, be exempt from the tax. They would instead be asked to reduce their emissions voluntarily.

As proposed, the overall tax package includes reductions for less-polluting types of road vehicle, support for scientific research on energy and other environmental issues, and

*Eco-taxes effective
only in combination with
other concepts*

measures to help poor countries reduce their emissions of air pollutants. One of the main principles of the Commission's proposals is to compensate the new taxes with reductions in other areas.

The Council of Energy and Environment Ministers will be meeting on December 10 to try and reach a firm position on the Commission's proposal.

Environmental organizations within the Community, such as the European Environmental Bureau and the Climate Network, have criticized the proposed \$10 tax proposal as not being enough. They are calling for a doubling to \$20, to be added on top of the present tax of \$21. This would make energy from renewable sources more competitive. According to computer models run by the Commission's own energy directorate, a \$10 tax would only depress emissions until 1995. By the year 2000 the emissions of CO₂ will have risen to 4 per cent above 1990 levels. Even some of the Commission's own officials have admitted that if the Community's goal

is to be reached, \$18 a barrel would be more realistic.

The NGOs also disagree with the Commission's proposal to pay back the tax revenues to the member states. They would instead spend some of the money on EC programs to promote the use of energy from renewable sources, investments in energy-saving programs, and transfer of energy-saving technology to states in eastern Europe and the Third World.

Environmentalists argue in any case that eco-taxes can only be effective in combination with other concepts, such as environmentally sound infrastructures and public transport systems, as well as programs for energy saving and the efficient use of energy. There are none of these things in the Commission's proposal.

The Swedish Society for Nature Conservation claims that a tax on energy would be less effective for internalizing environmental costs than a system of charges on each type of emission: CO₂, NO_x, VOCs, and sulphur. The costs of nuclear energy should be internalized by a tax on uranium, and by placing unlimited economic liability on utility companies.

Several groups, such as the Climate Network, Greenpeace, Friends of the Earth, and the WWF, are closely watching the negotiations for a climate convention. During the INC meetings the environmentalists regularly issue an ECO bulletin, with commentary on the positions taken by the various governments.

A joint statement from a broad coalition of NGOs has also been prepared for the meeting of the EC Council of Energy and Environment Ministers in the Netherlands on December 12. This demands a tax mainly based on energy, divided 75 per cent for energy use and 25 per cent for carbon emissions. Starting in 1993, the tax level should be the equivalent of \$5 per barrel of oil, with yearly increments of \$5 until it reaches a final level of \$50 per barrel. The tax should be imposed simultaneously in all OECD countries. According to the proposers this would meet the external costs of energy and make renewables more attractive than either coal, oil, or gas.

REINHOLD PAPE

UNITED STATES

Coal-industry funded disinformation campaign

THE AMERICAN coal industry, including the National Coal Association, is funding a disinformation campaign on global warming which carefully targets susceptible groups among the public, such as "older, less-educated males" and "younger lower-income women."

An organization called Informed Citizens for the Environment (ICE) has been set up, and the primary aim of the coal-funded strategy is to "reposition global warming as a theory (not a fact)." For example, one advertisement from the test campaign likens global warming to the belief that the earth is flat.

Another reads "If the earth is getting warmer, why is Minneapolis getting colder?" In fact independent scientific studies show that over more than 100 years, the area has been getting significantly warmer.

Source: ECO No 6, June 26, 1991.

BRITAIN

Research on acid rain to be axed

BRITAIN'S LARGEST electricity generator, National Power, has announced that it will close its main research laboratory at Leatherhead, which is the biggest research unit in the country for acid rain. This will affect not only environmental studies, but also research into power generation and use.

According to the research director of National Power, research on acid rain is no longer needed now that Britain, in line with the rest of Europe, is introducing strict controls on pollution from power stations.

The government says that the research is a matter for National Power and that it has no plans to take over the projects.

Source: New Scientist, July 13 and August 17, 1991

Ups and downs of emissions

DURING THE EIGHTIES the emissions of sulphur declined in Europe, while those of nitrogen oxides increased, according to the latest report from the EMEP meteorological centre in Oslo. Between 1980 and 1989 sulphur emissions fell by 6.5 million tons, or just over 23 per cent. From preliminary data for 1990 it appears however that they have begun to rise again, which gives cause for alarm. The emissions of nitrogen oxides increased by 1.5 million tons, or 7 per cent, between 1985 and 1990. Fresh data on transboundary fluxes is also to be found in this report.

Emission data, based on official figures supplied by each country, has been assembled by the EMEP since the late seventies (Table 1). Together with data from field measurements of concentrations and fallout, meteorological data and advanced mathematical calculations are used to describe the transformation and deposition of pollutants as they move about in Europe.

Last year the EMEP's computer model was revised and also improved. The emission data was, for example, expanded so as to cover the areas of sea and include emissions from shipping in international trade as well as natural emissions of sulphur from the seas (NAT). As a result, the contributions of sulphur and oxidized nitrogen from indeterminate sources (IND), that is, depositions that cannot be attributed to any known source of emission, have now become substantially reduced.

Especially in the case of western Europe, a considerable proportion of deposition still comes under IND. This is probably because of a combination of emissions from outside Europe (for instance from North America) of European emissions that have been under way

for more than 96 hours (the time limit for modelling so-called trajectories), and of emissions from natural sources.

