

Acid News

No. 1-2, Aug 1987

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



Photo: Christer Ågren

Crumbling heritage

In and around Cracow in the very south of Poland can clearly be seen the results of decades of non-caring for the environment. Here part of Europe's cultural heritage is rapidly crumbling away. Here there is an unusual amount of illness among the population. But here too the problem of the environment are being debated in a manner that is unusually open for East Europe, and in the

midst of these blackened, soured, poisoned, and worn-down surroundings is an active environmental movement which yet gives hope for the future.

Cracow is a good place from which to see what is being done to our atmosphere. Not that you can see especially far here: Cracow lies in a basin in the Vistula valley where the air remains relatively still, and the city is always covered by a fog

of pollutants. But the magnificent central square with historic buildings and churches all around makes an excellent starting point from which to ponder the rapid deterioration of the European air and the fearful consequences of airborne pollution.

The old town of Cracow, which by a miracle escaped bombardment during the war,

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Acid News

A newsletter from the Swedish and Norwegian NGO 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 SECRETARIATS

The Swedish NGO Secretariat on Acid Rain is supported by the following environmental organizations:

- The Environmental Federation (Miljöförbundet)
- The Swedish Anglers' National Association (Sportfiskarna)
- The Swedish Society for the Conservation of Nature (Svenska Naturskyddsföreningen)
- 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 six non-governmental organizations concerned with the environment:

- Nature and Youth (Natur og Ungdom)
- The Norwegian Forestry Society (Det Norske Skogselskap)
- World Wildlife Fund Norway (Verdens Villmarksfond)
- 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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Crumbling heritage

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and has been classified by Unesco as a cultural reserve of greatest importance for humanity, is now crumbling away under the attack of acid.

As elsewhere in Europe, in Poland the expansion of heavy industry took precedence over the environment and human health. Expansion took place especially after the last war, and in just this part of the country where industrial plants had remained largely intact. A striking expression of this policy is the huge Lenin steelworks at Nova Huta close to Cracow, where 38,000 people work. Here a forest of tall smokestacks pour out pollutants in all the colours of the rainbow. Here as elsewhere one tried to escape the problem of pollution by throwing it high up into the sky.

In this university town with a proud tradition of scholarship the effect of pollution shows up in yet another way. The damage to buildings and health is documented both in scientific reports and official statistics. Scientists and civil servants alike are relatively outspoken in matters concerning the environment.

Poland is one of the countries in Europe that release most

pollutants to the atmosphere — and where, as in the case of East Germany, Czechoslovakia, and Great Britain, there is the least hope of any rapid improvement.

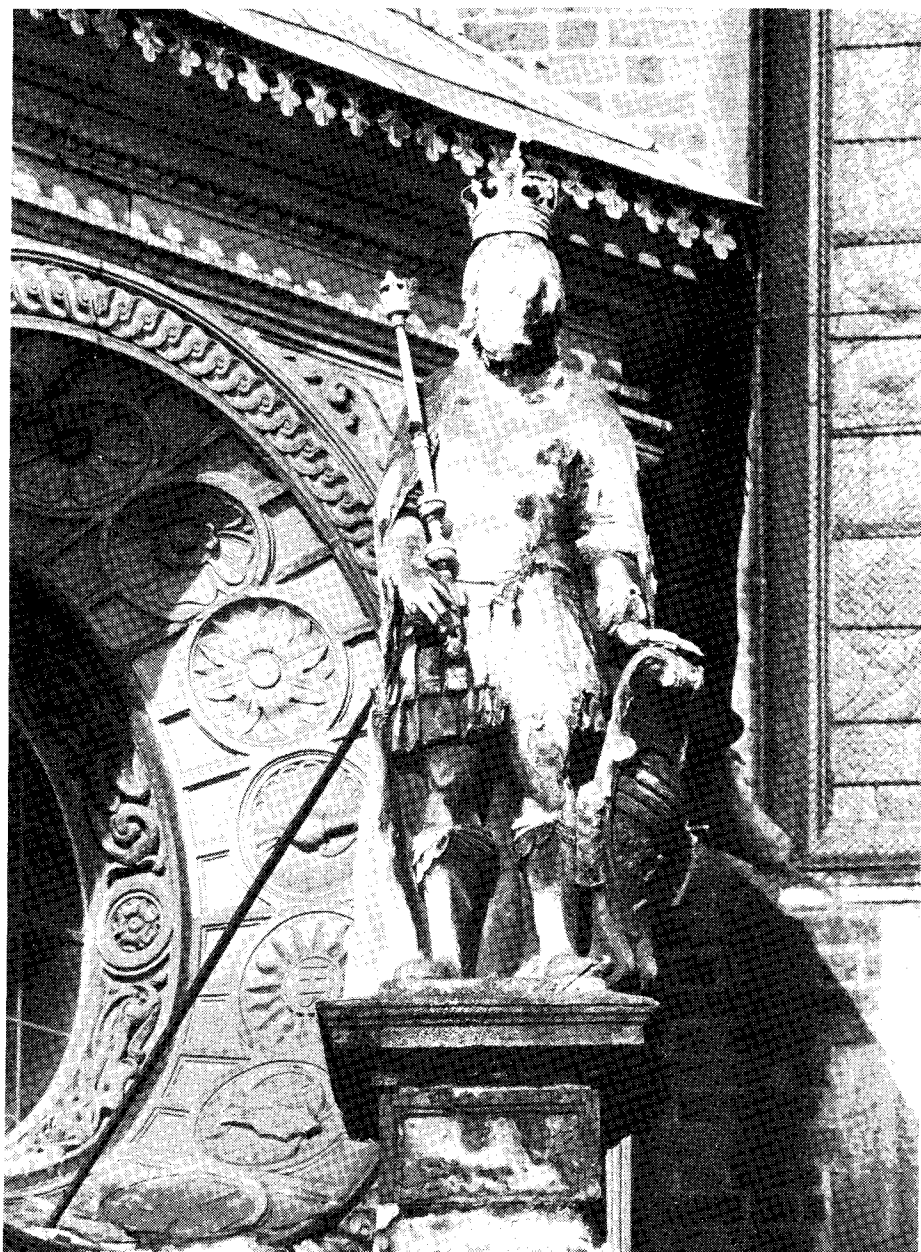
But in Poland, too, much of the pollution is imported from other countries. According to Jerzy Pruchnicki, head of the institute for meteorology and water conservation in Warsaw, 55 per cent of the depositions come from abroad. The rest is home produced. In terms of sulphur dioxide, the country's own emissions amount to 4,300,000 tons per annum.

Calculated per square kilometre, the amount of poisonous gases emitted in Poland in 1979 was 14 tons. That is however an average figure. For Cracow it would be 255 tons. The concentration of pollutants in the air is very high, especially in the central parts, where coal firing old houses accounts for one-third of the local sulphur dioxide.

The concentrations of sulphur dioxide in the air are given as micrograms per cubic metre. From the latest measurements in central Cracow it appears that there the national standards for air quality are greatly exceeded, and that sometimes the pollu-



Coal is commonly used for heating in central Cracow. Photo: André Maslennikov/IBL



Damaged statue outside Cracow cathedral. Photo: André Maslennikov/IBL

tion is obviously enough to constitute a danger to health.

The head of the municipal office for the environment in Cracow, Bronislaw Kaminski, says that yearly averages of 95 micrograms of sulphur dioxide have been recorded. If the city were to meet the standards for especially protected areas, the figure would have to be reduced to 11 micrograms per cubic metre, something that no one believes to be possible in any foreseeable future. In winter the concentrations now average 150 micrograms.

More significant, in the view of Edward Garscia, editor of the environmental publication *Aura*, are the top figures — since it is there the danger to health is most serious. In 1985 concen-

trations of 700, 800, and even 1000 micrograms of sulphur dioxide were recorded, all on a 24-hour basis. International bodies consider that concentrations of 500 micrograms give rise to an increase in mortality among the chronically ill and elderly. That is only half what has been found in Cracow, and as the figures represent 24-hour averages, at times they must have been still higher.

Every year Cracow and its inhabitants receive from above 134,000 tons of dust and 570,000 tons of gases, including 102,000 tons of sulphur dioxide (the rest being nitrogen oxides, carbon monoxide and dioxide). In addition the soot particles bring with them 7 tons of cadmium, 170 tons of lead, 470

tons of zinc, and 18,000 tons of iron.

What is happening to historic buildings is causing alarm all over Europe. Everywhere the work of skillful sculptors and stonemasons can be seen crumbling away. In Cracow, the capital of Poland from 965 to 1609, the authorities only have the means to rescue a few of the buildings that are in danger. The 80 to 90 cultural objects that are scheduled for restoration during the next five years are only a small fraction of those that need it. Some 1700 buildings of historic importance are rapidly decaying.

It has been calculated that in Cracow sandstone is now weathering away a thousand times more rapidly than it would normally. What this means becomes clear enough if one goes to the Church of Sts Peter and Paul. On the facade are statues of all twelve apostles, shining white, still with sharply chiselled details. These have replaced the original statues, which can now be seen in a shed at the back of the church. They are black with soot, and emaciated from having turned the cheek — to the wind.

It is not only stone that gets attacked. The cupola of the Sigismund chapel on the Wawel height has had to be given a new gold overlay after the old one had become dissolved by the acid rain. Precious metals are normally highly resistant, and can only be dissolved by a mixture of hydrochloric and nitric acid.

"Our historic monuments are in a very bad state, and the effects of sulphur dioxide become multiplied when there are also nitrogen oxides in the air," says Professor Jerzy Haber, a chemist who is carrying out research into the resistance of various kinds of stone to weathering, and ways of restoring buildings so that the fabric will last longer.

"If only we could curb our local emissions and cut down road traffic we should be nearer a solution," he says. "The problem would be halved if gas could be

used instead of coal for domestic heating in the central parts of the city." But even if natural gas could be obtained, there would still remain the problem of finding suitable gas burners for all the thousands of apartments there.

Not only statues and buildings are affected. From a quick look at the faces of passers-by, it would seem that the inhabitants of Cracow do not differ from any Europeans in winter. But a study of research reports and the official statistics will show that illnesses connected with air pollution are commoner in Poland than elsewhere.

The actual situation can be gathered from a long series of reports in the scientific journal *Folia Medica Cracoviensia*. Measurements at city day nurseries show the limits for carbon dioxide, hydrocarbons, and sulphur dioxide to have been greatly exceeded. According to a study published in 1978 the levels of lead and

fluorine were also high. Since then road traffic has increased and industrialization has continued.

The high incidence of a variety of diseases shows that inhabitants of Cracow are having to pay dearly for the country's industrial and energy policies. A quarter of the population in the inner city are suffering from high blood pressure, as compared with 17.5 per cent in the United States and a world average of 5 per cent. Lung trouble is naturally more frequent among smokers, but in that area men who smoke are affected twice as much as those living in the cleaner air of the outskirts. Whereas the average for chronic pulmonary disease among men in the inner city is 15.7 per cent, among smokers there it is 27 per cent.

