

# Acid News

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



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HUNGARY

## Change is not easy

AS ELSEWHERE in central and eastern Europe, a far-reaching reform of energy and environmental policy has been announced in Hungary too. This new direction of policy will be seen primarily in a gradual introduction of the polluter-pays principle and a stage-by-stage conformation to EC environmental standards. Moreover any capital investment will have to be preceded by an assessment of the environmental impact.

Despite having undergone a marked economic recession during the last few years, with rising unemployment and a decline in industrial output, Hungary has still managed to increase its spending on environ-

mental improvement. In 1991 investments for such purposes amounted to 1.5 per cent of the gross national product, as against 1 per cent in the previous year.

Although the signs are thus encouraging, there are nevertheless some peculiar problems to be surmounted. In the first place the new environmental legislation has itself been greatly delayed. It should have been ready for presentation in 1990, but neither the Ministry for Environment nor the parliamentary committee that had been appointed to draft the necessary bills suc-

*East German Trabants (above) still swarm on the eastern and central European roads.*

ceeded in producing a proposition. In the end the Regional Environmental Center, handling environmental matters for eastern Europe generally, had to take over and employ a specialist environmental lawyer to do the work.

Another difficulty is that the Ministry for Environment and Regional Policy (as it is called) is having trouble in obtaining the collaboration of other government departments. Relations are especially poor with the Ministry of Transport (popularly known as the "autobahn ministry") and the Ministry for Industry. Insufficient allocations have also meant that the environment

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# Acid News

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

ACIDNEWS 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

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- The Swedish Anglers' National Association (Sportfiskarna)
- The Swedish Society for Nature Conservation (Naturskyddsforeningen)
- The Swedish Youth Association for Environmental Studies and Conservation (Fältbiologerna)
- World Wide Fund for Nature Sweden (Världsnaturfonden WWF)

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)
- The Norwegian Mountain Touring Association (Den Norske Turistforening)

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# First sulphur

THE CRITICAL LIMITS for acid deposition are being exceeded on 80 per cent of the forest area in Scandinavia (including Finland and Denmark as well as Sweden and Norway). According to the latest calculations for Sweden the deposition will have to be reduced by at least 70 per cent between 1990 and 2010 if the acidification of the soil is not to go on increasing.

Predominant among the acidifying substances is sulphur, and international negotiations for a reduction of the emissions have been going on for some time.

From a combination of data for emissions, depositions of sulphur, and the critical loads for different areas, various scenarios for the near future have been worked out, as a base for negotiations for a new sulphur protocol. The aim throughout is to get some way towards the point at which depositions will no longer exceed the critical loads.

The four or five scenarios on which attention has mainly focused show a total resulting reduction of emissions to be at least 60 per cent, compared with the 1980 level. In comparison with 1990 the reduction would be about 50 per cent. The cost in each case for the whole of Europe would also be about the same – the estimate being about DM30 billion per annum, or DM40 for each individual citizen.

As a result of decisions already taken, emissions should come down by 40 per cent from the 1980 levels by the year 2000, and the cost would be about half of that envisaged in the scenarios, or somewhat more than DM15 billion.

Estimates of the "ecological effectiveness" of the various scenarios have been made by mapping the extent to which critical loads will still be exceeded. Again, taking Europe as a whole, there are no great differences between the scenarios. The differences appear in comparisons between countries, both as regards the reductions of emissions that are required and the amounts by which the critical loads are being exceeded. One of the main problems to be solved in the course of the negotiations will therefore be to settle on the

"best" scenario – the one that will suit a majority of the negotiating parties. (Some of the other problems have already been described in Acid News No. 1/92, page 5.)

The current negotiations only concern sulphur, but if acidification is to be stopped, the emissions of nitrogen compounds, in the form of nitrogen oxides and ammonia, will also have to be dealt with. Solutions for these will have to be negotiated by the same group that is wrestling with sulphur, so that the longer it takes to arrive at a sulphur protocol, the longer will be the delay in reaching one for nitrogen.

It is already evident that the negotiators are for the most part aiming too low. Merely to halt the process of acidification – that is, no more than maintain the *status quo* – the depositions of acid will, as already noted, have to be reduced by at least 70 per cent, from 1990 levels. To reverse acidification will naturally require still greater reductions. And the quicker the desired rate of recovery, the faster and greater they must be.

Environmentalist organizations and others can add to the pressure on the negotiators – both as regards the extent and speed of reductions – by national effort. They should for instance turn to the authority or institution that is responsible for mapping critical loads in their country and demand information on the situation there.

Data should be available to show, for instance, which are the parts of the ecosystem where the critical limits are being exceeded, and by how much they will be exceeded in the light of the various scenarios. The next step is then to spread the information in a clear and easily comprehended manner (as exemplified, say, in the article on page 10 of this issue).

By such means public awareness of the acidification danger can be increased, and so the pressure on decision-makers. The problem is far from being solved, although it may temporarily have fallen out of sight. There is therefore all the greater need to have it brought out into the open again.

CHRISTER ÅGREN

Continued from front page

ministry is understaffed, lacking especially environmental jurists and economists.

Then again there is a question of how the environmental aspects are to enter into the process of privatization. During its first wave, which involved only light industry and small firms, the environment was not mentioned at all. No environmental accounting is required of any enterprise that is up for privatization. The Ministry for Environment has been trying for a long time to convince the State Property Agency (the Hungarian correspondent to *Treuhand* in Germany) and the Ministry of Finance of the need to give greater consideration to the environment when privatizing state enterprises.

In the view of the Ministry for Environment, assessments of the environmental impact should be obligatory in all cases of privatization, but neither the State Property Agency nor the finance ministry have been willing to accede to this demand, preferring a separate investigation for each case.

The question of who is to be responsible for past sins in the way of environmental pollution is another problem dogging privatization in Hungary. It can be especially troublesome if the new owners discover, say, toxic waste on the site after gaining possession. As a means of reducing the risk, the privatization agency has set up a guarantee fund to aid purchasers who are willing to deal with the matter themselves. But to get money from the fund, the new owners must show proof that the damage had been done before they took over.

Because they are not prepared to pay for any cleaning-up that may

turn out to be required, foreign investors are inclined to be wary of buying existing Hungarian industrial enterprises. Consequently they tend more and more to prefer "greenfield" investments – in other words, to build entirely new plant on virgin sites.

The energy sector is where par-



ticularly great changes have been made in the last few years. For one thing the Hungarian Electricity Board, the state enterprise that was responsible for the production of electricity under the socialist

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*In Hungary the debate  
is now centring on  
future energy needs*

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regime, has been turned into a public limited company bearing the name of Hungarian Power Companies. This concern provides 98 per cent of the country's power, 48 per cent of it coming from a single source, the Paks nuclear station.

For fuel, world market prices now apply – which means that domestic supplies actually cost more. Starting this year, however, the subsidies for coal producing are being reduced, and a number of mines will in consequence be closed down. The

price of electricity had already been raised in August last year by 20 per cent, bringing it to 4.5 forints per kilowatt-hour.

The government is also working on a program for diversifying energy imports. The intention is to hook up to the West European power-distribution network and the pipeline system for natural gas. One reason for doing this is that the imports of power, gas, and oil from the former Soviet Union have been steadily declining.

In Hungary the energy debate is now centring on future energy needs and the question of whether to expand capacity. In calculating the likely demand up to the year 2000, the Ministry for Industry has assumed a yearly growth in the GNP of 3-4 per cent.

It therefore wants to increase capacity in one of the following ways.

□ Enlarge the country's one nuclear plant at Paks. With its four reactors it now has a total capacity of 1760 megawatts, and it is accounted the safest plant of all in central and eastern Europe. Various French and Canadian companies in the nuclear business have declared an interest in selling their technology to Hungary.