The emissions from international shipping include those from traffic in the Atlantic (ATL), the North Sea (NOS), and the Baltic (BAS). Traffic in the Mediterranean is on the other hand not covered at all. According to EMEP, the data on emissions from ships is still incomplete, probably conveying an underestimate of the actual emissions. The data on natural emissions of sulphur from the sea (in the form of dimethyl sulphide) is said to be a first estimate based on crude assumptions.

It is noted in the report that very few countries include emissions of nitrogen oxides from ferries and other shipping on inland waterways as well as from offshore installations. Since such emissions may be relatively large in some countries, it is important that they should be included in the official data on emissions.

Every year the EMEP presents information on emissions, transports (exports and imports), concentrations, and depositions of sulphur and nitrogen pollutants. The latest available data on exports and imports of sulphur and oxidized nitrogen compounds appears in Tables 2 and 3. Since they are as recent as for 1990, the figures must however be regarded as preliminary.

The EMEP reports provide an important check on the way signatories to international agreements are fulfilling their obligations, as well as on the general effect of such agreements. They are also useful in the development of new agreements, based on the critical loads concept. It is therefore highly important that every country deliver correct data within the agreed time, thus improving still further the value of the EMEP work.

CHRISTER ÅGREN

EMEP is an acronym for European Monitoring and Evaluation Programme (officially the **Co-operative Programme for Monitoring and Evaluation of Long Range Transboundary Air Pollution**). It was started in 1977 and is carried out under the UN ECE Convention on Long Range Transboundary Air Pollution.

*The data shown in the tables is from the EMEP MCS-W Report 1/91, entitled **Calculated Budgets for Airborne Acidifying Components in Europe, 1985, 1987, 1988, 1989 and 1990**. It can be had from The Norwegian Meteorological Institute, Box 43-Blindern, N-0313 Oslo 3, Norway.

Table 1. Emissions of sulphur and nitrogen oxides.

		Sulphur (1000 tons)		Nitrogen oxides (1000 tons as NO ₂)	
		1980	1990	1985	1990
Albania	AL	[25]	[25]	[9]	[9]
Austria	AT	185	47	230	201
Belgium	BE	414	210	281	300
Bulgaria	BG	517	515	150*	150
Czechoslovakia	CS	1550	1400*	1127	950*
Denmark	DK	224	133	258	254
Finland	FI	292	126	251	276*
France	FR	1669	667*	1615	1772*
German Dem. Rep.	DD	2132	2621*	955*	1005*
German Fed. Rep.	DE	1605	530*	2930	2860*
Greece	GR	200	250*	746	746*
Hungary	HU	816	582	262	264
Iceland	IS	3	3*	12	12*
Ireland	IE	111	84	91	135
Italy	IT	1900	1205*	1595	1700*
Luxembourg	LU	12	5	19	15
Netherlands	NL	233	127*	544	552*
Norway	NO	71	33*	203	226*
Poland	PL	2050	2250	1500	1480*
Portugal	PT	133	106	96	142
Romania	RO	900	900*	[390]	[390]
Spain	ES	1625	1095*	950	950*
Sweden	SE	257	102	394	373
Switzerland	CH	63	31	214	184
Turkey	TR	138*	199*	[175]	[175]
Soviet Union**	SU	6400	4790	3369	4406*
United Kingdom	GB	2424	1916	2278	2573
Yugoslavia	YU	650	775*	400	430*
Remaining area	REM	[256]	[256]	[100]	[100]
Int. trade, Baltic Sea	BAS	[36]	[36]	[80]	[80]
Int. trade, North Sea	NOS	[87]	[87]	[192]	[192]
Int. trade, rem. Atl.	ATL	[158]	[158]	[349]	[349]
Int. trade, Mediter.	MED	[6]	[6]	[13]	[13]
Int. trade, Black Sea	BLS	no data			
Biogenic sea emis.	NAT	[755]	[755]	[0]	[0]
Sum		27897	22025	21777	23263

The table shows national official data received at the ECE secretariat up to February 6, 1991.

* Interpolated data (no data have been officially submitted).

** European part of USSR within EMEP area of calculation.

Table 2. Provisional estimate of sulphur budget for Europe 1990. Total (dry + wet) deposition of sulphur.
Unit: 100 tons sulphur per year.