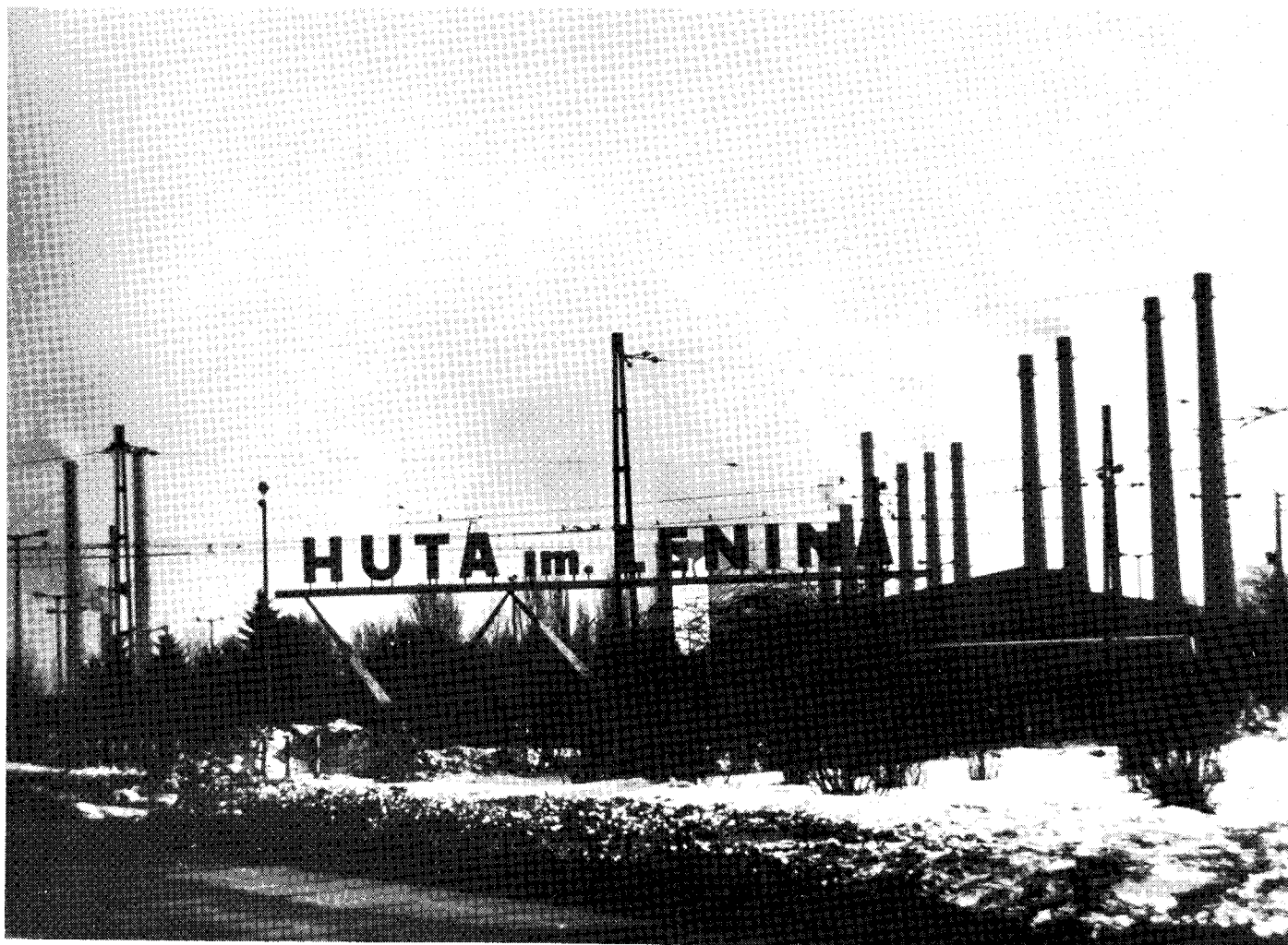
The effects of city air on students who have come to Cracow have also been studied. It was found after five years that the incidence of pulmonary dis-

ease among male students had increased 2.5 times, and among female students threefold.

The death rate from lung cancer is also higher in central Cracow than in other parts of the city — 67.1 per 100,000 of population, or double so high as elsewhere. The situation is much the same as regards breast cancer, and deaths from cancer of the stomach, liver, and bladder.

Even on sunny days one can see from the hills around Nova Huta the thick cloud of pollution that hangs over Cracow. It is thus hardly surprising that the Polish environmental movement was born just here, at the beginning of the eighties, and that its main stronghold should still be in Cracow — although Poland's ecological club now counts 4,000 members scattered all over the country.

"Frank discussion and correct information concerning health have been a great success for us," says Zygmunt Fura, secre-



Lenin steelworks at Nova Huta, near Cracow. Photo: André Maslennikov/IBL



Today's scene in Cracow Old Town. Photo: André Maslennikov/IBL



Crumbling stonework in city centre. Photo: Christer Ågren

tary general of this Polish NGO. While environmentalists regard the relatively open public debate as a distinct triumph, the most important concrete result so far achieved was the closing down of the aluminium smelter at Skawina in 1980.

The emissions of fluorine from that plant amounted to 40 kilograms per ton of aluminium it produced. That was forty times as much as would come from a modern installation. Protests from the local people, strongly supported by environmentalists and scientists, led to closure and some improvement of the environment. An especially important effect was that this showed that something could be done about the environment even in a poor, run-down country like Poland.

"But if we are to save Cracow, we shall have to alter the whole structure of industry, we shall have to develop other, smaller towns, growth here must be stopped, we must have flue-gas cleaning, and gas must be used for heating in the inner city," says Zygmunt Fura.

The question is whether he and other environmentalists will be able to persuade the local authorities and the government in Warsaw of the necessity of such measures. Plans exist, as well as good intentions. It seems even money may be available. But lack of foreign exchange may make it difficult to purchase the necessary technology from the West, and it is difficult to rustle up labour and materials in Poland. There is thus a risk here, as in other countries, that industrial expansion and consumer goods will take precedence over the needs of the environment. Although the attitude may be similar elsewhere, the effects are not likely to be so clear as they are in Cracow and Poland generally.

Lasse Johansson

Dagens Nyheter, January 11, 1987.
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Cleaner coal-firing

Neckarwerke's coal-fired power plant at Altbach, near Stuttgart, is possibly the world's, and certainly Europe's, cleanest as regards emissions to the atmosphere. With a net capacity of 420 MW, it took six years to build at a cost of more than 800 million DM, one-third of which is attributable to measures to save the environment.

The plant is designed for district heating as well as power generation. Its heating capacity of 280 MW is sufficient for the needs of 45,000 households, while the power equivalent is 375 MW.

The fuel is domestic hard coal with a sulphur content of 0.8-1.0 per cent which is transported to the plant in barges and by rail. There is stocking capacity for 135,000 tons, corresponding to seven weeks' consumption. The coal is carried from the stockyard on enclosed conveyor belts to pulverizers at the boiler. Consumption when the plant is operating at full load is 140 tons an hour.

The use of thirty-two low NO_x burners reduces the emissions of nitrogen oxides by 30-50 per cent, but neither this nor the low sulphur content of the coal suffices to meet the current West German emission standards for SO_x and NO_x . The SCR (selective catalytic reduction) method developed in Japan is therefore employed immediately after the boiler to reduce nitrogen oxides. These oxides are converted to harmless nitrogen and water by spraying the flue gases with ammonia just before they enter the catalyzer, where reduction takes place. By this means at least 70 per cent of the nitrogen oxides are eliminated.

At Altbach altogether 300 cubic metres of catalyzer material have been installed, and the total cost of the power company's investment in this technology is said to have been 600,000 DM. One problem is

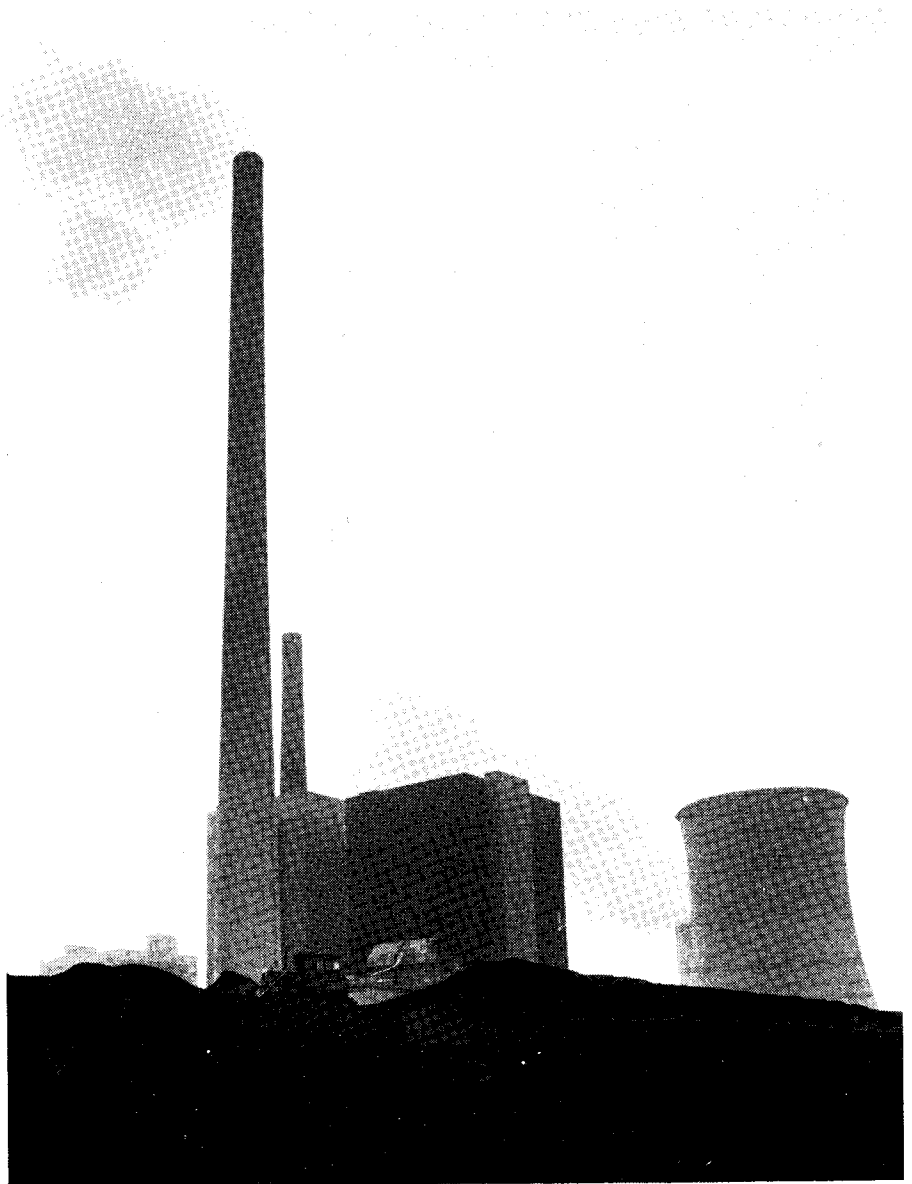
how long the catalyzer elements will last before having to be replaced. The supplier of the Altbach installation guarantees a life of 12,000 hours at full load, which would amount to barely three years with the plant operating at medium load.

Another problem with this method of NO_x reduction is that the operating temperature of the catalyzer lies between 320 and 380 °C, making it almost necessary to place it close to the boiler, where space is likely to be limited. This may cause difficulties of installation at existing, older power stations.

It has long been usual to fit dust extractors at coal-burning

power plants in the Federal Republic. At Altbach modern electrofilters collect 99.7 per cent of the dust in the flue gases. Here too 85 per cent of the sulphur is removed in a scrubber using the wet method. The sulphur reacts with the suspended limestone to form calcium sulphite, and oxidation by blowing air into the mixture produces gypsum.

Due mainly to its reliability and efficient removal of the sulphur, wet scrubbing is the predominant method in Germany. Whereas the wet limestone method can remove up to 95 per cent of the sulphur, dry methods are less efficient and



Coal-fired power station at Arzberg (Bavaria). Photo: Christer Agren

leave large amounts of residual products.

The disposal of such products constitutes an environmental problem for all coal-fired plants. At Altbach every hour 7 tons of gypsum, 8.5 tons of fly ash, and 1.5 tons of coal ash have to be taken care of in some way. By considerable working up the gypsum is converted into briquettes for use in the gypsum and construction industries. At present marketing presents no difficulty, but in a few years the situation will be different. Over 90 per cent of the West German power generating capacity that is based on coal will soon be equipped for sulphur removal, with gypsum as a residual product. In the 1990s the quantity of gypsum that will have to be dealt with will amount to several million tons a year.

Ash is usually dumped, but Altbach has succeeded in placing all its ash with the cement-making industry. Although so far there has been no problem with the catalyzer elements, these will later have to be sent back to Japan. Both the design and manufacture of the catalyzer are protected by a number of Japanese patents. West German firms are developing and testing their own technology for NO_x reduction, but they do not have the operating expe-

rience that the Japanese have.

The price of electricity for household use is already three times as high in West Germany as it is for instance in Sweden, and to this will now be added the cost of curbing emissions of SO_x and NO_x .

The following are the lowest emission levels achieved at Altbach: Dust 30 mg/nm³, sulphur 47 mg S/MJ fuel, nitrogen dioxide 68 mg NO_2 /MJ. Compared with those of other power plants, these values are considered extremely low.

It is worth noting that the strict West German standards have to be met on a half-hour average, as compared with the monthly averages required for instance in Sweden. This presupposes advanced measurement technology — which is in fact a well developed and rapidly expanding business in the Federal Republic.

Strict emission controls are causing the development of interesting methods for flue-gas cleaning in West Germany. While installation will initially involve heavy capital costs, this should later serve German industry well, when other countries also start to think about the environment.