□ Build a new lignite power plant. The Hungarian brown coal is of very poor quality, and the emissions of sulphur dioxide might be very great – although the actual levels would depend on the combustion and flue-gas-cleaning techniques that are employed.

□ Build a new power plant fired with imported hard coal.

Istvan Pomazy, director of the planning section at the environment ministry, thinks the ministry for industry has gone badly wrong in its calculations of future energy needs. He points out that in the last two years energy consumption has

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dropped by 15-20 per cent, and that in 1991 the GNP was 10 per cent lower than in the previous year. He therefore concludes that there is no need for an expansion of power-producing capacity. What is needed, he says, is an increased effort to save energy.

The industrial recession of the last few years has not only led to a reduced demand for electricity, but also to a distinct lowering of the emissions of air pollutants. This trend means that Hungary will be able to reduce its emissions of sulphur dioxide by 30 per cent by 1993, from 1980 levels, according to Laszlo Gajzago, air-quality expert at the Ministry for Environment. He adds that with nitrogen oxides back at 1987 levels, Hungary will be fulfilling its international commitments in this respect as well.

This year will also see the introduction of new standards for emissions of sulphur dioxide and nitrogen oxides from large combustion plants. These will conform to the EC directive for such plants.

The environment ministry is moreover planning to exact charges for emissions of sulphur dioxide. The size of these has not yet been decided, although 10,000 forints has been mentioned as the charge per ton. Some hold the view on the other hand that 100 forints would suffice.

Environmental charges will also be introduced for nitrogen oxides and possibly for carbon dioxide. The ministry has on the other hand no plans for setting up a system for trading in pollution credits, as has been done in Poland. A study of the possibility has however been made by a trade association of the chemical industry.

No Hungarian power plant has yet been fitted for flue-gas desulphurization, although here again the matter has been studied for three plants: Gagarin, 800 MW, lignite fired. Pecs, 229 MW, hard coal. Oroszlany, 235 MW, also hard-coal fired.

Local technology for reducing sulphur dioxide is going to be applied at Ajka (132 MW) where eight boilers



Forest in northern Hungary. Broadleaved species predominate in Hungarian woodlands, where 20 per cent of the trees were found to be more than 25-per-cent defoliated in the 1991 ECE forest survey.

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are being converted to fluidized-bed combustion. This is expected to result in a 70-per-cent reduction of emissions. The technology developed at Ajka will later be used at

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*Probably nowhere else are  
private cars such a  
source of pollution*

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other plants, such as Borsod (171 MW) and Tisza II (860 MW).

Probably nowhere else in central and eastern Europe are private cars such a source of pollution as in Hungary. Every day some 3-4 million Hungarians are exposed to air with a high level of pollutants from vehicles. The situation is worst in the capital, Budapest.

The cars generally are over-aged, the majority being Trabants made in the former German Democratic Republic – with two-stroke engines that have a particularly bad reputation for emitting great amounts of pollutants. Not even new cars have to be equipped with catalyzers. The exhaust gases of all cars are however checked in yearly tests, and the owners of cars that meet the emission standards receive a green card that must be kept with the driving licence.

Last year and environmental tax of 0.5 forint per litre was put on petrol and diesel fuel. This is less than 1 per cent of the retail price, but the revenue is to be applied for making improvements in the road-traffic sector.

Two foreign car makers have already put up plants in Hungary, the one being Suzuki which plans to turn out 15,000 vehicles a year, and the other General Motors for making Opel Astras.

**MAGNUS ANDERSSON**

Magnus Andersson is a freelance writer specializing on environmental matters and Eastern Europe in particular.

#### Sulphur dioxide emissions (000 tons)

1980	1632
1985	1404
1990	1010
1995*	1142
2000*	1094

#### NO<sub>x</sub> emissions (000 tons as NO<sub>2</sub>)

1980	273
1985	262
1990	238
1995*	280
2000*	279

\* = Projected estimates.

Source: UN ECE 1992.

# Secondary benefits from reducing emissions

THE CHEAPEST AND EASIEST way to bring about a reduction of the emissions of the greenhouse gas carbon dioxide would be to lessen the use of fossil fuels. This would have the effect of simultaneously reducing the emissions of several other harmful air pollutants. The indirect gains that could be obtained from a reduction of carbon-dioxide emissions are however seldom mentioned in the political debate on climate, despite economic calculations showing the local benefits from using less fossil fuel to be 10-20 times greater than the direct gain from moderating climate change.

If nothing is done, the amount of carbon dioxide in the air is likely to double in the course of the next fifty years. According to the Intergovernmental Panel on Climate Change, the result may be a rise in global mean temperature of something between 1.5 and 4.5 °C. The temperature rise will in turn affect precipitation, the sea level, farming, and ecosystems, to mention only the main effects.

It is naturally difficult to estimate the extent of all these effects, but in order to evaluate the benefits of a reduction of carbon-dioxide emissions, an estimate must be made of the costs associated with climate change. Those who have made the attempt have come to the conclusion that the cost of a doubling of the carbon dioxide in the atmosphere would be 1-2 per cent of the world's gross national product. In current money values that would mean between US\$7 and \$18 per ton of released carbon.

Since a lowering of carbon-dioxide emissions presupposes less use of coal, oil, and natural gas, a number of secondary benefits may be expected. There will for instance be a reduction in the emissions of sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), carbon monoxide (CO), heavy metals, and particulate matter – all of which can be seriously damaging

to health and the natural as well as the man-made environment.

The average cost of the effects as regards SO<sub>2</sub>, NO<sub>x</sub>, and particulates has been worked out by Pearce et al. for the United Kingdom. Pearce has then calculated the relationship be-

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## *Great social-economic gains from using less fossil fuel*

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tween the emissions of these substances and those of carbon dioxide from various sources. By combining the two sets of data they found that the secondary beneficial effect of lowered emissions of carbon dioxide amounted to US\$200 per ton of carbon – in other words, ten to twenty times the figure for the primary benefit. Calculating the secondary benefits for Germany, Ayres and Walter arrived at a figure of US\$20-60 per ton.

Some of the gains from a local reduction of emissions (of SO<sub>2</sub>, NO<sub>x</sub>, CO, and particulates) have also been worked out for Norway. The data have then been fed into a model that

takes into account the fact that differences in the methods employed to reduce the emissions of carbon dioxide will produce differing effects as regards other pollutants. Whereas Pearce is concerned with the average cost of local emissions, the Norwegian figures refer to the marginal cost of changes in the emissions. A recent Norwegian estimate of the effect of an international tax on carbon dioxide showed the secondary benefits of a cleaner atmosphere to be worth US\$240 per ton of carbon, or about the same as the figure arrived at for the United Kingdom.

The value of the secondary benefits for Norway are shown in the table. Included in the calculations are the following subcomponents:

**HEALTH** The calculations of the effects on health arising from emissions of SO<sub>2</sub>, NO<sub>x</sub>, CO and particulates are based on the exposure levels that exceed the WHO limits in the larger towns.