	AL	AT	BE	BG	CS	DK	FI	FR	DD	DE	GR	HU	IS	IE	IT	LU	NL	NO	PL	PT	RO	ES	SE	CH	TR	SU	GB	YU	REM	BAS	NOS	ATL	MED	BLS	NAT	IND	SUM
AL	41	0	0	18	9	0	0	3	9	1	14	11	0	0	30	0	0	0	9	0	12	2	0	0	1	5	2	37	2	0	0	0	0	0	7	57	271
AT	0	118	23	2	284	3	0	93	321	110	0	64	0	1	224	1	9	0	171	0	8	11	1	12	0	13	48	88	1	1	5	2	0	0	7	153	1774
BE	0	0	403	0	12	1	0	130	47	59	0	1	0	2	2	1	29	0	13	0	1	7	0	0	0	3	123	1	0	0	13	2	0	0	6	45	902
BG	4	2	21282	64	1	0	7	67	9	37	87	0	0	29	0	1	0	88	0	340	1	0	0	7	83	10	136	1	0	1	0	0	0	12	189	2461	
CS	0	24	31	7	3565	7	1	75	1295	148	1	347	0	2	55	1	15	0	679	0	47	7	2	3	0	34	76	96	1	2	6	2	0	0	8	208	6748
DK	0	0	13	0	18	149	1	19	94	37	0	2	0	3	1	0	11	1	29	0	0	2	6	0	0	5	124	1	0	5	10	1	0	0	11	57	601
FI	0	1	7	1	35	20	372	11	97	19	0	9	0	2	4	0	5	5	117	0	5	3	45	0	0	461	62	5	0	14	4	1	0	0	36	323	1664
FR	0	3	182	1	113	7	0	2180	331	202	0	16	0	12	224	6	56	0	113	11	3	320	2	14	0	15	382	32	3	1	45	45	0	0	85	701	5107
DD	0	2	59	0	521	22	0	93	6429	280	0	9	0	4	12	2	35	1	187	0	4	7	3	1	0	24	155	4	0	4	14	2	0	0	12	152	8040
DE	0	12	247	2	349	27	1	494	1201	1614	0	16	0	11	93	10	133	1	230	1	7	37	3	22	0	33	493	15	0	4	46	9	0	0	32	368	5510
GR	8	1	2	206	25	0	0	6	28	4	470	28	0	0	38	0	1	0	36	0	82	5	0	0	17	44	7	47	7	0	0	0	0	26	219	1307	
HU	0	18	8	9	298	2	0	24	190	30	2	1515	0	0	85	0	3	0	188	0	102	6	1	1	0	25	17	259	1	1	2	1	0	0	6	150	2944
IS	0	0	1	0	1	0	0	1	2	2	0	0	5	1	0	0	1	0	2	0	1	0	0	0	0	1	14	0	0	0	0	1	0	0	22	50	106
IE	0	0	5	0	4	0	0	8	15	5	0	0	0	178	0	0	3	0	1	1	0	3	0	0	0	0	86	0	0	0	2	9	0	0	23	73	416
IT	2	15	21	14	172	2	0	182	228	63	14	100	0	1	3163	1	8	0	146	4	24	64	1	22	1	17	46	248	22	1	4	4	0	0	63	570	5223
LU	0	0	3	0	1	0	0	11	4	4	0	0	0	0	0	8	1	0	1	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	4	40
NL	0	0	102	0	13	2	0	77	57	121	0	1	0	4	2	0	189	0	13	0	0	4	0	0	0	3	241	0	0	0	20	2	0	0	9	54	916
NO	0	0	24	0	38	41	13	40	142	44	0	6	0	10	2	0	20	75	67	1	6	11	26	0	0	114	362	3	0	6	22	8	0	0	79	425	1585
PL	0	12	69	10	1301	53	6	113	3276	282	1	226	0	6	44	2	44	2	7405	0	71	11	16	2	0	201	256	91	1	15	20	4	0	0	29	520	14090
PT	0	0	1	0	1	0	0	8	3	2	0	0	0	0	3	0	1	0	1	235	0	112	0	0	0	0	9	2	2	0	0	22	0	0	14	69	484
RO	3	7	8	138	297	4	2	23	269	33	13	442	0	1	67	0	5	0	362	0	2717	4	1	0	5	290	25	397	1	1	2	1	0	0	12	362	5490
ES	0	0	16	0	12	2	0	128	53	21	0	2	0	3	35	0	7	0	15	116	0	2875	1	1	0	1	89	9	16	0	5	48	3	0	67	430	3958
SE	0	1	26	1	98	124	61	41	350	85	0	12	0	6	3	0	22	27	231	0	8	7	278	0	0	193	287	7	0	25	20	6	0	0	65	465	2453
CH	0	2	11	0	30	1	0	116	62	38	0	3	0	1	166	1	5	0	30	1	1	16	0	84	0	2	25	8	0	0	2	2	0	0	5	77	690
TR	1	1	2	94	40	1	0	6	46	7	44	40	0	0	13	0	1	0	73	0	105	2	1	0	509	296	8	27	4	0	1	0	0	0	43	626	1991
SU	2	20	103	136	1277	130	221	169	2278	324	24	651	0	13	99	2	69	13	4035	1	900	21	101	3	63	19241	518	273	1	61	38	9	0	0	188	5181	36165
GB	0	0	28	0	16	6	0	59	67	30	0	0	0	71	2	0	20	1	17	1	0	17	1	0	0	6	4775	1	0	1	38	28	0	0	64	233	5483
YU	15	24	12	163	270	3	1	55	272	46	29	402	0	1	443	0	5	0	232	1	168	21	1	3	2	46	32	2482	8	1	3	2	0	0	34	494	5269
REM	0	1	4	10	30	1	0	35	49	8	19	17	0	1	95	0	2	0	21	6	9	96	0	1	2	3	26	24	626	0	1	4	1	0	62	682	1837
BAS	0	44	118	2	190	296	153	80	884	203	0	32	0	9	10	1	46	11	755	1	16	11	176	1	0	453	394	16	0	120	32	6	0	0	135	520	4712
NOS	0	1	196	0	93	118	3	360	414	218	0	7	0	63	8	1	253	32	110	4	2	49	21	1	0	25	3763	4	0	9	285	44	0	0	262	691	7037
ATL	22	1	99	1	76	35	63	356	297	129	0	10	11	216	16	1	57	37	134	215	6	1415	33	1	0	586	1767	9	3	7	61	650	0	2114	3421	11851	
MED	42	18	40	267	367	6	1	355	476	87	513	275	0	4	2330	1	19	0	343	23	216	823	2	8	116	150	138	618	342	1	10	16	2	0	597	2126	10331
BLS	1	2	4	130	114	3	11	8	100	13	19	65	0	0	14	0	2	0	179	0	286	1	1	0	123	875	15	38	1	1	1	0	0	103	553	2663	