Jan Hellsten

Miljö i Sverige No. 7-8, 1986. Reproduced by permission.

Tightened standards

Extensive forest dieback has led to a tightening of air-quality standards in the Federal Republic. For power plants with a capacity of more than 300 MW, the following limits for emissions will apply as from July 1, 1988.

Particles 50 mg/nm³. SO_2 400 mg/nm³, corresponding to about 75 mg S/MJ fuel (calculated) as 26 MJ/kg). For NO_x the limit of 200 mg/nm³, corresponding to 75 mg NO_2 /MJ fuel, must be attained as soon as possible, which in practice will mean at the latest by early in the 1990s.

In 1985 52 per cent of the West German electricity was generated from coal, with hard coal accounting for slightly more of this total than lignite. Nuclear plants supplied 36 per cent of the country's power requirements — a share that has lately been growing as new plants have come into operation.

Reducing NO_x emissions

Last May the British Minister for the Environment, William Waldegrave, announced that his government supported a proposal of the Central Electricity Generating Board to reduce the emissions of nitrogen oxides from the country's largest power stations.

This is to be achieved by equipping the twelve largest coal-fired plants with low- NO_x burners, at a cost of 170 million pounds over the next ten years. The CEGB is calculating by this means to reduce the overall emissions from power production by 30 per cent, from the 1980 levels, by the end of the 1990s.

Since about 40 per cent of the country's emissions of nitrogen oxides comes from power plants, this measure alone will only result in a 10-per-cent reduction of the total emissions. The government is still aiming however to reduce total emissions by 30 per cent between 1980 and the end of the century. Mr Waldegrave also stated that in future all new generating plants using fossil fuels would have to be fitted with low- NO_x burners.

In 1985 the UK emissions of nitrogen oxides amounted to 1,838,000 tons. Britain is thus the next greatest emitter of nitrogen oxides in Western Eu-

rope. Power plants and road traffic each account for 40 per cent of the total, while the remaining 20 per cent comes from industry, agriculture, and domestic sources.

In several European countries flue-gas denitrification is considered to be the best available technology for cutting down nitrogen-oxide emissions from power plants. This applies for instance in West Germany as well as in Sweden. By this method emissions can be reduced by 80-90 per cent. The cost is however higher than that for the low- NO_x -burner technique.

Christer Ågren

Will to reduce seen lacking

A decision to start working on a binding agreement to reduce emissions of nitrogen oxides was the main outcome of the 4th Session of the Executive Body of the UN Economic Commission for Europe in Geneva last November. It was given to the Working Group on Nitrogen Oxides to develop a proposal for such an agreement by the time of the next meeting of the Executive Body in November this year. The agreement would take the form of a protocol to the 1979 Convention on Long Range Transboundary Air Pollution — in the same way as that of 1985, which enjoins the signatory countries to reduce their emissions or transboundary fluxes of sulphur dioxide by 30 per cent, from the 1980 levels, by 1993.

Attending the meeting last November were representatives of the following nongovernmental environmentalist organizations: Friends of the Earth International, International Union for Conservation of Nature and Natural Resources (IUCN), WWF International, and Greenpeace International. During the course of the four-day meeting these organizations regularly produced sheets of their joint ECO magazine for distribution to delegates and to the press. In this they were following an established practice, the aim being *"to provide ideas and alternative proposals to delegates, to report on and analyze the meeting in order to generate a wide-ranging debate, and to clarify the issues for members of the press."*

The demands made by the environmentalists at last year's meeting of the Executive Body may be summarized as follows:

1. A protocol should be drawn up and signed, setting out specific reductions of the emissions of nitrogen oxides and hydrocarbons.

2. Those countries that have not signed the Convention's sulphur protocol, and especially

major polluters such as the UK, the United States, Poland, and Spain, should do so without delay.

3. Negotiations should be started for reducing emissions of sulphur dioxide beyond the 30 per cent already agreed upon.

4. Future Convention targets, including the coming NO_x protocol and the extended one for SO₂, should be based on limits of ecological tolerance rather than on what is supposed to be politically attainable.

While the environmentalist groups naturally welcomed the widened mandate for the Working Group, they felt it to represent the minimum as a basis for real progress. It stops short for instance of saying that a protocol shall be in a state for signing at the meeting in November of the Executive Body (although it does not exclude such a possibility). Nor does it say that hydrocarbons shall be included. This last omission is especially serious, since it is now generally considered that hydrocarbons have a decisive influence, particularly in local formations of ozone. These substances do in any case belong in the Working Group's sphere, which would make it only natural to deal with them in tandem with nitrogen oxides.

Of the three meetings of the Working Group that are scheduled for this year, two have already taken place. The outcome so far has hardly been encouraging, however. In its terms of reference to the Working Group, the Executive Body had pointed out *"the need to reduce efficiently the total annual emissions of nitrogen oxides from stationary and mobile sources, or their transboundary fluxes, by 1995."* After having attended the last meeting of the Group in May as observers, the environmentalist organizations are now greatly worried by the fact that the negotiations are tending to bog down in a lot of technical detail,

and that the national delegations are not showing the requisite political will to bring about a reduction of emissions.

All countries seem to agree on the need to reduce emissions, but show considerable disagreement when it comes to deciding how that is to be done. Agreement has however been reached in principle on a two-stage approach, involving a certain amount of quick action in the first stage, and discussing more all-embracing measures later.

Many countries consider the facts about transboundary fluxes and critical loads for nitrogen oxides to be too uncertain for them to commit themselves at present to any specific reduction figures. They therefore want to revert to the matter later, when research has produced greater certainty.

A compromise proposal that was put forward at the May meeting, to freeze emissions at present levels, only drew unqualified support from six countries. These were West Germany, Sweden, Switzerland, the Netherlands, Austria, and France — the countries that are in any case prepared to reduce their emission by the middle of the nineties.

The environmentalist organizations do however still have a chance to try and influence the formulation of the NO_x protocol, for instance by giving their views to the national delegations before the matter is again taken up at the meeting of the Working Group in September.

Christer Ågren

Copies of the ECO magazine sheets mentioned above, Nos. 1-4 Vol. 36, can be obtained from AIR-PLAN, P.O. Box 5627, NL-1007 AP Amsterdam, The Netherlands. See also pages 10 and 11.

Move now towards a protocol

For the first time, there is broad scientific consensus about the levels to which pollution must be reduced to allow forests, soils and lakes to recover or even to survive at all.

The figures regarding critical loadings are before the meeting, and yet no action has been taken to agree on ways of achieving emission reductions consistent with critical loading values. Are we to wait until natural environmental tolerances have been irretrievably exceeded? The technology for making effective reductions already exists.

Today is the 7th anniversary of the Convention, yet only 26 nations have reported their emission status, and only 12 of these to the full extent requested. Not only that, some countries have actually given notice of their intention to increase emissions.

We have been surprised this week to note that a number of governments still seem to be entrenched in the philosophy of the 1950s and 1960s. They argue that there is an inherent connection between increased economic activity, increased energy consumption and the emission of pollutants. In modern society, there are numerous examples that an opposite trend can be achieved with economic benefits to all areas of society as well as helping the environment.

Effective energy conservation programs and new energy-efficient technologies make economic development possible with less energy consumption and less pollution. The World Commission on Environment and Development in its 1986 Report on Energy states:

"In the industrialized countries economic growth was financially decoupled from parallel growth in energy use during the past decade. The incremental energy content of growth (that is the new energy required for every new in-

crement in growth) fell in many countries, some from 1.2 to 0.5 units, resulting in substantial gains in overall economic efficiency and competitiveness and substantial reductions in the cost of environmental damage."

There are even studies available showing that a further 50 per cent reduction of energy consumption is possible at the same time as continuing economic growth.

We have been disappointed with the lack of ambition shown at this meeting by most delegations. If progress has been made within these walls, then the difference has not yet been seen in nature.

Another example that could easily be seen as evidence of the lack of commitment from the Contracting Parties is the development and financing of EMEP. The joint work within EMEP is the channel through which a common understanding of the air pollution problems in Europe is supposed to be created, thus forming the very foundation on which to base the joint action programs to reduce emissions.

At the Nordic Council meeting, environmental NGOs presented a joint set of demands to delegates. These NGOs represent some 8 million members in more than 30 countries.

It must be emphasized, in outlining these demands, that the basis for them lies in the ecological tolerances of our most sensitive and susceptible habitats.

In order to avoid further environmental damage over large areas of Europe and North America, we must achieve a reduction in sulphur emissions of 90 per cent. We are calling for 80 per cent of this to be achieved by 1993.

As regards nitrogen oxides, environmentalist organizations have been calling for a 75 per cent reduction since the Stockholm Conference of 1982. We

maintain that demand, and believe that a reduction of this order is both urgently necessary and technically achievable by a deadline not later than 1995.

In addition, we recognize the role of hydrocarbons in the formation of ozone, and call for rapid measures to reduce emissions, and to reduce the levels of ozone by at least 75 per cent. These are ambitious targets, but ambition is necessary. Time is not on our side, the damage is intensifying.

Emission reductions such as these can only be achieved if we not only apply rigorous legislation for technical control, but also go on to tackle the underlying problems of industrial planning which have created the pollution crisis. This means transforming industry.

Not only must we make each car cleaner: we must not allow an increase in traffic which would then create a higher level of total pollution.

We urge you to mandate the working group on nitrogen oxides to prepare a protocol on NO_x reduction to be ready for signature at the 5th Session of the EB. Resist the temptation to spend twelve more months researching into research, and move *now* towards a comprehensive protocol that does not duck the environment's needs. The 30 Per Cent Club fell short of what was needed — do not allow a NO_x protocol to do the same.

For our part, environmental organizations will do all in their power to further the objectives we have set before you this morning. But while I have been speaking to you, around 1 million kilograms of sulphur dioxide has been emitted and fallen over Europe. Our resources are limited, only governments can finally solve this problem. You represent the world's richest nations. This is your responsibility.

Statement to the meeting of UN ECE Executive Body, Nov 1986.

Acting as they do

The driving force for countries to take action to reduce emissions of air pollutants derives from the damage caused by those pollutants. The technology exists, and it has been shown that the cost of the damage is often bigger than the cost of emission controls. Then why do not all countries effectively reduce their emissions?

Unfortunately, there is no obvious answer to this question. However, studying the background of some countries that have implemented reduction programs, and some that have not, gives at least part of the answer.

The countries that have scheduled reductions of sulphur emissions of 50 per cent or more, between 1980 and 1995, seem to have some common features. One is that they all have well-documented facts on the negative effects of pollution, and often also a strong public

opinion promoting environmental protection. Another common factor is that the bulk of their pollution is imported. The relation between export and import of sulphur pollution shows that all countries that are net importers are to be found among the "more-than-50-per-cent-countries".

What do the other countries — the ones that have scheduled less than 30-per-cent reductions of sulphur emissions — have in common? Most of them have high emissions, many emitting more than 1 million tons of sulphur dioxide per year. Generally in these countries, more than 50 per cent of the deposited sulphur originates from within their own country. All of them are net exporters of sulphur, and some of them export some 5 to 11 times more sulphur than they import.

ECO No 3

Country	Ratio export/import	Import* (%)	Promised reductions**
United Kingdom	10.9	19	30 % by 1999
Italy	6.7	22	30 % by 1993
Spain	6.7	24	—
D.D.R.	5.9	32	30 % by 1993
Hungary	4.8	36	30 % by 1993
Czechoslovakia	4.1	42	30 % by 1993
U.S.S.R.	3.7	32	30 % by 1993
Belgium	3.5	53	50 % by 1995
Poland	2.9	42	—
F.R.G.	2.0	53	65 % by 1993
Denmark	1.8	69	50 % by 1995
Luxembourg	1.7	78	58 % by 1990
Ireland	1.4	69	—
France	1.3	60	50 % by 1990
Netherlands	1.2	74	50 % by 1995
Finland	0.7	74	50 % by 1993
Austria	0.6	81	70 % by 1995
Sweden	0.4	84	68 % by 1995
Switzerland	0.4	89	57 % by 1995
Norway	0.2	93	50 % by 1994

Figures based on EMEP's sulphur budget for Europe for 1984.

* The import figures shows the percentage of the sulphur deposition not originating in the country itself.

** Reductions are from emissions in 1980.

Threat of double standards

Problems of air pollution are not confined to the industrial countries of the North. Many countries in the Third World suffer from worse levels of air pollution than we do. Acid rain, more specifically, has been reported from countries as diverse as China, Malaysia, Brazil, and Mexico.