**WATER** About 10 per cent of the country's lakes and streams are acidified. The loss as computed in money terms refers primarily to the spoiling of amateur fishing, which in 1987 was estimated to be worth about 400 million kroner a year. The reduction of the recreation value is accounted between 50 and 120 mil-

**Value of the secondary benefits for reduced carbon-dioxide emissions in Norway. Marginal costs (1000 kroner 1990).**

Type of cost	Unit	Low	Medium	High
Acidification of water	Ton SO <sub>2</sub> +NO <sub>x</sub>	0.11	0.19	0.31
Acidification of forests	"	0.41	0.49	0.51
Damage to health <sup>1</sup>				
SO <sub>2</sub>	Ton SO <sub>2</sub>	59	155	259
NO <sub>x</sub>	Ton NO <sub>x</sub>	194	555	1070
CO	Ton CO	0.06	0.1	0.31
Particulates	Ton particulates	194	555	1070
Corrosion	Ton SO <sub>2</sub>	0	4.2	8.4
Traffic accidents	Ton fuel	660	1530	4370
Congestion	"	0	1640	3280
Wear on roads	"	0	2050	4090
Noise	"	440	760	1080

<sup>1</sup> In Oslo, Bergen, Trondheim, Stavanger, and Baerum.

lion kroner yearly. Since nine-tenths of the acid depositions emanate from outside the country, only ten per cent of the cost of acidified waters is fed into the model.

**FORESTS** The fall-off in forest increment ascribable to air pollution in 1988 is estimated to have been 1-2 million cubic metres, with a worth of 300-600 million kroner. Because of a gradual impairment of the ability of the soil to cope with further depositions of acid, it is assumed that the annual reduction in tree growth will increase from 10 per cent in 1988 to 20 per cent in the next 25-30 years. The loss of worth for recreation is estimated to equal that for the reduction of growth in 1988.

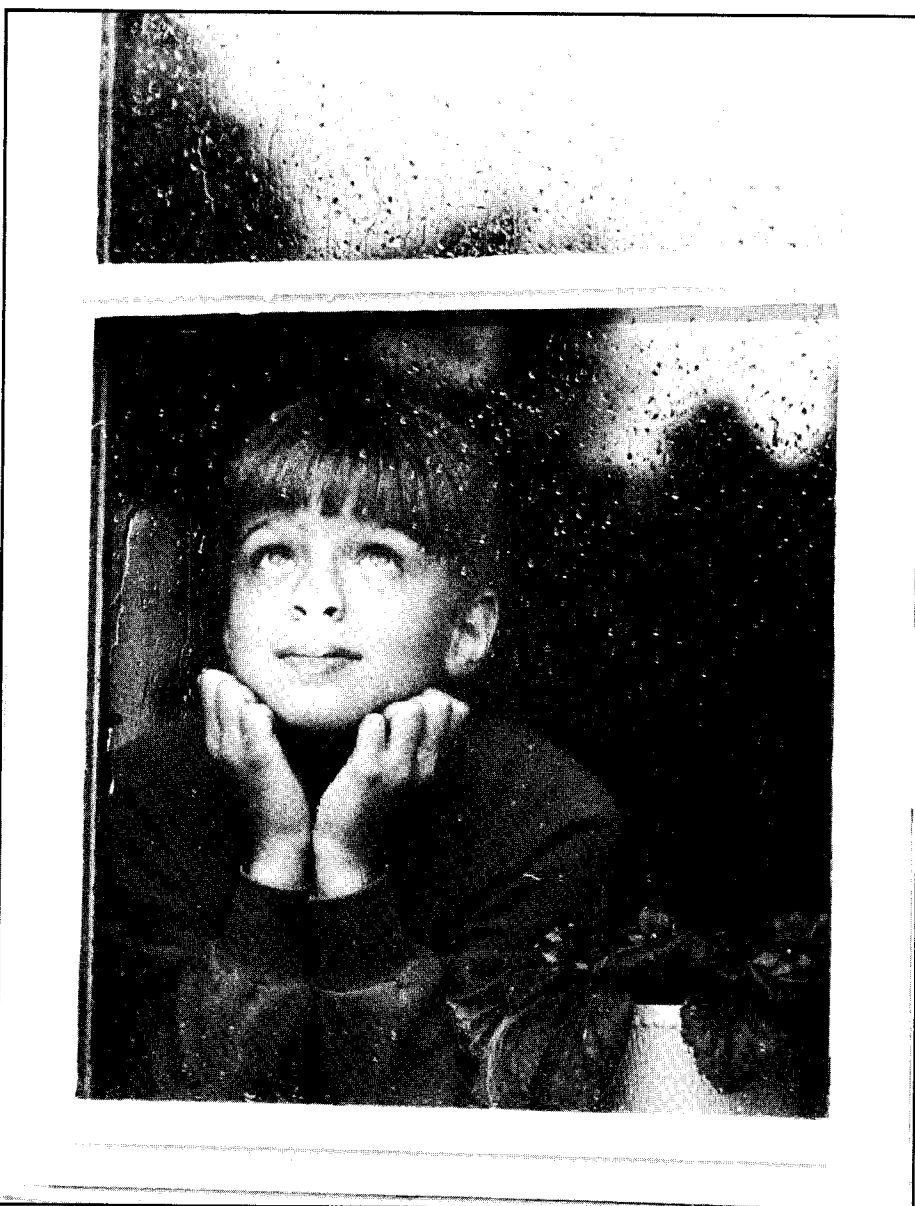
The effects for SO<sub>2</sub> and NO<sub>x</sub> are assumed to be equal. Although SO<sub>2</sub> certainly contributes more to acidification, NO<sub>x</sub> acts adversely in other ways as well, such as by helping to form low-level ozone.

**CORROSION** The only effects included in the computation are those on galvanized steel, painted steel slabs, and painted or stained wood. Such effects from local Norwegian emissions in 1985 were put at about 320 million kroner.

**TRANSPORTATION** Road traffic is accountable for considerable external costs. Apart from the great emission of air pollutants, the cost of which has already been included, there are various social-economic costs arising from wear and tear on the roads, traffic accidents, noise, and congestion. It is assumed, for the sake of simplicity, that there is a proportion between changes in the consumption of fuel (petrol and diesel) and the volume of traffic.

Lack of data has meant that some environmental costs, important though they may be, could not be included in the calculations. Among them are the effects of low-level ozone on human health, the effects of air pollutants in general on crop growth, and the corrosion of historic monuments and other cultural objects.

If the polluter-pays principle is to apply, the users of fossil fuels should defray the external costs associated with the use of such fuels. With the aid of the Norwegian computer model, the marginal environmental and other costs related to their use have now been worked out. The results show that the environmental effects of one litre of fuel give rise to a marginal environmental cost of at



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*With reduced emissions of carbon dioxide will come great secondary gains in the form of better health and a better state of the environment.*

least 2 kroner for petrol and 3.5 for diesel fuel. With the marginal traffic costs added, the overall marginal costs come to 7.13 kroner for petrol and 9.20 kroner for diesel.

It is thus evident that using less fossil fuel would produce great social-economic gains, even if all the likely effects cannot be quantified in terms of money. Whereas the benefits of a slower global warming will mostly be enjoyed by future generations, the reduction of the emis-

sions of other pollutants besides carbon dioxide will not only produce greater results, but also more immediate ones by way of less damage to health, the environment, and all kinds of structures.

PER ELVINGSON  
CHRISTER ÅGREN

Article based on the report entitled **Nytte og kostnader av klimapolitikk**, av Knut H. Alfsen och Solveig Glomsrød. Ökonomske analyser nr 7, 1992. Statistisk sentralbyrå, Norway. ISSN 0800-4110. □

## Sunny future

SOLAR AND HYDROGEN could eventually become the foundation of a new global energy economy. All the world's major population centres are near sunny and wind-rich areas. Calculations for the

United States show that one quarter of today's electricity could be supplied by developing solar generators on an area of 15,000 square kilometres – equivalent to eight per cent of the land used by the US military.

State of the World 1992. World Watch Institute.



# Curbs on cars stalled

HALTING THE RISE in carbon-dioxide emissions from road transport is essential if targets to stabilize greenhouse gas emissions are to be met. So far there appears to be little political will within Europe to ensure that the necessary measures are introduced in the short term. A European Commission commitment to prepare a proposal by the end of 1992 for controlling emissions from new cars has failed to materialize, and there are no signs that it will appear in the forthcoming months. Likewise, there are no signs of any individual countries being willing to take unilateral action on the issue.