Table 3. Provisional estimate of oxidized-nitrogen budget for Europe for 1990. Total (wet + dry) deposition of nitrogen.
Unit: 100 tons nitrogen per year.

	AL	AT	BE	BG	CS	DK	FI	FR	DD	DE	GR	HU	IS	IE	IT	LU	NL	NO	PL	PT	RO	ES	SE	CH	TR	SU	GB	YU	REM	BAS	NOS	ATL	MED	BLS	NAT	IND	SUM
AL	1	1	0	2	3	0	0	3	2	4	12	2	0	0	17	0	0	0	3	0	2	1	0	0	0	2	1	8	0	0	0	0	0	0	0	18	82
AT	0	43	15	0	65	2	0	97	49	247	0	9	0	1	102	1	21	1	43	0	1	4	2	21	0	5	32	15	0	1	5	2	0	0	0	60	846
BE	0	0	25	0	4	1	0	69	7	53	0	0	0	2	1	1	22	0	4	0	0	3	0	1	0	1	60	0	0	0	8	3	0	0	0	18	283
BG	1	4	1	30	19	1	0	7	12	22	41	17	0	0	20	0	3	0	26	0	45	1	1	1	2	27	6	23	0	0	1	0	0	0	0	53	363
CS	0	27	22	1	223	7	1	80	141	327	2	41	0	2	37	2	34	2	129	0	8	3	4	7	0	12	53	21	0	2	8	2	0	0	0	81	1276
DK	0	0	8	0	4	18	1	20	14	59	0	0	0	3	1	0	18	3	7	0	0	1	5	0	0	2	84	0	0	2	7	2	0	0	0	23	284
FI	0	1	6	0	15	22	112	17	28	58	0	2	0	2	4	0	14	17	46	0	1	2	62	1	0	99	50	2	0	12	5	2	0	0	0	110	687
FR	0	5	69	0	34	5	0	875	51	350	0	4	0	9	105	5	80	1	34	8	1	126	3	20	0	5	197	8	1	1	32	47	0	0	0	257	2333
DD	0	2	35	0	71	14	1	94	174	419	0	2	0	3	8	2	64	3	39	0	1	3	6	3	0	9	98	1	0	3	13	3	0	0	0	63	1134
DE	0	12	110	0	87	15	1	402	138	1033	0	3	0	10	43	8	174	5	60	1	1	14	7	33	0	12	297	3	0	3	36	10	0	0	0	154	2671
GR	1	2	1	13	8	1	0	9	5	11	148	6	0	0	25	0	2	0	11	0	15	3	0	0	4	16	6	10	2	0	0	0	0	0	0	73	373
HU	0	22	5	1	65	2	1	27	31	77	3	71	0	0	60	0	8	0	52	0	13	2	1	3	0	8	12	44	0	1	2	1	0	0	0	50	561
IS	0	0	1	0	0	0	0	3	1	7	0	0	2	1	0	0	3	1	1	0	0	0	1	0	0	0	15	0	0	0	1	1	0	0	0	29	68
IE	0	0	3	0	2	0	0	11	4	13	0	0	0	17	0	0	6	0	0	1	0	2	0	0	0	0	38	0	0	0	2	8	0	0	0	30	140
IT	0	22	14	2	51	2	0	210	36	151	19	19	0	1	599	1	18	1	39	3	5	35	2	33	0	6	29	50	4	1	5	5	0	0	0	195	1558
LU	0	0	1	0	0	0	0	7	1	5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	19
NL	0	0	25	0	4	1	0	47	8	72	0	0	0	3	1	0	55	1	4	0	0	2	1	0	0	1	116	0	0	0	10	3	0	0	0	22	375
NO	0	0	19	0	15	32	13	61	33	124	0	2	0	10	1	0	47	57	26	1	2	7	38	1	0	18	264	1	0	6	22	9	0	0	0	174	984
PL	0	18	48	1	266	43	8	132	395	617	1	35	0	5	32	3	97	8	611	0	12	4	32	6	0	62	184	20	0	13	22	5	0	0	0	192	2873
PT	0	0	1	0	0	0	0	9	1	5	0	0	0	0	2	0	2	0	0	40	0	34	0	0	0	0	8	1	0	0	1	17	0	0	0	39	161
RO	0	12	5	12	82	4	2	24	46	82	15	71	0	0	44	0	10	1	102	0	138	2	3	1	2	69	17	61	0	1	2	1	0	0	0	107	916
ES	0	1	11	0	5	2	0	138	10	56	0	1	0	2	28	1	15	0	5	62	0	422	1	2	0	0	58	3	3	0	6	45	3	0	0	188	1069
SE	0	2	20	0	34	76	52	53	77	209	0	3	0	7	3	1	50	51	74	0	2	3	146	1	0	67	214	2	0	18	22	6	0	0	0	181	1374
CH	0	3	7	0	9	0	0	111	9	79	0	1	0	1	53	1	10	0	7	0	0	7	0	35	0	1	17	2	0	0	3	2	0	0	0	30	388
TR	0	3	2	7	14	1	0	8	9	20	50	8	0	0	9	0	2	0	26	0	20	1	1	0	59	120	6	6	1	0	1	0	0	0	209	584	
SU	0	37	78	17	395	128	192	219	458	863	31	114	0	12	74	3	161	40	1124	1	135	9	186	11	24	3322	370	65	0	59	43	10	0	0	0	1497	9679
GB	0	0	12	0	7	7	0	53	17	63	0	0	0	37	1	0	24	3	7	1	0	8	4	1	0	2	561	0	0	1	19	24	0	0	0	92	944
YU	2	34	9	14	79	3	1	68	46	119	29	68	0	1	259	1	12	1	69	1	31	10	2	8	1	15	21	167	2	1	3	2	0	0	0	157	1231
REM	0	2	3	2	12	1	0	53	9	25	32	4	0	1	62	0	5	0	7	4	3	43	1	2	1	1	19	8	40	0	2	4	1	0	0	353	701
BAS	0	3	34	0	45	89	57	84	133	347	0	5	0	9	7	1	84	22	127	0	3	4	115	2	0	83	250	3	0	28	27	6	0	0	0	163	1732
NOS	0	1	61	0	25	40	3	207	61	283	0	1	1	39	4	1	147	27	28	3	0	20	23	2	0	8	1120	1	0	6	68	37	0	0	0	247	2466
ATL	0	3	58	0	27	35	33	277	61	297	0	2	8	76	9	2	106	80	41	41	1	164	44	3	0	61	844	2	0	7	53	244	0	0	0	1492	4074
MED	2	24	22	18	82	5	1	303	58	173	275	37	0	3	601	1	32	1	74	11	31	162	4	15	18	42	71	88	26	1	8	13	1	0	0	600	2801
BLS	0	2	2	6	17	2	1	6	12	23	18	9	0	0	8	0	3	0	34	0	26	0	2	0	15	167	6	6	0	1	1	0	0	0	0	105	471