ECE policy on air pollution is related to the problems in other countries. The ECE sets the example. If ECE countries, being the richest, do not use readily available technology to curb air pollution, why then should much poorer countries, who do not even have direct access to the necessary technology, do so.

It was observed many times during the meeting that abatement technology should be transferred more easily within the ECE, preferably with the aid of an Environmental Fund. Countries outside the ECE should also be able to profit from such a greatly needed effort. Present trends are quite the reverse. As pollution standards are tightened in this part of the world, industry is moving its most polluting production processes to countries where environmental standards are low or not enforced, usually in the Third World.

It is unacceptable that our environmental problems should be repeated all over again in other parts of the world. Technical aid in abatement technologies should therefore be accompanied by the demand that corporations operating abroad should be subject to the same environmental (and other) standards as in their home country.

ECO No 4

Smallness is no argument

The widespread frustration over the lack of effective international action against acid pollution, felt particularly in those countries which have suffered most from the effects of acidification, has mainly been vented against the big polluters such as the US and the UK. Smaller countries, whose activities may be just as polluting in relation to their size, tend to be ignored in the drive to reach international agreements on emission controls.

Ireland, a non-signatory to the 30 per cent sulphur protocol and one of the few ECE countries in which sulphur emissions are actually projected to increase from the 1980 levels over the next decade, is a case in point.

The Irish Environment Minis-

ter stated recently that Ireland would not be participating in any program of uniform reductions such as are prescribed in the Helsinki Protocol. One of the main reasons given for this stance is the small scale of national emissions in relation to other European countries — approximately 1 per cent of total EEC emissions, in the case of sulphur. But is this really a valid argument?

In fact, Ireland has been producing more sulphur dioxide in relation to its economic productivity than the Netherlands, West Germany or France, and per capita sulphur emissions have been comparable with those of four out of the five big Western European polluters — Spain, France, West Germany,

and Italy (the fifth being the UK). The cited 1 per cent of the EEC's sulphur pollution load derives from the activities of approximately 1 per cent of the EEC's citizens.

According to the cost-benefit approach whereby pollution must be justified in relation to the benefits of the activity giving rise to it (e.g. megawatts), there is no reason why small countries should be exempt from international programs of uniform emission reductions on grounds of smallness alone. If a large polluter such as the UK were divided into fifteen small countries, would that in any way reduce the need to clean up its power stations?

ECO No 2

WWF INTERNATIONAL

Demands curb on emissions of nitrogen oxides

Many of the world's leading industrial nations must reduce pollution by oxides of nitrogen (NO_x) to below critical ecological levels in order to halt further widespread damage to nature, said WWF in a report, "Reducing NO_x Pollution to Conserve Nature", published this March.

NO_x , one of the main constituents of acid rain, must be curbed by an overall 75 percent across the United Nations Economic Commission for Europe region (UN ECE) to prevent spreading tree death, the poisoning of soils and the acidification of freshwaters, said the 18-page report.

The aim of the reduction would be to meet new scientifically defined "critical loads" based on ecology not politics, said WWF. The UN ECE region

includes the USSR, USA, Canada, Eastern and Western Europe.

The report concludes that in Europe as a whole, acidity of rain has increased by a factor of ten since the 1950s and it identifies NO_x as causing about one-third of all damage due to acidity from man-made sources. It adds that in most UN ECE countries emissions are increasing, particularly in line with vehicle traffic.

Especially at risk are many important nature reserves based on heathland, nutrient-poor grasslands, most woodlands and mire systems. The report warns that these "protected areas" will lose their key natural characteristics if the processes are not halted.

WWF has already called for an 80-per-cent reduction in sulphur

dioxide emissions.

WWF's recommendations for reducing NO_x pollution are contained in the report, which is available from WWF International, CH-1196 Gland, Switzerland.

WWF News March 1987



Motor vehicle manufacturers



Photo: André Maslennikov/IBL

It is becoming ever more well-documented that a "cocktail of pollutants" is destroying the lakes and forests of Europe (see *Acid News*, December 1986). The acid rain campaign is now combining its attack on sulphur pollution from power stations with a parallel demand that automobiles should clean up too. Some progress has been made in this area, but not nearly enough: so it was timely that the European Environment Bureau and Friends of the Earth Ltds should host a top-level seminar entitled *The Clean Car, a Challenge for Europe*, on March 12 in London.

The broad conclusions from this seminar were:

- that vehicle emissions threaten the environment, and have an impact on human health;
- that emissions should be cleaned up using the best available technology, which means adopting current USA regulations rather than the more

permissive EEC Euro-compromise currently stalled by the Danish government's veto;

- that the technology for cleaning car emissions — the catalytic converter — is successful in the scale of its emission reductions and in in-use operation over long distances and timescales;

- that diesel vehicles are no longer considered to be a clean environmental alternative to gasoline-powered vehicles, and should be fitted with emission-reducing technology.

Vehicle emissions, the environment and human health

Petrol vehicles emit a number of pollutants, among which are carbon monoxide (CO), nitrogen oxides (NO_x), and hydrocarbons (HC). These are emitted in large quantities — 86 per cent of the UK's total carbon monoxide output comes from road transport, 42 per cent of nitrogen oxides and 33 per cent of hy-

drocarbons. NO_x and HC play an important role in the formation of acidic rain, and in ozone formation. The impact of both these pollutants on the environment was discussed in *Acid News*, December 1986. The levels of NO_x and ozone in the air are already greater, across large parts of Europe, than the forests can tolerate.

Effects on human health have been overlooked, however. A paper given by Mike Walsh (formerly of the US Environmental Protection Agency) looked at the human aspects, as well as the environmental deterioration caused by vehicle pollutants:

Carbon monoxide

Over 90 per cent of the carbon monoxide emitted in cities generally comes from motor vehicles. Because the affinity of haemoglobin in the blood is 200 times greater for carbon monoxide than for oxygen, carbon monoxide hinders oxygen transport from

prevaricate while people die

blood into tissues. Therefore, more blood must be pumped to deliver the same amount of oxygen. Numerous studies in humans and animals have now demonstrated that those individuals with weak hearts are placed under additional stress by the presence of additional CO in the blood. In addition, foetuses, sickle cell anaemics and young children may also be especially susceptible to exposure to low levels of CO.

Nitrogen oxides

As a class of compounds, the oxides of nitrogen are involved in a host of environmental concerns impacting adversely on human health and the environment. Nitrogen dioxide (NO₂) causes increased susceptibility to respiratory infection, increased airway resistance in asthmatics, and decreased pulmonary function. Even

short term exposures to NO₂ have resulted in a wide-ranging group of respiratory problems in school children — cough, runny nose, and sore throat are among the most common — as well as increased sensitivity to bronchoconstrictors by asthmatics...

Ozone

... Adverse health consequences associated with exposure to elevated levels of ozone include eye irritation, cough and chest discomfort, headaches, upper respiratory illness, increased asthma attacks and reduced pulmonary function. Recent studies show that adverse health effects can occur in healthy people at levels very close to the US air-quality standards for ozone. This standard has frequently been violated in the UK.

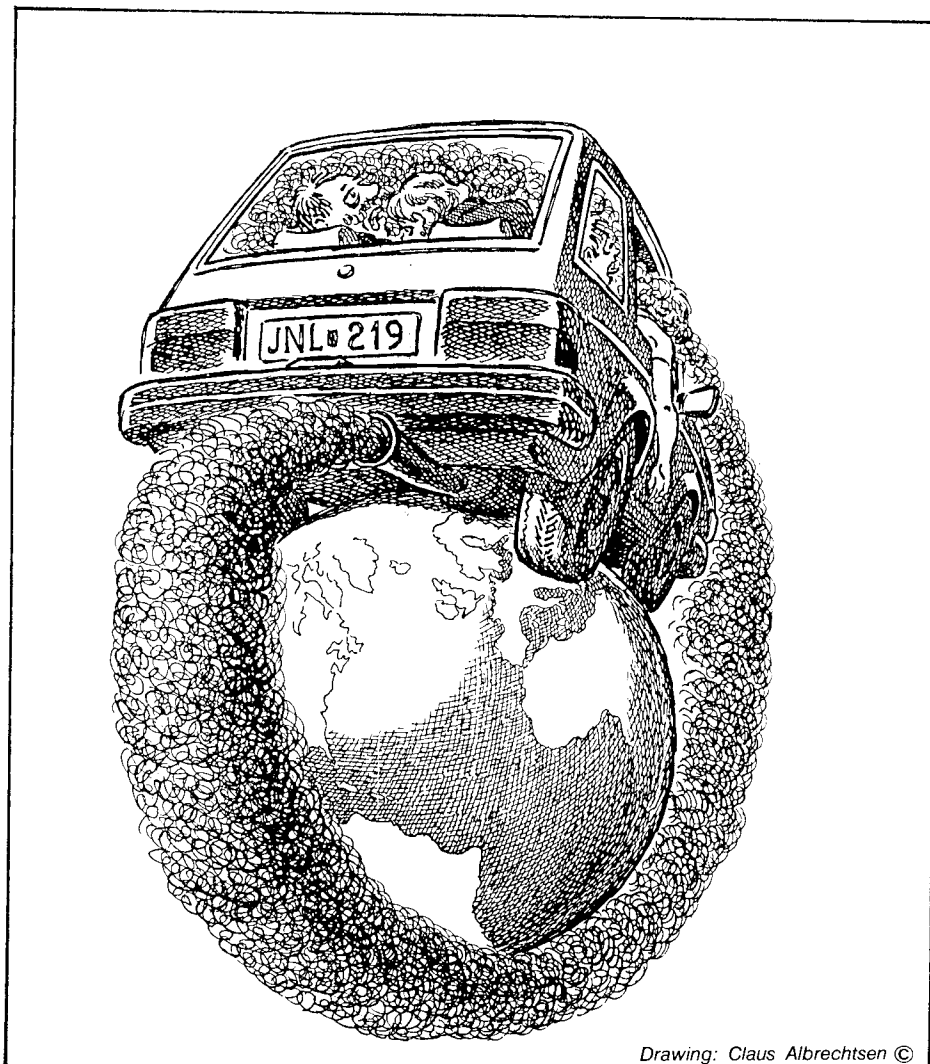
Mike Walsh then turned to diesel emissions. Up till very

recently, diesel engines have been considered to be environmentally safe. New research is swiftly overturning this complacency. The problem is that diesel engines emit small particles — thirty to seventy times more particulate than petrol engines equipped with catalytic converters. These are problematic for three reasons:

1. Many areas of the world already have unhealthy air-quality levels for Total Suspended Particulate (= particles hanging in the air). In urban air, these particles are of concern because a strong correlation has been established between suspended particulate and variations in infant mortality and total mortality rates. Particles have been implicated in the aggravation of disease among bronchitics, asthmatics, cardiovascular patients and people with influenza. Any significant increase in diesel particulate emissions would add to the severity of this problem.

2. In addition to the general problem of adding to the level of particulates, diesel particulates raise a special health concern because they are so small — about 0.2 microns in size. Small particles are more likely than large particles to lodge deep in the recesses of the lung (alveolar region), and require a longer period of time to be cleared from the respiratory tract. They also remain suspended in the air near the breathing zones of people for long periods of time — so they are more likely to be breathed in.

3. Diesel particulates have been singled out as especially hazardous and toxic because of their composition. "The US EPA has noted that up to 10,000 chemicals may be adsorbed on the surface of diesel particles and drawn deep into the lung with them. Many of these chemical compounds are known to be mutagenic (= causing mutations) in short term bioassays, and to be



capable of causing cancer in laboratory animals ... Recent animal studies conducted under the auspices of the European car industry have shown statistically significant increases in tumors in animals exposed to diesel particulate."

Research into human exposure has produced similar results. A pilot study of US railroad workers, conducted by researchers at Harvard, indicated that the possibility of developing cancer may be 42 per cent greater in individuals exposed to diesels than in individuals who have not been exposed. The follow-up study which has now been completed appears to be equally alarming.

USA standards versus Euro-compromise

The USA standards for petrol-driven vehicles are technologically-forcing and designed to

protect human health. The proposed European standards for car emissions are designed to protect the small-car industries of Britain, France, and Italy (see *Acid News*, December 1986), and are much more lenient than the US standards.