Attempts within the European Community to define a suitable framework to encourage more fuel-efficient vehicles have floundered in the face of divergent views within national governments and the European Commission. It is generally agreed that the most effective way of reducing CO<sub>2</sub> emissions from cars is by increasing fuel price – because this affects both the type of vehicle bought and the distance travelled. However, the relatively large price hikes needed to be effective are unlikely to be politically acceptable. The US\$10 a barrel combined energy and carbon tax proposed by the European Commission will do little to road fuel prices because of the current high level of duty on fuel. In the United Kingdom, for example, it has been estimated that it will only result in a six-per-cent rise in gasoline prices over seven years. Thus, other approaches are being investigated.

The European debate on controlling CO<sub>2</sub> emissions from transportation has focused largely on technical fixes. This is because encouraging the adoption of advanced technology is perceived as politically less sensitive than seeking a reduction in demand through high fuel prices. In

addition, the focus has been almost totally on cars. As they are generally over-powered and have relatively inefficient engines compared with the direct-injection diesel engines used in

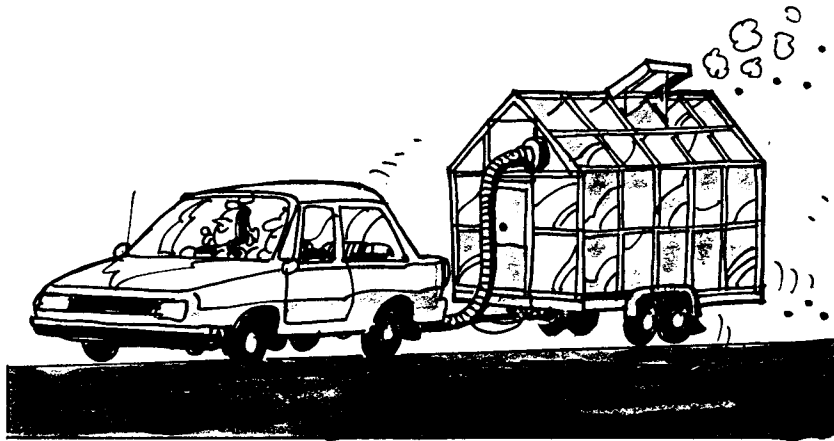
years away. Simple regulation using limit values, such as is applied to the toxic pollutants, is likely to be adopted by the Stockholm group of countries.\* However, this approach

is generally not considered to be practical for limiting carbon-dioxide emissions, especially in car-producing countries. This is due to the large range in CO<sub>2</sub> emissions, even for vehicles of the same weight. Thus this type of regulation is likely to do little more than to remove a few of the grossly inefficient models from the market.

For any regulation to be effective it must reduce emissions from the bulk of the cars, not just from a few gas guzzlers, and preferably encourage a move towards smaller vehicles. Therefore most of the proposals have included a fiscal element, and few have suggested mandatory limit values.

For the past two years the European Commission, through its Motor Vehicles Emission Group (MVEG), has been attempting to reach a compromise framework for limiting emissions of carbon dioxide from cars. At least seven different proposals – from Germany, France, Italy, UK, and the Netherlands, as well as from the European car industry's association (ACEA) and the European Environmental Bureau – have been put forward in that forum.

Britain, Germany, and the Netherlands led the way in 1991. The British proposal was based on a system of tradeable emission credits. Manufacturers whose cars exceeded the fuel-efficiency standard could earn credits. These could then be sold to those companies whose products did not meet the standard. Over time, the standard would be tightened, and so the credits would become more expensive, providing a progressively increasing incentive for improved fuel efficiency. It is



trucks and buses, there is more room for improvements with cars.

Carbon-dioxide emissions are directly proportional to the amount of fuel burnt and the type of fuel used. There is no add-on technology available. The only way to reduce emis-

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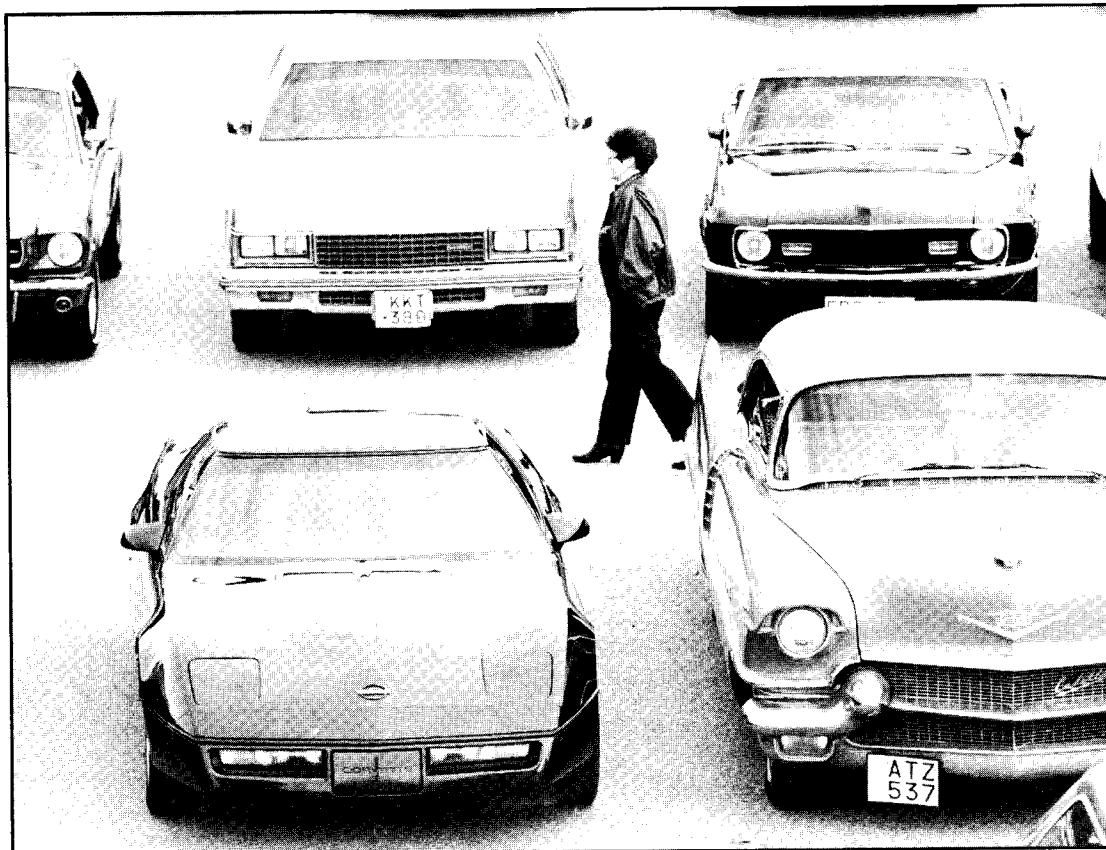
*Surplus of ideas  
put forward but  
agreements far away*

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sions is through improving fuel economy or switching fuel. In the late 1970s and early 1980s high fuel prices ensured that there was an interest in improving fuel economy amongst both the motor manufacturers and their customers. However, towards the end of the 1980s, falling fuel prices gave rise to a decline in average new-car fuel economy as buyers switched to larger and more powerful models. This trend continues today despite the acknowledged need to reduce carbon-dioxide emissions.