Environmental fund

THE POLISH government has lately been making preparations for setting up a fund to forward the development of environmental projects, no matter whether the ultimate financing comes from abroad or from domestic sources. The intention is that it should also be an instrument in the Debt for Environment Swap Program, by which part of the country's \$20 billion foreign debt would be exchanged for investments in environmental projects with an effect extending beyond Poland's borders.

The aim is however to provide additional resources for the protection of the environment in Poland too, and not merely to divert funds from local projects to others that happen to be of greater international interest.

The Polish government decided that in order to make the idea convincing to foreign governments, it would have to put forward a proposal for an institution that would ensure the implementation of environmental projects. A feasibility study was therefore carried out this last summer in consultation with various governmental departments, scientists, politicians, and NGOs.

The outcome was a proposal to establish such a fund as an independent foundation, secured by statute and with the Minister of the Environment as its legal trustee. It would be governed by a supervisory board, comprising seven Polish representatives and five from creditor countries, which would in turn be advised by a small group of independent international experts, who would review the fund's strategy and performance on an annual basis.

Priority, it is suggested, should be given to investments in four main areas:

1. Transboundary flows of sulphur dioxide and nitrogen oxides.
2. Pollution of the Baltic Sea.
3. Emissions of greenhouse gases.
4. Nature conservation and biodiversity.

The first two would mean attending to the improvement of efficiency, flue-gas desulphurization, and the installation of low-NO_x burners at large heating and power plants. The

finances from mines with high-sulphur coal would also need cleaning, and the gas supply should be extended to various end-use markets as well as to the repowering of existing electricity plants.

Measures to promote energy efficiency will be necessary in all end-use sectors. This will require such things as demonstration projects, programs for energy saving by local authorities in their buildings and plants, the replacement and upgrading of small and medium-size boilers, improvements in process integration at industrial plants, better insulation and more modern coal-

Projects proposed for diminishing transboundary pollution

burning equipment in urban housing, and a renewal of public transportation.

Along with a general modernization of the gas-supply systems, methane could be extracted from coal mines and waste dumps and put to use.

Detailed proposals for projects in all four areas were also included in the feasibility report. These are based on previous research carried out by the Ministry of Environment and advice from the local voivods. Besides giving technical data, they assess the environmental benefits as well as estimating the costs.

It is proposed, for instance, that in order to diminish transboundary flows of SO₂ and NO_x, ten specified coal-fired power stations should be equipped for desulphurization and part-denitrification. Coal cleaning at hard-coal mines in Upper-Silesia would add two more projects to the list. The total cost for the twelve is estimated to be \$1842 million, of which \$953 million should come from the proposed environmental fund.

REINHOLD PAPE

Ozone levels rising

OZONE CONCENTRATIONS in Britain show an apparent upward trend over the three years when they have been measured by a national monitoring network. Between 1987/88 and 1989/90 there was more than a three-fold increase in the exceeding of the 60 ppb value, and a ten-fold increase as regards higher values. (It should be noted that 1989 is said to have had a photochemically active summer weather.)