To demonstrate this disparity, Mike Walsh showed a graph detailing the 650 different engine models approved by the EPA for sale in the US by mid-January 1987 (Fig. 1). The emissions for these engines are compared with the proposed three-stage Euro-compromise, which is superimposed in black on the graph. The bands are calculated by adding the permissible HC emissions to the NO_x emissions.

As can be seen from the graph, all the US engines are capable of meeting emission limits that are roughly twice as effective as the most stringent of the pro-

posed Euro-limits, regardless of engine size. This includes 30 to 40 engines that would be classified as in the "small car" category in Europe.

It should also be pointed out that the US results are from production-line cars which are now on sale in the US (some of them made by British manufacturers). The Euro-limits, by contrast, are still being discussed — the actual emissions on our roads are much higher.

The disparity between emission limits for petrol engines in the US and Europe is matched by the difference between existing US and proposed EEC diesel limits. The European Commission has proposed particulate limit values of 1.3 grams per test for light vehicles, with 1.7 grams per test for conformity of production. These standards are three times higher than the US (1987 Model Year) limits.

Figure 1

1987 CERTIFICATION RESULTS FTP RESULTS CONVERTED TO ECE TEST

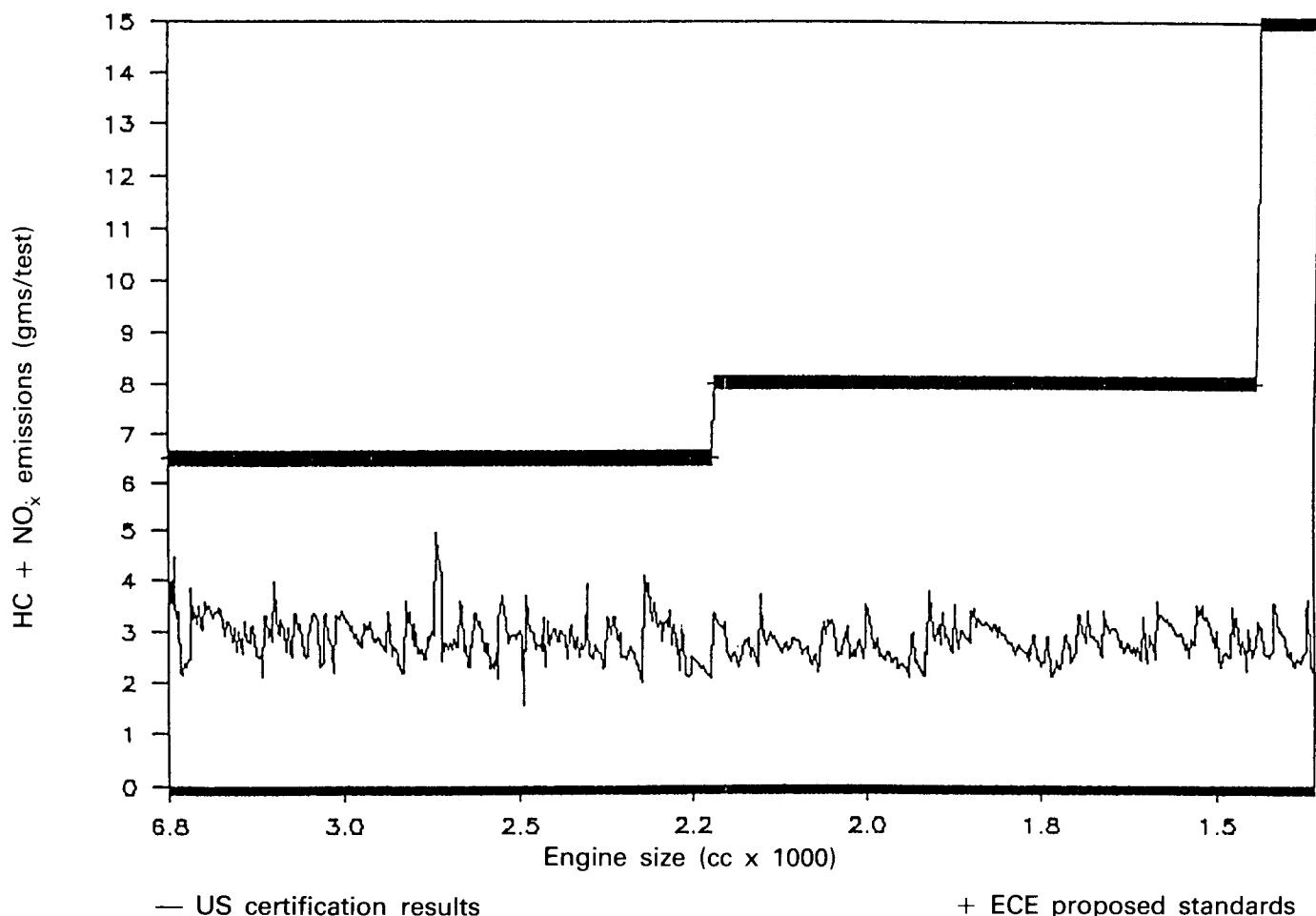
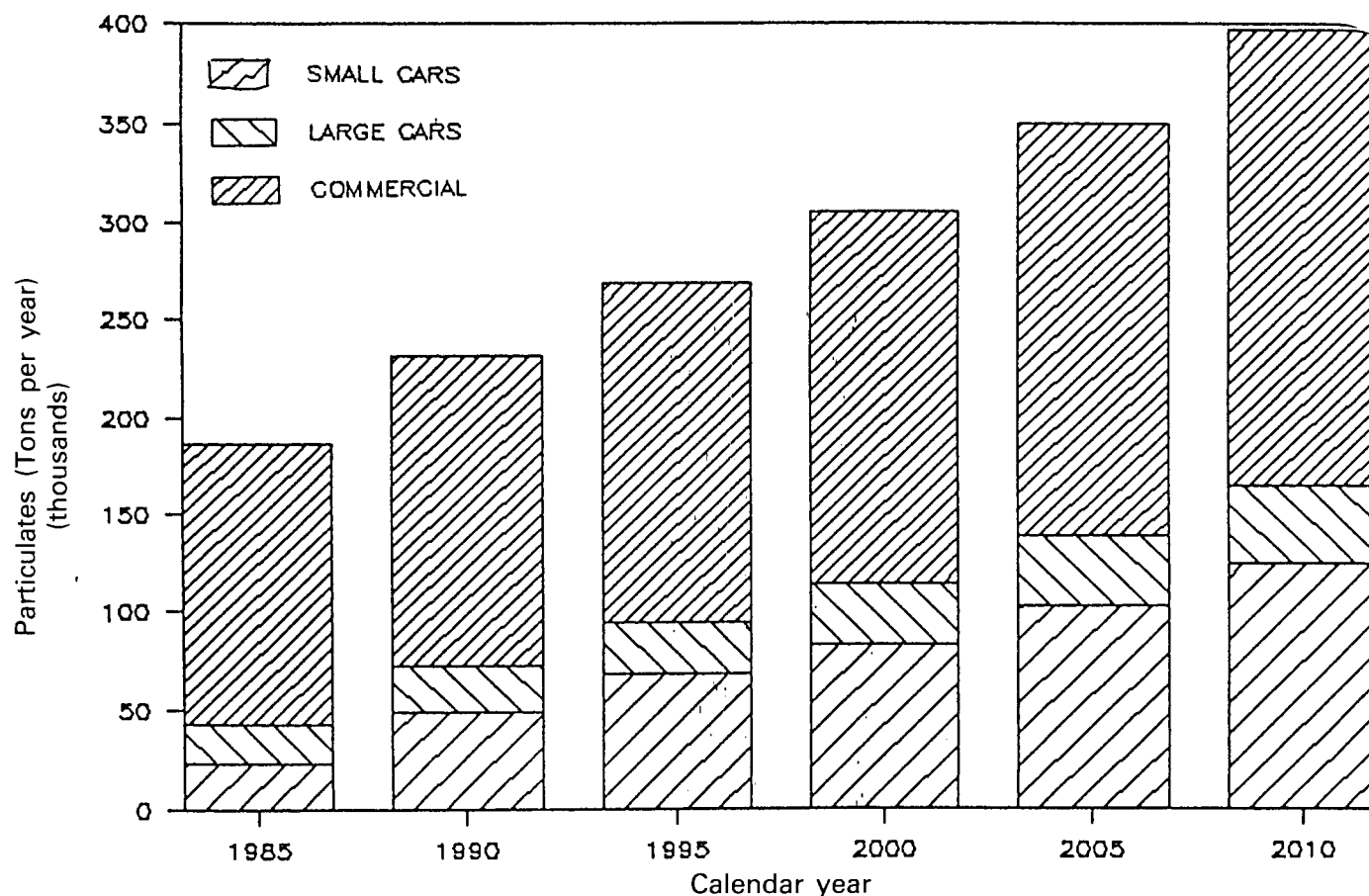


Figure 2

EMISSIONS FROM 1985 TO 2010

COMMISSION PROPOSAL



If the EEC proposals are adopted, diesel emissions in Europe will more than double by the year 2010 — hardly an adequate way of protecting people's health (Fig. 2).

The European situation in relation to car emissions is now reaching a position of comic lunacy. Certain countries, such as Spain and Ireland, are very lax in their emission requirements, and haven't even adopted ECE proposal 15:04. Not all of the EEC countries have adopted ECE 15:04, but ten out of the twelve support the EEC Euro-compromise, an optional regulation that does not have to be adopted by member countries even if it is ratified. In addition to this, the Stockholm Group, a group of countries including Sweden, Switzerland, and Austria, are introducing US standards before the end of the decade. European car manufacturers are faced with three different levels of emission control to deal with.

There were some representatives of the automobile industry

at the EEB/FoE seminar, although they were there in a personal capacity. Some of the reasons they put forward for not adopting catalytic technology are listed below, with the response they attracted:

- Catalysts do significantly reduce emissions, but their add-on cost is so large as to deter potential customers from buying catalyst-equipped cars.

Nonsense. 130 million cars have already been sold with catalysts fitted — a third of the world's car fleet.

- The link between automobile pollution and environmental degradation has not been adequately demonstrated.

There is scientific agreement that vehicles emit large quantities of NO_x and hydrocarbons; that the combination of these pollutants produces ozone; and that existing ozone levels in Europe are damaging crops and vegetation.

- It would be more appropriate to achieve reductions of NO_x from power stations, or HC reductions from solvents, than to

ask the automobile industry for more pollutant reductions.

Power stations are frequently being pressured to reduce their emissions, and the automobile industry should not evade its considerable responsibilities by passing the buck. In respect to solvent emissions, this is a valid point, and governments should be looking at ways of replacing solvents with water-based equivalents where possible.

- We are manufacturers who are dealing with reality; we have to consider questions of cost, of reliability, of fuel consumption — all you are doing is talking about the environment, and ignoring other factors.

There are many different perspectives of reality: ours is that the environment cannot afford this continual degradation from an industry that has the technology to prevent the pollution that it is causing. It may well be that your perception of reality is more anachronistic than ours.

Steve Elsworth

Lower speeds, less pollution

The connection between driving speeds and the emission of pollutants has continued to be hotly debated — which may seem strange, seeing that a number of investigations have been made since 1980, for instance in West Germany and Switzerland, and all have shown that in non-urban driving higher speeds result in higher emissions. The connection is most obvious as regards nitrogen oxides, but can also be seen at higher speeds for hydrocarbons and carbon monoxide.

Now Sweden has joined those countries that have carefully looked into the matter, and found — hardly surprisingly — the same pattern as elsewhere (see table). In the Swedish study, which was carried out by the vehicle exhaust laboratory of the National Environmental Protection Board, sixty petrol-driven cars were tested, comprising year models from 1977 to 1987. Six cars equipped with three-way catalytic converters were also tested. As from the 1976 year models, Swedish requirements have been somewhat stricter than those in force elsewhere in Europe. And from 1989 onwards all cars will have to meet the US standards (which means in effect that they will have to be equipped with catalytic converters). The vehicles for the test were selected in such a way as to make them representative of the general car fleet in Sweden. Included for instance were ten of the most-sold makes.

The emissions were measured on the one hand at various constant speeds, and on the other in a simulated driving cycle at average speeds of 26, 32, and 78 kph. The emissions turned out to be in general large in driving that involved much braking and acceleration, and the greatest increases were recorded for hydrocarbons and nitrogen oxides at low speeds corresponding to driving in ur-

Effects of speed on emissions of carbon monoxide, hydrocarbons, and nitrogen oxides according to Swedish NEPB test. The figures show emissions at various speeds in relation to those at 70 kph.