Over the past two years a surplus of ideas has been put forward, but agreements are still months if not

similar in many respects to the US CAFE system (corporate average fuel economy) which set a timetable for the introduction of more fuel-efficient cars from 1979 based on the average consumption of all cars from a given manufacturer (or importer). If a company failed to meet the target, it was fined US\$5 for each 0.1 mpg for each car over the CAFE target. The European Federation for Transport and Environment, an umbrella organization representing the interests of European groups working on transport issues from an environmental perspective, support the tradeable credits approach.



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*Choosing a car with good fuel economy will benefit the pocket as well as the environment. Still better to leave the car and take a walk.*

The Dutch and Germans both originally favoured a system in which carbon-dioxide emission targets would be based on the car weight or some other vehicle parameter. Friends of the Earth UK have proposed a similar scheme. One possible disadvantage of this approach is that it might encourage manufacturers to produce large cars which would have a less demanding emission target to meet. However, Friends of the Earth have sought to overcome this by proposing that emissions from small cars be reduced by 45 per cent, from medium cars by 50 per cent, and from large cars by 55 per cent by the year 2005, with the eventual aim of having just one carbon-dioxide emission limit irrespective of vehicle size, weight, or other parameter.

Early in 1992, France suggested that both fiscal and regulatory instruments should be used to address the problem. Under its scheme, all cars on the Community's market would have to meet an absolute emission limit expressed in terms of grams CO<sub>2</sub> per kilometre. In addition, each manufacturer or importer would have to comply with an average CO<sub>2</sub> emission standard. Companies exceeding this would pay a fine, while those beating it could be offered some financial benefit.

These proposals share some of the features of the UK's tradeable credits and the US CAFE schemes.

At the same time Italy tabled a proposal for a variable car purchase

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*The longer it takes  
the more intractable  
will the problem become*

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tax based directly on CO<sub>2</sub> emissions. Below a pre-defined threshold, no tax would be payable on a new car. Between this level and a ceiling value the tax rate would rise in steps exponentially. Above the ceiling value the tax rate would remain constant. In 1994, the threshold and ceiling values would be set at 100 and 400 grams of CO<sub>2</sub> per kilometre respectively.

After offering to reduce CO<sub>2</sub> emissions from new cars by 10 per cent between 1993 and 2005, the motor industry's representative, ACEA, remained noticeably quiet on the issue for a number of months as it struggled to come up with a proposal that was acceptable to the majority

of its members. In February 1992 it proposed a new system of car purchase tax, fully harmonized in all the EC member states, and based on CO<sub>2</sub> emissions, but only "if legislative requirements are deemed necessary to control CO<sub>2</sub> emissions." Under ACEA's scheme purchasers of all new cars would pay the CO<sub>2</sub> tax in direct proportion to the car's emissions, and only a car with no emission of CO<sub>2</sub> would pay no tax.

Finally, the European Environmental Bureau, working with a framework for controlling new-car CO<sub>2</sub> emissions that was initially developed on behalf of WWF UK, proposed a taxation system similar to those proposed by the car industry, the major difference being that the base is a target value that declines each year. Cars emitting less than the target value would pay no tax. Those above the target value would pay tax dependent on the purchase price of the vehicle and the actual emissions. This would result in a more steeply geared tax than under the ACEA proposal which is likely to be needed to have the desired affect on car purchasers.

In an attempt to find common ground MVEG set up a working group in the summer of 1992 to identify a





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for Environmental Studies and  
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World Wide Fund for Nature  
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## CRITICAL LOADS



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### The limits of tolerance

HOW MUCH POLLUTION can the environment take? The question is central to the debate on environmental matters, because from the answer one can see how much the emissions of pollutants will have to be reduced.

#### **Critical loads**

Various attempts have been made since the late 1970s to calculate tolerable levels for acid deposition. Such levels of exposure to pollution came later to be known as "critical loads." The following definition was coined in 1986 by an international scientific workshop on critical loads for sulphur and nitrogen: "The highest load that will not cause chemical changes leading to long-term harmful effects on the most sensitive ecological systems" (1).

If that is to be the definition, it can be said that in a strict sense a critical load is one that does not produce any effect on the most sensitive receptor even in the long term. By receptor may be meant and individual species, type of soil, ecosystem, etc.

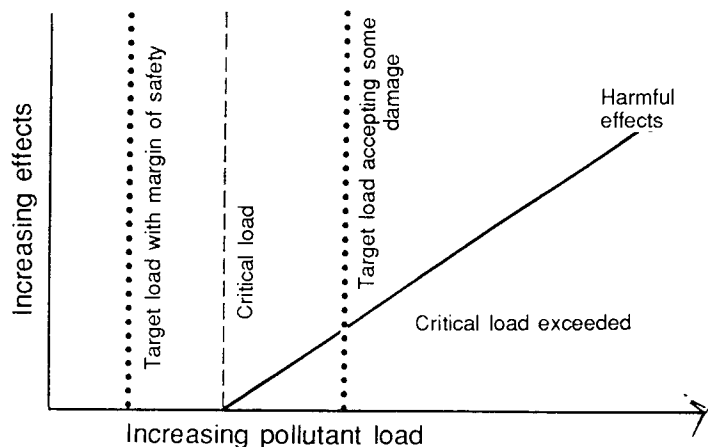
Two years later the critical-load concept was adopted in the UN ECE Convention on Long Range Transboundary Air Pollution (CLRTAP) (see

No.3 in this factsheet series). The concept will henceforth be basic to the development of international agreements concerning the limitation of emissions of air pollutants. As work within the Convention has proceeded, various other definitions of a critical load have been tried, the most usual being: "A quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge" (2). As a definition this is however less than satisfactory, since it allows too much room for interpretation.

#### **Target loads**

In political negotiations aimed at the reduction of emissions the term "target load" also appears. While determined essentially in accordance with the critical-load concept, target loads also take other aspects into consideration, such as national environmental objectives. Target loads may therefore be higher or lower than the critical loads, depending on the manner in which the situation is judged in different cases. They may be set

Figure 1. Critical loads and targets loads.



lower, for instance, in order to leave a margin of safety. This would simply be following a practice that is standard in the medical field. Target loads may on the other hand be allowed to be higher – meaning in effect a deliberate acceptance of a certain degree of environmental damage, or risk of damage (see Figure 1). When set higher, they may be regarded as interim targets, reflecting the need for a stepwise approach to reducing emissions. They should subsequently be progressively reduced to a level at or below the critical load.

**Scientific agreement**

In the spring of 1988, two major international scientific conferences were held on the subject of critical loads. One was concerned with sulphur and nitrogen deposition (3), the other with atmospheric levels of gaseous pollutants (4). There were two follow-up meetings four years later (5, 6).

The conclusions from these various meetings are set forth in the following. In considering them it should be kept in mind that the proposed critical-load figures have always tended to be set lower as research methods improve and more data becomes available. It is thus not unlikely that even today's critical loads will be revised downwards.

**Acid deposition (sulphur)**

The critical load for acid deposition will depend on the buffering ca-

capacity of the soil – on how quickly the minerals in the soil can be freed by weathering, thus enabling them to neutralize the acid.

Table 1 shows the critical loads for various types of soil, calculated a) for the total input of acid, and b) for a corresponding quantity of sulphur. A kiloequivalent of hydrogen ions per sq kilometre corresponds to 0.16 kg of sulphur per hectare. In any effort to protect a given area from acidification, the total acid input must be taken into account. The figures for sulphur, however, assume sulphur to be the only cause of acidification. Should nitrogen also be a cause, the soil will be able to tolerate less sulphur than indicated in the table. The limits will have to be lowered, too,

if other acidifying processes, such as the removal of biomass in forestry operations, also have to be taken into consideration.

As regards forest soils, the critical load for sulphur in the most sensitive areas is maximum 3 kg per hectare per year. For surface waters and ground waters the critical loads are usually determined by the sensitivity of the surrounding soils, and so are often about the same. If the deposition is higher than the critical load, the system will suffer long-term acidification. Recent mapping has shown that critical loads for acidity are now being exceeded over three-quarters of Europe (7).