For example the one-hour average of 76 parts per billion (ppb) in the World Health Organization's guideline was exceeded on no less than 768 occasions at eleven sites in 1989/90. Values in excess of the UNECE guidelines, which are tighter, were much more common. Thus the number of times the 8-hour "critical level" of 30 ppb was exceeded was 3806 in the same year. Concentrations above this level may cause damage to sensitive vegetation, as for example to agricultural crops.

Source: **ENDS Report**, No 198, 1991.

EAST-WEST

School project

ONE HUNDRED AND FIFTY school classes, seventy-five each in Norway and Czechoslovakia, are collaborating in a project for learning more about air pollution and acidification. One part of it involves measuring the acidity of precipitation. The arrangers are the Norwegian Society for Nature Conservation and the Czechoslovakian department of the environment.

A similar exercise, in which 100,000 schoolchildren took part, had previously been organized in collaboration with a WATCH project in England.

If the present project works out well in Czechoslovakia, the idea is to expand it so as to include at least a thousand school classes in Norway and an equal number in eastern Europe, in Poland and Estonia in the first place, as well as in Czechoslovakia.

Source: **Natur & Miljö Bulletin** (Norges Naturvernforbund), No. 16, 1991.

Acid even in the north

THE LAKES AND STREAMS of the mountainous region on the Norwegian-Swedish border have now been found to be extensively acidified. In a quarter of the land area extending down to the lowlands on the Swedish side, the waters have such a low pH value that the more sensitive species of fauna are unable to survive.

The acidification of lakes and streams has long been apparent in

southern Sweden. But it will probably come as a surprise to many that there is acidification in parts of the northern half of the country as well, since there the depositions of sulphur and nitrogen are very low (2-4 kg/hectare per annum).

There are several factors making the mountain region especially sensitive to acid depositions. The soil cover is for the most part thin, and there is often a rapid runoff, which

in combination result in a low buffering effect. The greatest damage to fauna occurs during the snow-melt, when acidic meltwater can cause a sudden marked lowering of the pH of the water in the smaller lakes and streams. If the pH value of the snow is less than 4.8, there is a very probable risk of severe acid surges in spring.

The problem is worst at the southern end of the mountain range, where the precipitation is the most acidic. In a number of small lakes and streams in Härjedalen county there remains on an average only a tenth of the benthic species that were found there in the seventies. The number of aquatic species is also tending to become reduced in the middle of the range. The effects decrease as one goes north, mainly because the depositions of acidifying substances are less in those parts.

Knowledge is largely lacking as regards the specific effects of acidic deposition on the mountain ecosystems. It is known that apart from the benthic fauna, sensitive fish species, including grayling (*Thymallus thymallus*), brown trout (*Salmo trutta*), and char (*Salvelinus alpinus*), will be affected – as will also, indirectly, some species of bird, such as the long-tailed duck (*Clangula hyemalis*) and the red-necked phalarope (*Phalaropus lobatus*), when their food supply is gone from the most acidified waters.

Much of the damage resulting from acidification can be halted by liming lakes and streams. The Swedish government is already spending about 170 million kronor a year on this means of offsetting the effects of acid deposition. Both for practical and economic reasons it would be difficult, however, to lime all the exposed areas of the mountain range. The scientists from Fiskeriverket indeed recommend more liming, but in the long run real improvement will only be obtainable through a great reduction of the European emissions of sulphur and nitrogen.

PER ELVINGSON



Every year large sums have to be spent on liming inland waters in Sweden. Some 6000 lakes and several hundred streams have so far been treated at least once.

Source: *Försurning i fjällen?* Erik Degerman et al. Fiskeriverket, PM No. 2:1991

Sustainable living

THREE INTERNATIONAL conservation organizations recently issued an ambitious proposal for a strategy to achieve "sustainable living." Entitled *Caring for the Earth*, it follows on the World Conservation Strategy which was published in 1980, also by the World Conservation Union (IUCN), the United Nations Environment Programme (UNEP), and The World Wide Fund for Nature (WWF).

It sets its sights particularly on developed countries, which are urged to make drastic cuts in their use of energy and their emissions of pollutants. By the end of the century all governments, it says, should have adopted the "precautionary principle" as fundamental to pollution control. This means that discharges of substances that could be harmful should be minimized, and wherever it is possible prevented. Furthermore it should be ensured that products and processes will be non-polluting.

As regards air pollution, it is noted that the ECE area, comprising Europe and North America, accounts for 80 per cent of world emissions of sulphur dioxide, nitrogen oxides, carbon monoxide, and volatile organic compounds, which are the causes of acid rain and oxidant smog.

Also brought out is the fact that even low-income countries may be under threat from acid rain, and that the problem will become greater with growing industrialization. An outstanding case is China, already the third largest emitter of sulphur dioxide, after the Soviet Union and the United States.

The action proposed for dealing with air pollutants would include the governments in Europe and North America committing themselves to reducing emissions of sulphur dioxide by at least 90 per cent

(based on 1980 levels), and nitrogen oxides by 75 per cent (from 1985 levels). Eastern European countries will need help to meet these targets. Such commitments should be made under the UN ECE Convention on Long Range Transboundary Air Pollution.