Kph	CO	HC	NO _x
70	1.0	1.0	1.0
80	1.0	1.0	1.3
90	1.2	1.2	1.8
100	1.2	1.2	2.3
110	1.2	1.2	3.0
120	1.6	1.5	3.7

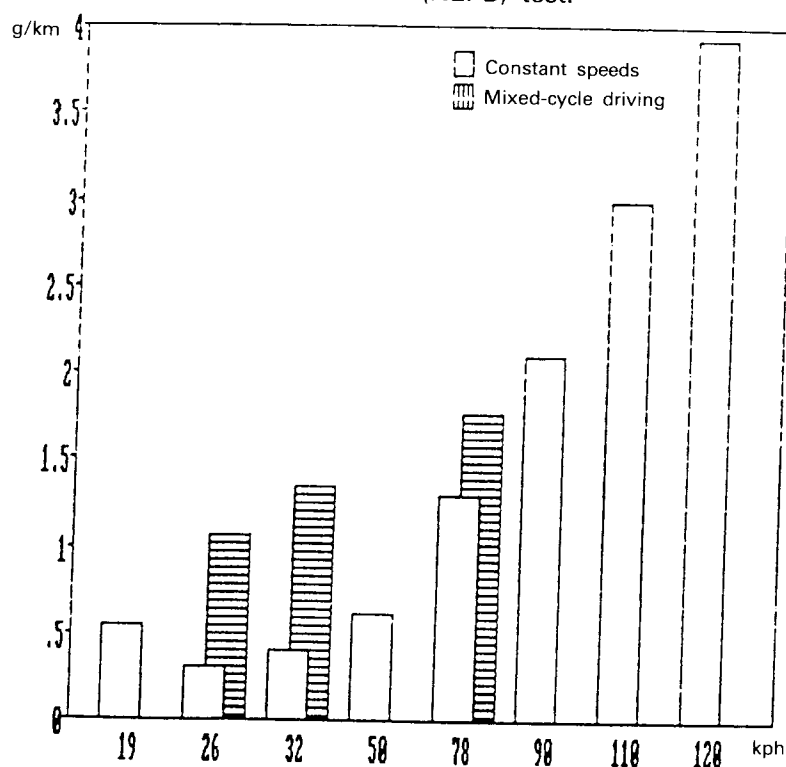
ban traffic. Since there is normally not much variation in speed when driving at higher speeds, the driving pattern has relatively little effect on emissions at average speeds of more than 80-90 kph, as may be seen from Figure 1.

When driving at constant speeds within the range that is usual in non-urban areas — that is, 70-120 kph — the emissions of carbon monoxide, hydrocarbons, and nitrogen oxides all increased with the speed. The largest increase is for nitrogen

oxides, the emissions of which were shown to be almost four times as much at 120 kph as compared with 70 kph. See the table and Figure 2.

In two cases even catalyzer cars emit more pollutants: in mixed-cycle driving compared with driving at a constant speed, and at increasingly high constant speeds. Here however the increase is greatest as regards emissions of carbon monoxide, and as might be expected the emissions are generally lower than those from cars

Fig. 1. Emissions of nitrogen oxides at constant speeds and in mixed-cycle driving as shown in Swedish (NEPB) test.



without catalyzers (at most speeds less than a tenth of the latter).

In another report the NEPB sets forth the reductions that would result from lowered driving speeds in Sweden. A lowering of the average speed by 10 kph on roads with limits of 70-110 kph would reduce the emissions of nitrogen oxides by 19 per cent. The effect for the country as a whole, including all types of road, would be a reduction of 11 per cent. If all drivers on 70-110 kph roads were to observe the speed limits, the overall reduction of nitrogen oxide emissions would amount to about 9 per cent.

It should be borne in mind that in contrast to most of the other measures that are being considered for reducing vehicle emissions, lowering speeds would have a very rapid effect. Moreover it would cost nothing, and would most probably provide economic gains both to society and the individual in the form of fewer and less serious accidents, lower fuel consumption, and — not least — a better environment.

According to NEPB estimates, if all drivers were to observe

even today's speed limits, the total emissions of nitrogen oxides in Sweden would be almost 100,000 tons less than they would otherwise be during the period up to 1995. This may be put against the effect of stricter exhaust standards (mandatory from 1989 year models), which are calculated to reduce such emissions by 170,000 tons. This latter effect would come mostly between 1992 and 1995, when there would be ever more catalyzer cars in the roads — whereas the effect of lower speeds would be felt mainly between 1987 and 1992. Lowering speeds is thus a necessary complement to the introduction of stricter exhaust controls.

The reason that 1995 has been taken as the year for comparison is that parliament adopted a program of action against airborne pollution and acidification in 1985, one of the aims of which was to reduce the emissions of nitrogen oxides by 30 per cent, from 1980 levels, by 1995. But the latest forecasts now point to a great increase in the volume of road traffic. The traffic work carried out by passenger cars and

heavy trucks is expected, according to official estimates, to increase by 16 and 25 per cent respectively between 1984 and 2000.

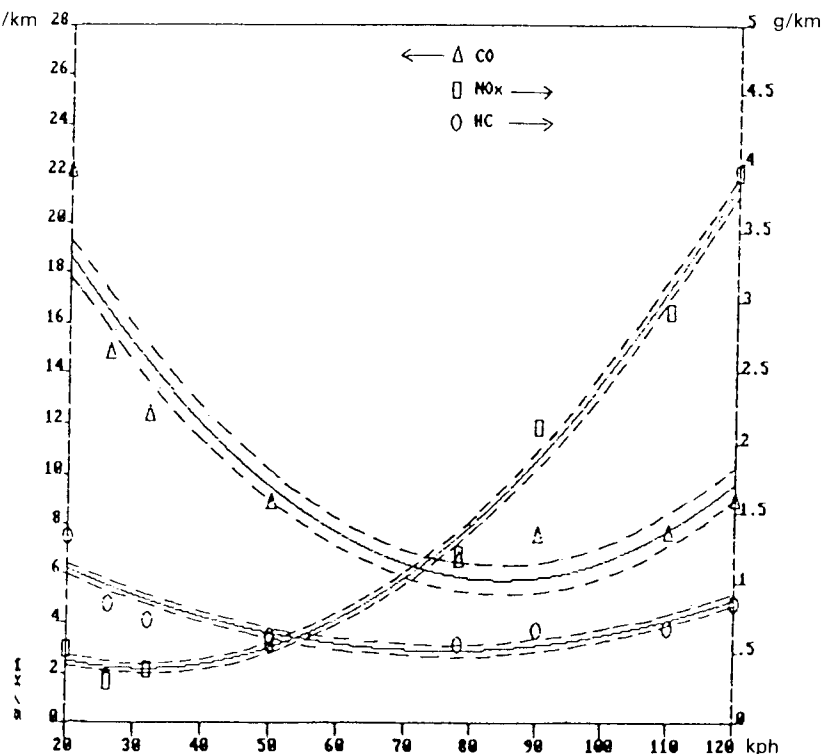
As a result of this increase, the emissions of nitrogen oxides from road traffic are expected to be only 15 per cent lower by 1995. The reduction obtained by the introduction of more stringent exhaust controls for petrol-driven cars will thus be largely offset by the increase in traffic. Today road traffic accounts for more than half of the total emissions of nitrogen oxides in Sweden, amounting to some 300,000 tons. If road traffic is to produce its share of the desired 30-per-cent reduction, its emissions will have to be reduced from 160,000 tons (1980) to 112,000 tons a year by 1995. If no steps are taken beyond exhaust controls for petrol-driven cars, the emissions in 1995 will be about 130,000 tons.

The environmentalist groups are now demanding further measures to reduce exhaust emissions, such as lowered speed limits, stricter exhaust requirements for diesel-driven vehicles, the switching of freight and passengers from the roads to the railways, and an expansion of public transportation generally.

The propriety of these demands is further accentuated by the fact that the latest research indicates that the load of nitrogen accumulating on the environment will have to be reduced by 75 per cent if we are to avoid lasting damage.

Christer Ågren

Fig. 2. Emissions of carbon monoxide, nitrogen oxides, and hydrocarbons at speeds ranging from 20 to 120 kph. Weighted values, NEPB test.



Hastighet, föroreningsutsläpp — bensindrivna bilar. NEPB Report No. 3276.

Hastighetens inverkan på vägtrafikbuller och bilavgaser. NEPB Tekniska avdelningen.

Both obtainable from the National Environmental Protection Board, Box 1302, 171 25 Solna, Sweden.

Acid rain, aluminium and

In the most acidified areas of southern Norway there are more people suffering from senile dementia than in other parts of the country. It is believed that this is because acidification leads to increased concentrations of aluminium in the drinking water, and that there is a link between aluminium and the disease.

So it appears at any rate from a report recently published in Norway by the Central Bureau of Statistics, under the title of "Vannkvalitet og helse" (Water Quality and Health), after a careful study of the relationship between acidification, aluminium in drinking water, and the incidence of senile dementia.

Typical early symptoms of the disease are, according to the report, reduced short-time memory, bad time orientation, and defect speech. Later on long-time memory will also become worse. It is mainly people above 70 years of age that become stricken. When sufferers are under 65 years old it is called presenile dementia, but there are also other forms of dementia, caused by diseases of the circulatory system, alcoholism, epilepsy, and schizophrenia.

Of those suffering from either form of age-related dementia, 50-70 per cent will be victims of Alzheimer's disease, where the symptoms of advanced senility appear much earlier than usual. Obductions of persons who have died from Alzheimer's disease have revealed cell losses in the grey matter of the brain. No definite cause of the disease has yet been proved, nor is there any known cure or effective treatment. Victims usually die within ten years of the first appearance of the symptoms.

Research carried out by Dr Daniel Perl, professor of pathology and psychiatry at the Mount Sinai School of Medicine in America, had previously shown on the one hand a con-

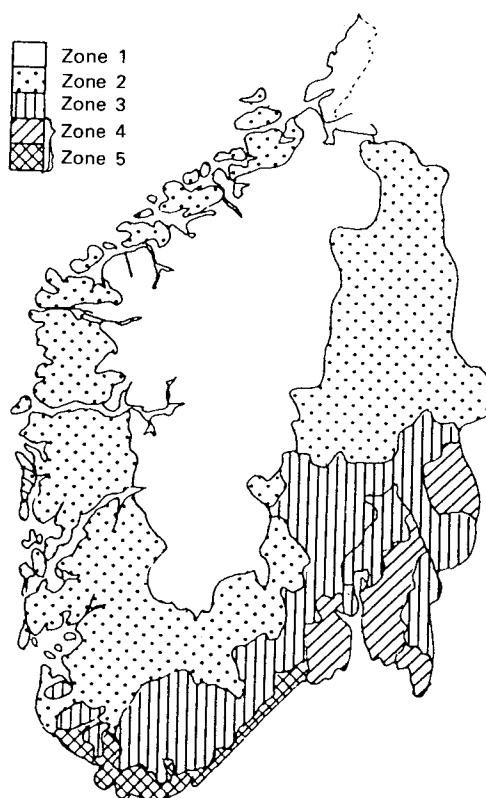
nection between the intake of aluminium via the drinking water and the incidence of Alzheimer's disease, and on the other exceptionally large amounts of aluminium in the brain of persons with Alzheimer's or Alzheimer-like diseases. And only a year ago British scientists were maintaining that aluminium in the brain actually was the cause of the disease.

Aluminium occurs naturally in bedrock and soil, and is one of the most common elements in the earth's crust. The extent of its concentration in surface and ground water will depend mainly on the acidity of the soil and rock. While it is normally tightly bound to various minerals in the ground, acidification causes it to become liberated in ion form, and become mobilized and carried into the surface and ground water. The concentrations of aluminium in the lake water in those parts of Norway that lie outside the most severely acidified areas is usually less than 20 micrograms per litre ($\mu\text{g/l}$). In the acidified areas it

may be 100-300 $\mu\text{g/l}$. It has already been proved that one of the causes of fishkill in acidified lakes is precisely aluminium, and that fish are affected at concentrations of 100 $\mu\text{g/l}$. The killer is aluminium in hydroxide form, which is most dangerous to fish when the pH of the water is about 5.

For the purposes of the Norwegian study the southern part of the country was divided into five zones, according to the concentrations of aluminium in the lakes. This corresponded fairly well with the amounts in the drinking water, data on which came from 384 of the country's larger waterworks, providing water for 70 per cent of the total population.