In Europe the depositions of sulphur now vary greatly from region to region. Where emissions are very great, as in parts of the Czech Republic, the deposition may reach 100 kg S/ha and year, as against 20-40 kg/ha and year in much of the rest of Central Europe. Whereas in the forest areas of southern Scandinavia the depositions may amount to 20-30 kg/ha and year, in the far north they are only about 3 kg/ha and year.

**Nitrogen**

Nitrogen can cause both over-fertilization (eutrophication) and acidification of ecosystems. It is this dual effect that has made critical loads more difficult to define –

**Table 1. Critical loads of acid and sulphur in relation to the weathering capacity of forest soils**

Minerals controlling weathering	Usual parent rock	Acid input (keq H <sup>+</sup> /km <sup>2</sup> ·yr)	Sulphur deposition (kg S/ha · yr)
1. Quartz K-feldspar	Granite Quartzite	<20	<3
2. Muscovite Plagioclase Biotite (<5%)	Granite Gneiss	20-50	3-8
3. Biotite Amphibole (<5%)	Granodirite Greywakee Schist, Gabbro	50-100	8-16
4. Pyroxene Epidote Olivine (<5%)	Gabbro Basalt	100-200	16-32
5. Carbonates	Limestone	>200	>32

than it is, say, when considering sulphur alone. Furthermore, the critical loads for nitrogen will depend on several factors, including ecosystem productivity, microorganism activity in the soil, and the composition of the vegetation.

Eutrophication is a frequent occurrence, since most terrestrial and some inshore ecosystems are N-limited and thus additional nitrogen coming into the system will be quickly taken up by organisms (plants, trees, plankton) and usually stimulate their growth. This commonly leads to ecosystem imbalances, in the form of changes in nutrition, competitive relationships, and resistance to insects, fungi, and temperature/drought stresses. These changes can almost all be regarded as adverse. Excess growth from eutrophication may also mean that more nutrients/base cations may be taken up by plants and trees, thus impoverishing and acidifying the soil still further.

Acidification occurs when most of the system is saturated with excess nitrogen which can no longer be bound or retained by biological matter. In soils, this means that nitrogen in the form of nitrate ( $\text{NO}_3^-$ ) will leak from the system, taking with it nutrient (alkaline) base cations such as calcium and magnesium ( $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ), and thus acidifying the soil. Acidification may also occur in non-saturated soils during winter when the vegetation is not taking up nutrients.

The critical loads for nitrogen in terrestrial ecosystems are usually defined with reference to forest soils, with the intention of preserving ecosystem stability in the long term, or at least not reducing the vitality of forest trees. Using the simple mass-balance approach the critical load has been put between 7 and 20 kg N/ha/yr, according to whether the site is low productive or high productive. These figures are however probably too high, since they indicate the critical deposition at the nitrogen saturation level. When considering longer time periods involving several periods of forest rotation, and assuming that only stems are harvested, the critical load should be

**Table 2. Critical loads for nitrogen (kg N per hectare and year) to (semi-) natural terrestrial and wetland ecosystems.**

	Critical load	
Acid (managed) coniferous forests	15-20	*
Acid (managed) deciduous forests	<15-20	*
Calcareous forests	unknown	
Acidic (unmanaged) forests	unknown	
Lowland dry heathlands	15-20	**
Lowland wet heathlands	17-22	**
Species-rich lowland heaths/acid grasslands	7-20	*
Arctic and alpine heaths	5-15	(*)
Calcareous species-rich grassland	14-25	**
Neutral-acid species-rich grassland	20-30	*
Montane-subalpine grassland	10-15	(*)
Shallow soft-water bodies	5-10	**
Mesotrophic fens	20-35	*
Ombrotrophic bogs	5-10	*

\*\* reliable, \* quite reliable, (\*) best guess

in the range of 4-10 kg/ha/yr. For "natural" forests with no biomass removal, the critical load should be 2-5 kg/ha/yr.

Critical loads for eutrophication effects on semi-natural ecosystems are based mainly on observed changes in vegetation, such as alterations in the composition of species. As can be seen in Table 2, the critical loads are either given in ranges or expressed as a "less than" figure. This is because of the variation in sensitivity within the same type of ecosystem and/or the lack of data to enable a figure to be set for the upper limit. For several types of ecosystem, critical loads for nitrogen have still to be determined.

The total deposition of nitrogen over much of Central Europe is at present 30-40 kg N/ha/yr. Over forest land in southern Sweden it amounts to 20-30 kg/ha, and in coniferous forest in the Netherlands it may locally exceed as much as 100 kilograms.

### *Gaseous forms*

Instead of critical loads, the term critical levels is often used when speaking of gaseous pollutants. These have been defined as: "The concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as plants, ecosystems or materials, may occur, ac-

ording to present knowledge" (2).

Usually figures are given for one pollutant only. In fact however the air over Europe consists of a cocktail of substances, and it has long been known that in combination they can intensify each other's effect (so-called synergism). Thus if the synergistic effects are to be taken into consideration, the critical levels should be lower.

### *Ozone*

Crops are believed to be particularly sensitive to ozone ( $\text{O}_3$ ), but at present levels forest trees may also be damaged. At the 1988 conference (4) critical levels were agreed for the different kinds of pollutant, including ozone, the levels for which appear in Table 3.

At the 1992 workshop, a new concept for critical levels for ozone was developed (6). The formula is now to be: (x) ppb-hours above (y) ppb baseline (ppb=parts per billion; 1 ppb= $2\mu\text{g}/\text{m}^3$ ). In the course of discussion it was proposed to set the level at 300 ppb-hours above a 40 ppb baseline. These figures are still a matter of debate, however, and it has been suggested that the baseline figure would need to be as low as 20 ppb, if the earlier critical levels are to be replaced by this new concept.

Ozone is formed in the troposphere as a result of reactions be-

**Table 3. Critical levels for the protection of sensitive plants, plant communities, and ecosystems against ozone as a single pollutant.**

Exposure duration (hours)	Ozone concentration (ppb)
0.5	150
1.0	75
2.0	55
4.0	40
8.0	30
Vegetation period*	25

\* Average of 7-hour mean/day 09.00-16.00 during vegetation period.

tween nitrogen oxides and volatile organic compounds (VOCs) in the presence of sunlight. Monitoring data shows that the critical levels agreed in 1988 are being exceeded over almost the whole of Europe. For example, in the period 1985-87, the one-hour critical level of 150 micrograms per cubic metre ( $\mu\text{g}/\text{m}^3$ ) was exceeded at about 75 per cent of the measuring stations in western Europe. The eight-hour and the seasonal mean critical levels were exceeded at 100 per cent of the stations (8). Computer modelling has shown that a reduction of at least 75 per cent of the emissions of both nitrogen oxides and VOCs will be needed if critical concentrations are not to be exceeded.

### Sulphur dioxide

The atmospheric concentrations of sulphur dioxide ( $\text{SO}_2$ ) that are critical for forest ecosystems and natural vegetation are put at 15-20  $\mu\text{g}/\text{m}^3$  both as an annual mean and a half-year (October-March) mean. For agricultural crops the critical level is set at 30  $\mu\text{g}/\text{m}^3$  both for annual and half-year means. Sensitive lichens may be damaged at annual means as low as 10  $\mu\text{g}/\text{m}^3$ .

In some parts of Europe, particularly in the east and centre, these critical levels are being greatly exceeded.