Work should continue to define the tolerance of ecosystems to acid deposition, and to develop new standards and controls to ensure that the critical loads thus arrived at will not be exceeded.

circumstances prevailing in their countries, to curb pollution from motor vehicles. Catalytic converters are mentioned as the best present technology, but the motor industry should intensify efforts to produce engines that will be less polluting and with improved fuel efficiency. To stimulate improved fuel economy, governments should employ both economic and regulatory measures.

Climate change and the emissions of greenhouse gases are said to constitute one of the greatest threats to sustainability. Responsibility for reducing carbon dioxide emissions must fall especially on the industrialized countries, since to date they are the source of some three-quarters of the global emissions of carbon dioxide, and also have the economic resources and technical skills for corrective action.

The governments of all "high and medium-energy" countries should commit themselves to reducing their carbon dioxide emissions by at least 20 per cent (from 1990 levels) by 2005, and by 70 per cent by 2030. Ultimately, the permissible emissions should be defined in per-capita terms rather than as reductions from an arbitrary base.

Measures to reduce emissions of carbon dioxide include the use of economic incentives to promote energy efficiency, the substitution

of natural gas for coal, and the development and adoption of solar and other low-impact renewable energy systems.

CHRISTER ÅGREN

Caring for the Earth – A Strategy for Sustainable Living, published in partnership by IUCN, UNEP and WWF. Obtainable from IUCN, World Conservation Centre, CH-1196 Gland, Switzerland.



Governments in other regions than the ECE that are threatened by air pollution should consider adopting regional conventions for the prevention of transboundary air pollution, and higher-income countries should help with the transfer of the technologies that will be needed.

It is stressed that all governments should impose the highest standards that may be practicable, in the

Recent publications

Mapping Critical Loads for Europe (1991)

Edited by J-P Hettelingh, R Downing and P de Smet. A report prepared by the Coordination Center for Effects (sorting under the UN ECE Convention on Long Range Transboundary Air Pollution). With maps of Europe showing critical loads for acidity, sulphur, and nitrogen, and also where critical loads are exceeded. The methods used for producing them are described, and the national reports (from 15 countries) on which they are based are also included. 200 pp. Obtainable from the publisher: RIVM, P.O. Box 1, NL-3720 BA Bilthoven, The Netherlands.

Emissions from Heavy Duty Diesel Vehicles (1991)

Fifteenth Report of the Royal Commission on Environmental Pollution. Looks at the effect of diesel emissions, considers the scope for further reductions, beyond those recently agreed for new vehicles in the European Community, and discusses ways in which emissions from vehicles in service might be reduced. Recommendations include both regulatory controls and financial incentives for improved emissions control. 113 pp. Price £12. Obtainable from HMSO Publications Centre, Box 276, London, England SW8 5DT.

OECD Environmental Data Compendium 1991

This report provides an up-to-date data base to accompany the recently issued third OECD report on The State of the Environment. The data includes country-by-country statistics on emissions of air pollutants, such as sulphur dioxide, nitrogen oxides, volatile organic com-

pounds, particulates, and carbon dioxide. It also provides data from the energy, transport, industry, and agricultural sectors, and statistics on pollution control expenditures in the various countries. 337 pp. In English and French. Price FF 235. Obtainable from: OECD Publications Service, 2 rue André-Pascal, F-75775 Paris Cedex 16, France.

Energy Policies and the Greenhouse Effect (1991)

Volume I: Policy Appraisal by M Grubb. Concentrates on policy issues arising from attempts to reduce the emissions of greenhouse gases from the energy sector. To start with, it gives an overview of the problem, as well as global energy trends and country studies. The matters for policy that are analyzed include product standards, fiscal incentives (such as carbon taxes), utility regulation, end-use efficiency, and renewable energy sources.

Volume II: Country Studies and Technical Options. By M Grubb, et al. Contains in-depth technical, analytical, and country analyses. Describes technologies for the efficient use of energy, and also for energy supply and conversion. The country studies include the United Kingdom and the European Community, the United States, Japan, the USSR, China, and India.

The conclusions are that there are considerable technical opportunities, as well as efficient policy tools, available for limiting CO₂ emissions, and that the long-term resolution of the problem will require acceptance of the "polluter pays principle" at the international level. The key problems, however, are not costs but deep-seated political and institutional factors. Limiting CO₂ emissions is not

just a matter of technology and economics, but of culture, institutions, and politics in the broadest sense.

Both volumes are obtainable from the publisher: The Royal Institute for International Affairs, Chatham House, 10 St James's Square, London, England SW1Y 4LE.

Advantages of Environmental Protection/Costs of Environmental Pollution (1991)

Information booklet from the German Federal Minister for the Environment presenting a research project of the same name, which was started in 1986 and completed this autumn. The aim of the project to provide a broad picture of the material as well as the immaterial damage to the environment resulting from pollution. A special attempt was made to assess the damage in monetary terms. 60 pp. Obtainable from the Federal Minister for the Environment (BMU), Box 120 629, D-5300 Bonn 1, Germany.