It appeared that the zones with the worst acidification — and the highest concentrations of aluminium in the drinking water — had the highest mortality rate from age-related dementia, and that the rate increased with increasing concentrations of aluminium. During the period covered by the



Zones of aluminium concentrations in lakes. South Norway.

senile dementia

Literature

study (1969-83) age-related dementia was the primary cause of the death of 2,000 persons in Norway, and one among four causes in the case of 21,000 others.

In the three least acidified areas (zones 1-3), the standardized mortality rate due to age-related dementia was 3.4 per 100,000 inhabitants, as against 4.4 in the most acidified zones. Where dementia was one of four causes of death the rate rose from 32.4 per 100,000 in zone 1 to 48.3 in zone 5, the most acidified. (See chart.) The differences in both cases are statistically significant. In general the mortality was higher among women than among men.

It also appeared that the number of persons admitted to psychiatric nursing homes on account of age-related dementia was higher per 100,000 of population in the most acidified areas — and greatest in two of the counties to the southwest of Oslo, Vestfold (zone 4) and Aust-Agder (zones 3-5).

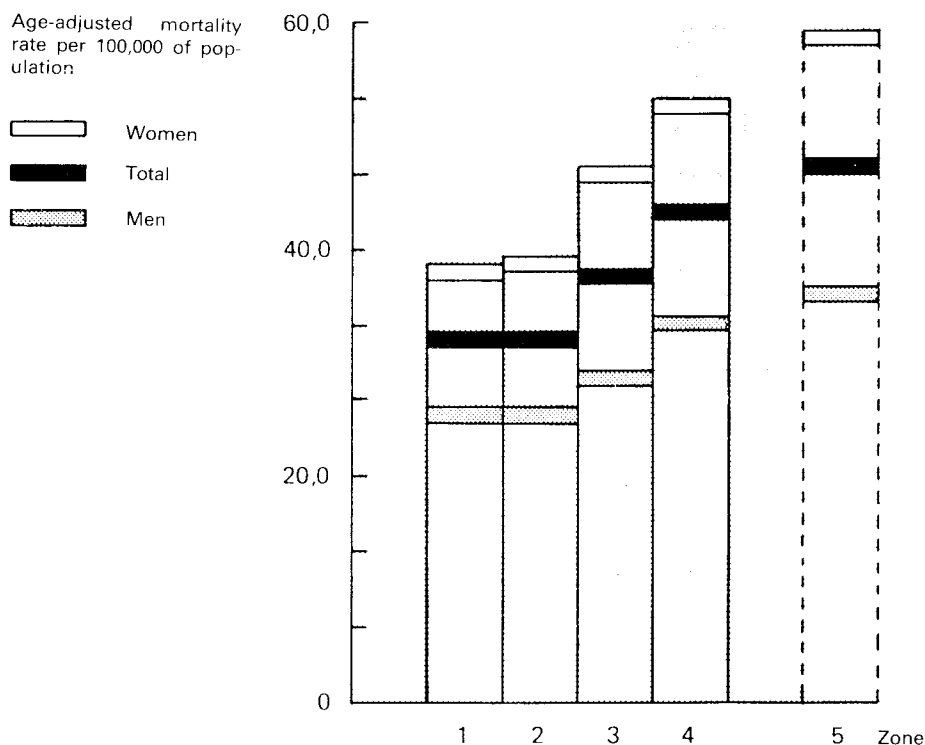
Although the report scrupu-

lously avoids any such claim, it seems the conclusion to be drawn from this study must be that there is a connection between aluminium in the drinking water and the incidence of age-related dementia, including Alzheimer's and similar diseases.

Such dementia is one of the most common mental diseases among old people, and one of the main reasons for admittance to nursing homes in Norway. In the United States, senile dementia is calculated to be the fourth prime cause of death among old people. It is reported that the costs of hospitalization for 2 million patients suffering from Alzheimer's or Alzheimer-like diseases alone in America amount to 12 billion dollars a year.

Christer Ågren

Vannkvalitet og helse. Edited by Tiril Vogt and published by the Central Bureau of Statistics, Oslo, Norway. In Norwegian with English summary. Price 30 kroner.



Mortality rate per 100,000 inhabitants where either senile or presenile dementia was one of four causes of death during the period 1969-83.

Lastbilar, bussar och renare luft (1987)

Report of the National Environmental Protection Board, containing proposals for new emission standards to be applicable in Sweden for trucks and buses. Presents the current and proposed standards of other countries, and reflects the current state of knowledge as regards measures for reducing the emissions of nitrogen oxides, hydrocarbons, carbon monoxide, and particulates from these types of vehicle. In Swedish, 280 pp. Price 140 kronor. Obtainable from the National Environmental Protection Board, Box 1302, S-171 25 Solna, Sweden.

Försurning och skogsdöd — förslag till åtgärder i Sverige (1987)

In this booklet, Svenska Naturskyddsföreningen (The Swedish Society for the Conservation of Nature) puts forward its proposals for measures to reduce the emissions of airborne pollutants in Sweden. In Swedish, 20 pp. Obtainable from Svenska Naturskyddsföreningen, Box 6400, S-113 82 Stockholm, Sweden.

Aktivitetstips — skogsdöd — försurning (1987)

Guide published by Fältbiologerna (Swedish Youth Association for Environmental Studies and Conservation) for the staging of activities on the theme of forest dieback and acidification. In Swedish, 16 pp. Available from Fältbiologerna, Box 6022, S-191 06 Sollentuna, Sweden.

Luftistens lilla blå (1987)

Booklet published by Miljöförbundet (The Environment Federation). A brief compilation of the facts about air pollution combined with tips on activities. In Swedish, 22 pp. Price 10 kronor. From Miljöförbundet, Box 64, S-150 13 Trosa, Sweden.

More notices of new publications will be found on pages 22 and 23.

Reports of effects on health

Leading international health experts presented new and previously unpublished information on the impact acid rain is having on human health at a Greenpeace symposium held in London last May. They made strong recommendations for research to be done in two broad areas:

Clinical and epidemiological studies into the health impact of current levels of air pollution transported over long distances, which US findings confirmed are responsible for respiratory symptoms in children;

Investigation of the impact of acid rain in mobilizing toxic forms of aluminium, and their uptake by the body (especially in the case of incurable ailments such as Alzheimer's disease).

Children are affected by current levels of long range air pollution to an extent which justifies urgent investigation, an international air pollution and health researcher told this Symposium on the Human Health Effects of Acid Deposition. He said there may be early evidence of long-term chronic changes in lung growth of children between 5 and 12 years old.

Another expert reported the first evidence of inhalation of aluminium being linked to Alzheimer's disease, which affects millions of people all over the world.

Dr John Spengler, Professor of Environmental Health Sciences at the Harvard School of Public Health, whose findings have demonstrated effects on health from air pollution that has been transported long distances, underlined the need to cut back on the air pollution causing acid rain.

"We are growing complacent in thinking that air quality has improved. Yet nitrogen oxide and ozone levels are increasing across Europe and North America. Decreasing visibility is evidence that the burden of fine par-

ticles of pollutants has increased," stated Dr Spengler.

His field research on children at summer camp in the United States has been unique in merging clinical tests with epidemiological studies. Results show conclusively that there is a systematic difference in the health of children exposed to current levels of air pollution from sources a long distance away, as compared with others that have not been so exposed.

Dr Spengler had found a significant drop in the children's pulmonary (lung) function during pollution episodes from long-range sources. And he told the Symposium, *"We may be seeing early evidence for long-term chronic changes in the lung growth of children between 5 and 12 years of age."*

He also reviewed studies from Europe, Canada, and the US which have looked at hospital admission data and found a significant association with the level of air pollution. From the Netherlands it was reported that depressed pulmonary functions in children followed an air pollution episode in 1985. Pollutants were transported from eastern Europe across Germany, the Netherlands, Belgium, and northern France. In the United States, he said, the Harvard Air Pollution Health Study has reported increased respiratory symptoms in children, associated with chronic exposures to atmospheric particulate. *"The association is stronger for fine particles and sulphur fraction and dramatically more pronounced in children who report chronic wheezing conditions."*

He said there was concern over sulphur-based particles, but that the impact of nitrogen-based compounds was virtually unexplored. *"There has been a long-term build up of nitrates and sulphates in the atmosphere."*

"It is now recognized that atmospheric acidic aerosols (a suspension of very fine acidic par-

ticles) are in the respirable size range and either alone or in combination with other contaminants contribute to airway irritation and susceptibility to respiratory disorders. Inhalation of coarse particles can exacerbate asthma and bronchitis." He also said that fine particles can lead to respiratory infections and emphysema and impair the body's defence mechanisms.

New findings from Dr Daniel Perl, a world authority on aluminium and Alzheimer's disease, could point the way to solving the riddle of this crippling killer. A link between aluminium and the disease is well-established but it is not yet possible to say whether aluminium is the root cause.

Aluminium is the world's most widely occurring metal in the Earth's crust. But it is not used biologically. It is highly toxic and the body has efficient mechanisms to ensure that if it enters it is excreted. In the case of Alzheimer's disease there may be a breakdown in this preventative mechanism, as Dr Perl stated, *"there are a number of species of aluminium, and it may well be that people suffering from Alzheimer's disease are being exposed to a uniquely toxic form which is readily available to the brain. This is an important concept, which needs to be looked at in greater detail."*

Further urgency is given to Dr Perl's statement as it is widely known that acid rain mobilizes aluminium in bioavailable forms. This combination of acidity and toxic forms of aluminium has eradicated the stocks of fish in tens of thousands of Scandinavian lakes.

Presenting the results of his latest research in this areas for the first time, Dr Perl produced alarming and unique evidence of a new air pollution threat concerning the uptake of aluminium by inhalation. His studies had shown that olfactory uptake of small particles was a

Still at odds over need to control acid rain

The United States walked away from negotiations with Canada over an acid rain agreement in 1983, and there have been no bilateral discussions for more than four years. Each spring, however, the president of the United States meets with the prime minister of Canada, and the issue of acid rain invariably arises. In March, 1985, President Reagan and Prime Minister Mulroney jointly announced the appointment of two Special Envoys — former US Transportation Secretary Drew Lewis for the United States, and former Ontario Premier William Davis for Canada — to study the US-Canada acid rain issue and to offer policy recommendations.

In March, 1986, Envoys Lewis and Davis jointly proposed, and the president and prime minister jointly accepted, a plan whereby the US government and private industry would each contribute 2.5 billion dollars toward research on new coal cleaning technologies. It was unclear how the plan would be implemented, and how the proposal would evade the Gramm-Rudman Act, which places strict limits on new federal spending. Indeed, President Reagan's 1988 budget included only 200 million dollars for acid rain programs.

Little more was heard of the 5

billion dollars spending proposal until the preparations for the Reagan-Mulroney meeting in April, 1987. On March 18 (1987), President Reagan announced that he would ask Congress to approve the 2.5 billion dollars in government spending over a five year period: 300 million dollars would be added to the 200 million dollars already requested for fiscal 1988, and the resulting 500 million dollars would be earmarked for research on new coal cleaning technologies.

Environmentalists attacked the entire proposal because it avoids any spending on existing and proven technology for flue-gas desulphurization, in contrast to West Germany's f.g.d. installation program. Michael McCloskey, national director of the Sierra Club, charged that the new spending "will not reduce acid rain by a single drop" because it is for research rather than for f.g.d. installation. He called the plan "*a smokescreen to obscure the administration's opposition to acid rain control.*"

On April 6 (1987), President Reagan addressed the Canadian Parliament and said he would "consider" a bilateral US-Canada acid rain agreement. It remains to be seen, however, whether the president's comments will be anything more

than empty rhetoric designed to generate positive news stories after five months of negative stories over the Iran/Contra scandal.

The Canadians hope for a pact that would be similar in scope and effect to the Boundary Waters Treaty of 1909 and the more recent Great Lakes Water Quality Agreements. According to the *Wall Street Journal*, US officials have acknowledged privately that they oppose the Canadian goal of a binding treaty with specific timetables and specific emissions reduction targets.

Meanwhile, three US scientists who advise the US Environmental Protection Agency (EPA) on acid rain issues have informed EPA that current levels of SO₂ emissions are beginning to acidify streams in the southeastern United States. They believe that the risk of acidification damage is greater now in the southeast than in the northeast. The northeast has heretofore been regarded as the region most vulnerable to damage from acid deposition since it is situated downwind from the midwestern industrial region, with its numerous coal-fired power plants.