### Nitrogen oxides

Nitrogen oxides ( $\text{NO}_x$ ) are generally regarded as less toxic to plants than sulphur dioxide and ozone. Because of its relatively low tox-

icity, no critical levels have been set for  $\text{NO}_x$  alone, but only in combination with  $\text{O}_3$  and  $\text{SO}_2$ , assuming that the concentrations of the two latter pollutants are each below the critical levels noted above. The aim of the critical levels defined for  $\text{NO}_x$  is to protect the structure and functioning of the plant community. The maximum annual mean for  $\text{NO}_x$  ( $\text{NO}$  and  $\text{NO}_2$  added, expressed as  $\text{NO}_2$ ) would then be 30  $\mu\text{g}/\text{m}^3$  and the peak level 95  $\mu\text{g}/\text{m}^3$  (average 4-hour exposure).

### Ammonia

Direct damage from ammonia occurs primarily in farming areas with intensive stock-keeping. The yearly, monthly, 24-hour, and hourly mean values for critical concentrations are 8, 23, 270 and 3300  $\mu\text{g}/\text{m}^3$ .

### Required reductions

A drastic reduction in emissions of air pollutants is urgently needed if the environment is not to be further damaged. In order to stop the ongoing deterioration of the environment, concentrations and depositions of air pollutants must be reduced to below the critical loads.

More than twenty European environmentalist organizations have, on the basis of up-to-date and internationally agreed scientific data on critical loads, jointly decided on the following objectives in regard to the overall emissions of air pollutants in Europe (9):

- At least a 90 per cent reduction in emissions of sulphur dioxide.
- At least a 90 per cent reduction in emissions of nitrogen oxides.
- At least a 75 per cent reduction in emissions of volatile organic compounds.
- At least a 75 per cent reduction in emissions of ammonia.
- At least a 75 per cent reduction in the concentrations of tropospheric ozone, to be achieved by meeting the objectives for  $\text{NO}_x$  and VOCs, as above.

The reductions are based on the emission levels in the early 1980s and refer to western and eastern Europe, including the European part of Russia.

These are minimum demands, but they do not necessarily imply

that every country or region must achieve equal reductions. In areas with very high emissions, greater reductions will be necessary, while in some other areas the needed reductions may be lower.

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single measure that might be acceptable to all member states. In November the group concluded that the most cost-effective way to reduce CO<sub>2</sub> emissions is via market forces. It argued that if there are constraints on the use of much higher fuel prices, the best complementary measure would be the introduction of charges/credits to influence the relative price of cars. This would act as a strong signal to both the motor industry and consumers. Any such fiscal instrument must ensure that higher CO<sub>2</sub> emitting vehicles always pay a higher charge than lower-emitting vehicles. This is to prevent manufacturers from increasing vehicle weight, size etc., to meet a higher CO<sub>2</sub> target value.

In essence the group proposed a revenue-neutral CO<sub>2</sub> charge/credit system based on two components, one reflecting "technology" and the other based on vehicle size. In addition to encouraging technological improvement, the charge/credit system is predicted to encourage a shift to smaller vehicles. The combined effect is expected to improve the fuel economy of new cars by 40 per cent between 1993 and 2005.

At the December MVEG meeting it became apparent that neither member states nor the Commission would accept this proposal. A number of delegations appeared to be returning to their original proposals. Until the various interests within the Commission come to a common position no progress is likely within the European Community on this issue. At the beginning of 1993 new Commissioners are appointed, and a number of senior staff posts reshuffled. Nothing is likely to happen until the dust has settled on the changeover. Meanwhile emissions continue unabated, and car manufacturers are having to delay finalizing their product plans. The longer it takes to reach a common position the more intractable the problem will become.

CLAIRE HOLMAN

Environmental consultant specializing on policies to reduce the environmental effects of the transport sector.

\* Stockholm group: All the EFTA countries, plus Denmark and Canada, with Germany and the Netherlands as observers.

EC WHITE PAPER

## Illusion of policy

CARBON DIOXIDE EMISSIONS from vehicles will continue to rise in the European Community until the end of the century, even though the Community's target is to maintain emissions at 1990 levels by the year 2000.

The forecast is included in the Community's White Paper on transport policy,\* which was published on December 2, 1992.

When the Council of Ministers met in Brussels at the end of May it agreed to hold down carbon-dioxide emissions at 1990 levels. However, in its business-as-usual scenario, the White Paper says: "On current trends carbon dioxide emissions from the transport sector will rise by some 24 per cent between 1990 and 2000." It adds that by 2010 road transport will be producing 30 per cent of the Community's CO<sub>2</sub> emissions.

The White Paper says technical measures designed to improve fuel efficiency will not, on their own, stabilize CO<sub>2</sub> emissions. "Calculations ... show that even with a 40 per cent increase in fuel efficiency of passenger cars by the year 2005, stabilization of CO<sub>2</sub> would not be achieved by 2010." It adds that "energy efficiency improvements will not be sufficient to compensate for the projected growth."

The White Paper also says that the number of cars could be controlled by introducing "a progressive environmental charge on the annual mileage of private cars." It then introduces the concept of subsidiarity. "These measures are not primarily the Community's responsibility."

The proposals in the Green Paper published last spring have been sig-

nificantly watered down in the White Paper. The Green Paper argued for a sustainable transport policy, which would include encouraging public transport instead of private cars (see Acid News 2/92, p.4).

In the White Paper this clear commitment is replaced by much vaguer phrasing: "Promotion of collective transport is a vital component of efforts to integrate environmental objectives into transport policy."

In a press release the European Federation for Transport and Environment (T&E) criticised the White Paper for recognizing the environmental problem, but in general totally failing to draw logical conclusions from its own evidence.

Arie Bleijenbergh, the T&E vice president, said: "The White paper says we will not meet even our modest environmental targets, and it says we need to make each mode of transport pay its full costs - but it stops there."

"The Common Transport Policy is to a large extent only paying lip service to the environment. Moreover, the European Commission misuses the word "sustainable," and it is offering the citizens of Europe only the illusion of a policy on transport and the environment," he added in his comment in T&E Bulletin.

Sources: **New Scientist**, January 2, 1992, **T&E Bulletin** No. 14, December 1992.

\* **A global approach to the construction of a Community framework for sustainable mobility.** COM (92) 494.

T&E has published a briefing document of its own, summarizing the White Paper. Copies can be obtained from the T&E Secretariat, Rue de la Victoire 26, B-1060 Brussels, Belgium.

## Charge on the autobahn

THIS YEAR trucks using the motorways in Germany will have to pay a charge, and next year it will be the turn for passenger cars. This was recently announced by the Minister of Transport Krause after negotiation with counterparts in the other

EC countries.

The minister also stated that Germany would be increasing the tax on petrol and diesel fuel without waiting for an EC directive for a general tax on carbon dioxide.

The German budgetary deficit is not the only reason for these moves. They are also part of an attempt to bring about a transfer of traffic from the roads to the railways.

Source: **Ny Teknik**, November 5, 1992.

# Special sites hit by acid rain

ALMOST 25 PER CENT of the area of those parts of Britain which have been designated as Sites of Special Scientific Interest (SSSIs) has been damaged by acid deposition, according to a report by English Nature.\* The study warns that existing official plans to curb emissions are inadequate to prevent continued acidification.

The study has identified 141 SSSIs throughout Britain in which freshwater habitats have probably suffered acidification damage. Although these represent only 2.5 per cent of Britain's 5,749 SSSIs, the proportion of the SSSI area affected is much larger, being 24.1 per cent. This is because the largest SSSIs are in upland areas which are the worst hit by acid deposition.

The areas affected by freshwater acidification are concentrated in the uplands of Wales, Dartmoor, northern England and parts of Scotland, with some damage in high ground in the south of England (see map).