Östeuropas Miljö (1991)

By Jürgen Salay. Presents the environmental situation in Czechoslovakia, Poland, Hungary, the Baltic States, and the former East Germany. Describes the underlying political and economic factors that are of influence. It concludes that the way the energy and transport sectors in particular are developed in these countries will be of great consequence for the state of the environment in the near future. The need for technical and economic support from western Europe is emphasized, as is that for supporting information and education. In Swedish. 162 pp. Obtainable from: Litteratur- och Föreningstjänst, Box 1338, S-171 76 Solna, Sweden.

Coming events

West Goes East: Opportunities or Pollution Transfer?, Sofia (Bulgaria) January 16-18, 1992.

Organized jointly by the Bulgarian environmental group Ecoglasnost, Friends of the Earth International, and the Dutch organization Milieukontakt Oosteuropa. The Conference is to develop a strategy for cooperation between environmental non-governmental organizations from the rich industrialized countries on the one hand and from the Central and Eastern European region on the other, to prevent pollution transfer by western enterprise to Central and Eastern Europe. For details contact: Friends of the Earth European

Coordination, CEAT, John Hontelez, Minister Elandstraat 27, NL-6523 CS Nijmegen, The Netherlands. Phone: +31-80-236512, fax: +31-80-604361.

PrepCom Meeting IV, New York (USA) March 9 - April 3, 1992.

Final meeting of Preparatory Committee of the United Nations Conference on Environment and Development (UNCED), which is to be held in Rio de Janeiro, Brazil, June 1-12, 1992. For more details about NGO activities and participation, contact: The US Citizens' Network for UNCED, 300 Broadway 39, San Francisco, CA 94133, USA. Phone: +1-415-9566162, fax: +1-415-9560241.

Next Generation Technologies for Efficient Energy End Uses and Fuel Switching, Dortmund (Germany) April 7-9, 1992.

Organized by the International Energy Agency and the German Bundesministerium für Forschung und Technologie. The Conference will address all major energy end use sectors, that is industry, residential and commercial buildings, and transport. The future role of energy efficient technologies will be discussed and assessed. For details contact: GVD, Gesellschaft für Veranstaltung-Dienste mbH, Degerstrasse 30, D-4000 Düsseldorf 1, Germany. Phone: +49-211-6801736, fax: +49-211-681462.

Taking to the streets

EVER STRONGER protests are being made at the steadily increasing number of motor vehicles on German roads. Between 1970 and 1990 the total doubled, and in the former West Germany alone there are now 31 million cars and 1.5 million heavy trucks in use.

People are starting to rebel at the polluted air, the noise, fast driving and the numerous accidents. Altogether 3000 groups of citizens are now working all over the country for alternative transportation systems, and tangible protests, often in the form of street occupations, are also being mounted.

Just recently, on September 27, some thirty main thoroughfares and street crossings in Hamburg were blocked by the local residents. Hundreds of people participated in this demonstration to demand "Verkehrsberuhigungen" (toning down of traffic), with a speed limit of 30 kmh in built-up areas, and to protest against air pollution.

The demonstrators were calling for special lanes for buses, a narrowing of the roadway for other traffic, better cycle tracks, "pedestrian friendly" traffic signals, and restrictions on truck driving within city limits. In some streets the occupation was kept up for several days, often leading to open conflict with the authorities and car drivers.

The protests were started off in August, after two small children had been killed on the Stresemannstrasse in the centre of Hamburg. In the previous twenty months there had been 460 accidents on this street, and 210 people had been injured. Here some 50,000 cars and 6000 trucks pass daily along a four-lane highway with six-storey apartment buildings on either side.

Recently, too, the municipal environmental department set up a station for monitoring air pollution on Stresemannstrasse – in accordance with an EC directive from 1985 which recommends the installation of one such station for every 50,000 inhabitants.

The same directive says that where the Community's air pollution limits are exceeded, the mem-



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ber states are required to reduce the volume of traffic. Measurements at the station in Stresemannstrasse showed that the concentrations of nitrogen dioxide were regularly exceeding the EC limit of 200 micrograms ($\mu\text{g}/\text{m}^3$).

For the protection of human health, the Society of Engineers (Verein Deutscher Ingenieure) has published "maximum immission concentrations" (MIK values). The recommended value for NO_2 is 100 micrograms as a 24-hour average. During the past year, that value was exceeded in the Stresemannstrasse on 168 days, with a peak value of 308 micrograms. The MIK value for half-hour average, 200 μg , was exceeded 1471 times during 127 days, with a highest value of 495 $\mu\text{g}/\text{m}^3$.

When they became known last summer, these facts gave rise to a spate of letters to the newspapers, with the result that people all over the city started to protest against the traffic chaos in their local area, saying: You can find Stresemannstrassen everywhere in the FRG.

Politicians are reacting only very slowly to the change in public opinion. While there has been some talk of introducing a general speed limit, an immediate decision is unlikely. At present all government effort is being directed to giving eastern Germany a road network of the same standard as that in the west.

Environmentalists are arguing that road traffic must be made to pay for its actual cost. According to expert studies, the current taxes on trucks only cover 10 per cent of the damage to roads and the environment caused by these vehicles.

According to the Heidelberger Umwelt- und Prognoseinstitut, every passenger car in the FRG is subsidized to the extent of DM6000 a year by the state. In general, the annual negative cost of road traffic is put at DM250 billion, whereas the tax revenues only amount to DM40 billion.

REINHOLD PAPE

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