Armin Rosencranz
Inverness, California

significant route for aluminium to the brain, producing results in test animals similar to Alzheimer's disease. "We need to look again at exposure to substances that contain aluminium," he said, warning that other potentially airborne toxins might be taken up in a similar way.

In the United States, said Dr Perl, Alzheimer's disease affects one-and-a-half million people and costs the US Government 30 billion dollars every year in

health care. According to Dr Perl, the number of those affected will double in the next 40 years. In the United Kingdom an estimated 500,000 people are affected.

Note:

Alzheimer's disease is a progressive brain disease of unknown aetiology, characterized by the development of large numbers of neurofibrillary tangles and senile plaques in

the brain. Epidemiological evidence from Guam strongly implicates local environmental conditions related to the availability of aluminium. Since a major consequence of acid rain is the liberation of large quantities of aluminium in bioavailable forms, there is concern about the possible human health risks of this environmental phenomenon.

Literature

Der Osten ist grün? (1986)

In this book Sabine Rosenblatt gives a wide and varied insight into the environmental situation in East Germany, Poland, Czechoslovakia, Hungary, and the Soviet Union — conveying impressions and providing a great amount of detailed information about a part of Europe that is largely unknown. Included are interviews and conversations with officials, scientists, and environmentalists. The author writes with liveliness and immediacy, not only about areas that are affected by pollution, but also about some remarkable national parks in these countries. There is a comprehensive appendix containing documents for instance of the Polish and East German environmentalist movements. In German, 235 pp. Price circa DM 30. Published by Rasch und Röhning Verlag, Hamburg, F.R.G.

Grönt ljus? Miljöfrågorna i Östeuropa (1987)

Swedish version of the above, published by Bokskogen, Box 7048, S-402 31 Göteborg, Sweden. Price 112 kronor.

Von oben nach unten wächst gar nichts — Umweltzerstörung und Protest in der DDR (1986)

By Peter Wensierski, West German journalist with DDR as a speciality. Gives a general survey of the ecological problems in East Germany. Focuses attention, among other things, on the greatly increased use of lignite, which accounts for 63 per cent of the energy produced and is the greatest source of atmospheric pollution. Other subjects include forest damage, the chemical industry with its emissions, and energy policy in general. Tells how individual environmentalists and groups are striving to influence developments. Hardback, 207 pp. DM 10. Published by Fischer Taschenbuch Verlag, Frankfurt am Main, F.R.G.

Der Osten ist grün?



Ökoreportagen aus der
DDR, Sowjetunion,
Tschechoslowakei,
Polen, Ungarn

Ein *naturl* Buch
von Sabine Rosenblatt
Vorwort: Robert Jungk
Rasch und Röhning

Praxis Geographie, No 6, 1986

Special 56-page issue of this German magazine on the theme of "Luft, Boden, Wasser, Wald — in Gefahr". Describes new methods of environmental education in German schools concerning air pollution and its effects on water, soil, and forests. Obtainable from the publisher, Westermann Zeitschriften, G. Westermann Verlag, Postfach 5529, D-3300 Braunschweig, F.R.G.

Clean air policy in Europe (1987)

A 90-page report by Helmut Weidner, analyzing the clean-air policies in 17 Western European countries, as well as the international efforts to reach a joint reduction of emissions. Consists largely of tables, comprising a massive compilation of data from the different countries, showing among other things the emissions of SO₂ and NO_x per country, per square kilometre, per capita, per unit of gross domestic product, per unit of energy consumption, etc. It also gives data on the number of motor vehicles in use, road traffic volumes, energy consumption, and so on. The report gives a lot of very important

information for anyone wishing to study clean-air policy in western Europe more closely. In German, English, or French, it can be obtained from the publisher, International Institute for Environment and Society, WZB, Potsdamer Strasse 58, D-1000 Berlin West 30, F.R.G.

Heavy-duty trucks and buses — the US program (1987)

Report by Michael P. Walsh, describing in detail the US program for reducing the emissions of air pollutants from heavy-duty trucks, and discussing the relevancy of adopting a similar program in Sweden. In English, 126 pp. Price 80 kronor. Obtainable from the National Environmental Protection Board, Box 1302, S-171 25 Solna, Sweden.

Bericht Luftreinhalte-Konzept (1986)

Report of the Schweizerischen Bundesrates, describing the present situation in Switzerland and the sources of airborne pollution. Analyses the possible countermeasures for reducing emissions in Switzerland, and gives proposals for some measures to bring emissions of sulphur dioxide back to the 1950 level, and of nitrogen oxides and hydrocarbons back to that of 1960. In German, French or Italian, 103 pp. Obtainable from the Bundesamt für Umweltschutz, CH-3003 Bern, Switzerland.

Luft zum Leben (1987)

Report by four environmental organizations in Switzerland: the World Wildlife Fund Schweiz, Schweizerischer Bund für Naturschutz, Schweizerische Gesellschaft für Umweltschutz, and Verkehrs-Club der Schweiz. Comments and criticizes "Bericht Luftreinhalte-Konzept" (see above), and outlines the countermeasures considered necessary if emissions are to be reduced to acceptable levels. In German, 55 pp. Published by INFRAS, Dreikönigstrasse 51, CH-8002 Zürich, Switzerland.

Acid Rain (1987)

By Fred Pearce, one of the senior editors of *New Scientist*. Gives a detailed examination of the problem of acid rain as it applies to Europe and the British Isles in particular. The author presents the terrifying results of two decades of meticulous detective work by Europe's scientists. Now, when acid rain has become the environmental issue of the 1980s, this vital book looks at the causes of acid rain, the irrefutable — but often suppressed — evidence of the havoc it has wreaked, and the urgent steps which need to be taken now. A very important as well as a most interesting book. A Penguin Special, 162 pp. Price 3.95 pounds. Published by Penguin Books Ltd, 27 Wrights Lane, London, England W8 5TZ.

Ozone in the United Kingdom (1987)

Report by the United Kingdom Photochemical Oxidants Review Group provides an introduction to ozone as a pollutant in the lower atmosphere and presents the results of monitoring in the UK between 1971 and 1985. Describes the origins and behaviour of ozone in the UK as revealed by laboratory investigations, field studies, and theoretical calculations, as well as drawing on a bibliography of over 180 publications. Concludes among other things that the observed ozone concentrations both in rural and urban areas of the UK often attain and exceed the levels of air-quality criteria that have been established elsewhere in the world. 112 pp. Price 10 pounds. Obtainable from DOE/DTp Publications Sales Unit, Building 1, Victoria Road, South Ruislip, Middlesex, England HA4 0NZ.

Les forêts meurent aussi (1986)

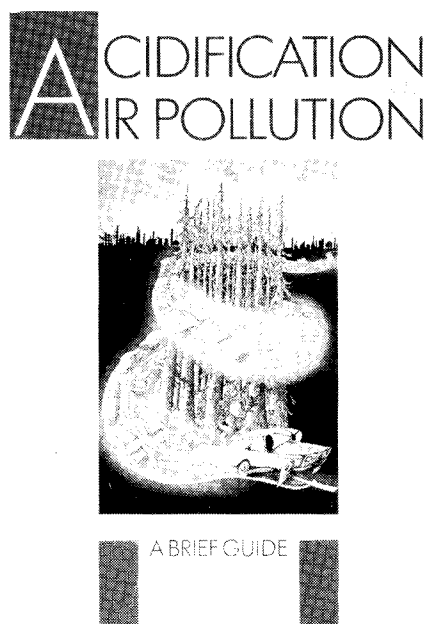
A book by C. Kempf and T. Piantanida describing the situation as regards forest damage in Europe, and especially in France, its causes and the possible countermeasures. In French, 171 pp. Price 69 francs. Published by Bueb & Reumaux, 15 rue de la Nuée-Bleue, F-670 61 Strasbourg, France.

Acidification and air pollution (1987)

This little compendium, issued by the Swedish Environmental Protection Board in conjunction with the Nordic Council, describes the mechanisms by which air becomes polluted, causing soil and water to become acidified, and damaging vegetation. Outlines the countermeasures that have been taken, as well as others that should be taken in order to save the environment. Editor: Bo Thunberg. In English, 94 pp, illustrated, with numerous charts, maps, and tables. Price 20 kronor. Obtainable from the National Environmental Protection Board, Box 1302, S-171 25 Solna, Sweden.

Gränslost miljöhot (1987)

Swedish version of the above.



Luftforurening/Skovdød (1987)

Published by Danmarks Naturfredningsforening (the Danish Society for the Conservation of Nature) this booklet gives a brief overview of the extent of forest damage in Europe and North America, as well as a thorough description of the state of the Danish forests. Also describes the symptoms of forest damage, the various mechanisms by which air pollution can damage trees, and the situation as regards air pollution in

Denmark. Emphasizes the urgency of an reduction of the emissions of pollutants. In Danish, 40 pp. Obtainable from Danmarks Naturfredningsforening, Nørregade 2, DK-1165 København K, Denmark.

Atmospheric chemistry, transport and deposition of nitrogen oxides (1987)

Report prepared for the Working Group on Nitrogen Oxides within the ECE Convention on long-range transported air pollution. Edited by P. Grennfelt. Describes the present state of knowledge as regards the chemistry, transport, chemical conversion and deposition of nitrogen oxides. 89 pp. Obtainable from the Nordic Council of Ministers, Store Strandstraede 18, DK-1255 København K, Denmark.

The Nordic Council's international conference on air pollution (1987)

Report from the conference held in Stockholm, Sweden, September 8-10 1986. Includes the speeches of parliamentary delegates, statements from NGO's, and scientific presentations as well as the subsequent discussions on: Emissions, transport, conversion and deposition of pollutants. Effects on ground water and surface water. Effects on forests and other vegetation. Effects on buildings and materials. Long term effects on humans and wildlife. Reduction of emissions. 184 pp. Obtainable from the Nordic Council, Box 19506, S-104 32 Stockholm, Sweden.

Air pollution control — Strategies and policies in the F.R.G. (1986)

By Helmut Weidner of the Wissenschaftszentrum Berlin, International Institute for Environment and Society. This book gives the most up-to-date survey of the development, current state, and unsolved problems of clean-air policy in the F.R.G. English, 139 pp. DM 22,80. Published by Edition Sigma, Rainer Bohn Verlag, Mittenwalder Strasse 48, D-1000 Berlin West 61, F.R.G.

Car-free day all over Europe

As a protest against mass-motorism and a push for a better environment, it is proposed to let Sunday September 20 be a car-free day in Europe. The idea has been put forward jointly by the Danish environmentalist organization NOAH and the Danish Cyclists' Association as an attention-catching event for the European Year of the Environment. Moral and financial support has been forthcoming from the European Community via the Danish national committee for Environment Year.

The car-free day, and the period leading up to it, should be used to bring about a discussion primarily of the role of cars in cities. It is hoped that people will, as a voluntary gesture, refrain from using their cars on that Sunday — but how many will actually do so will depend of course on how well the environmentalist organizations manage to put over their message, and make clear to people the good sense of limiting motor traffic in cities.

Suggestions for arrangements on Sunday September 20 include

- Street marathons (run for air, if not for your life)
- Bicycle tours of the city
- Street theatricals, music, and other performances
- Carnivals, jumble sales
- Guided city tours
- Ball games in public places.

The arrangers may well be other groups besides environmentalist organizations: sports clubs, housing associations, naturalists, theatre groups, and so forth. But in order for them to act, they will have to be well informed in advance of this proposal for a European car-free day.



For further information, consult any of the following organizations, from which stickers can also be ordered with French, German, Italian, and Spanish as well as Danish and English text.

NOAH
Studiestraede 24
DK-1455 Copenhagen K
Tel. 01 15 60 52

Dansk Cyklist Forbund
Kjeld Langes Gade 14
DK-1367 Copenhagen K
Tel. 01 14 42 12

Syklistenes Landsforening
Majorstuveien 20
N-0367 Oslo 3
Tel. 02 442731

AIRPLAN
P.O. Box 5627
NL-1007 AP Amsterdam
Tel. 020 851049/020 838955

Friends of the Earth
att: Andy Clarke
377 City Road
London EC1V 1NA
Tel. 01 837 0731

BUND-Jugend
Im Rheingarten 7
D-5300 Bonn 3
Tel. 02 28 469810