Wales is suffering the most severe damage, with 55 per cent of the SSSI area in north Wales affected. According to the report, this reflects the "relative proximity of sulphur emission sources in the Midlands combined with a large percentage of high altitude upland habitat with poor geology and soils." The uplands of central Wales are also seriously affected. No sites in south Wales could be considered, on account of a lack of data.

Air pollution constitutes a general threat to flora and fauna in Britain. Dr Andrew Farmer, English Nature's atmospheric pollution specialist, says: "From previous work we know that acid rain can cause local extinctions of rare species, such as the natterjack toad from southern England. Many water plants cannot survive in acidified pools and streams, and dippers and otters are also less likely to be

found there. However, this study is the first to show just how much of the national resource of a particular type of wildlife habitat has been af-

Combustion Plants Directive (1988), sulphur emissions from existing large combustion plants in Britain are to be cut by 60 per cent by 2003 (from 1980 levels). Such sources presently account for over 80 per cent of the total emissions of SO<sub>2</sub> in the United Kingdom. "Many of the SSSIs already damaged by acid rain will continue even then to be affected by power-station emissions. The Directive is therefore not sufficient to safeguard wildlife," claims Dr Farmer.

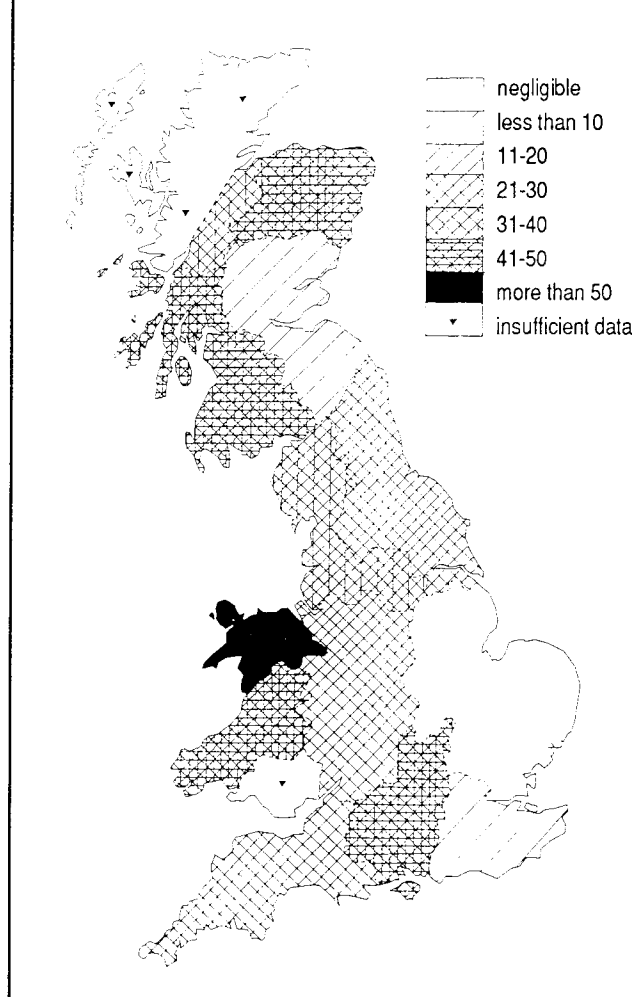
A further recommendation of the English Nature report is that afforestation should not be carried out in areas suffering from acidification. Although liming might in certain cases be successful in improving fisheries, the ecological consequences could be severe. Liming (particularly hydrological source-area liming) on SSSIs should therefore be strongly discouraged.

Dr Farmer also cautions: "Water bodies affected by acidification can be rehabilitated. But even then they may never recover the diversity of wildlife they once harboured. Over the next two years, commitment must be sought through the forthcoming negotiations within Europe

to secure adequate protection for threatened habitats that are of interest for nature conservation."

PER ELVINGSON

Area of SSSI affected by acidification expressed as a percentage of total SSSI area within each region.



affected by acid rain. English Nature is now looking at acid rain's effects on other biological SSSIs."

The Department of Environment has recently published critical-load maps showing how much acid deposition the ecosystems in Britain can tolerate without becoming damaged. They show that in order to safeguard aquatic and riparian species over a large area of upland Britain, the depositions will have to be markedly reduced.

The greater part (about 85 per cent) of the sulphur that falls down over Britain comes from within the country itself. Under the EC Large

\* **Freshwater acidification of SSSIs in Great Britain.** Study carried out by Dr Carrie Rimes. Obtainable from Department EN11, English Nature, Northminster House, Peterborough, England PE1 1UA. £6 for overview, £12 for English results.

English Nature is the statutory advisor to Government on nature conservation in England and promotes the conservation of England's wildlife and natural features.



# New EC directive sets thresholds

THE OFFICIAL TEXT of a new EC directive on air pollution by ozone was published in October.\* Unlike three earlier directives on smoke, sulphur dioxide, lead, and nitrogen dioxide, it does not set binding air quality standards. Instead, member states will have to establish ozone monitoring networks and ensure that the public are informed when two out of four ozone threshold concentrations are exceeded.

The reasons why no air-quality standards have been set is that existing international guidelines on the protection of health and vegetation from damage by ozone are breached with great regularity throughout the Community, and emissions of the precursor pollutants that contribute to the formation of ozone when exposed to sunlight – volatile organic compounds (VOCs) and nitrogen oxides – will not be reduced to any significant extent until the end of the century. Better information is also needed on the formation and transboundary transport of ozone and its precursors, especially in southern EC countries where the problem is most severe.

The directive obligates member states to establish a network of ozone-monitoring stations in accordance with criteria specified in an annex. The measurements will have to be carried out by means of a reference method, or any other method which is shown to give equivalent results. The directive includes four ozone thresholds:

	$\mu\text{g}/\text{m}^3$
Health protection	110 (8-hour mean)
Vegetation protection	200 (1-hour mean)
	65 (24-hour mean)
Population information	180 (1-hour mean)
Population warning	360 (1-hour mean)

Action to inform the public will have to be taken when the last two thresholds are exceeded. Special information will have to be disseminated "on a sufficiently large scale

as soon as possible to enable the population concerned to take all appropriate preventive protective action." The information to be imparted includes the population and area affected, a forecast of whether ozone levels are likely to increase, remain stable, or decrease, as well as health precautions.

*Some laws on precursors already adopted, others are likely to follow*

Exceedances of all four threshold values, as well as other details of the measurements made by the national monitoring networks, will be reportable to the Commission from the beginning of 1995.

The Commission is obliged to evaluate the information collected at least once a year and to submit its findings to member states. A series of consultations will also be organized by the Commission to consider trends in ozone levels, transboundary ozone-pollution episodes, and national programs to curb ozone pollution.

The directive says nothing about any further legislative proposal on ozone pollution. However, some Community laws on ozone precursors have already been adopted, and others are likely to follow. Already adopted are directives on emissions of VOCs and  $\text{NO}_x$  from vehicles and of  $\text{NO}_x$  from large combustion plants. A recent proposal to curb emissions of VOCs from the petrol-storage and distribution chain is due to be followed shortly by another on VOC emissions from vehicle fuelling operations. And a directive on solvent emissions from several industrial sectors is likely to be proposed next year. However, these are unlikely to be the end of the matter.

Meanwhile, member states must bring the ozone directive into force by February 21, 1994.

Source: **ENDS Report**, No. 213, October 1992.

\* Directive 92/72. Official Journal of the European Communities.

## Publications

### Climate change: Designing a practical tax system (1992)

Contains the technical papers discussed at a workshop organized by the OECD. It draws on actual experiences in designing tax systems to address the global warming problem, and reviews the key design problems likely to be encountered in expanding their use in this field.

272 pp. £22.00. Obtainable from national OECD publications distributors or from the OECD publications service, 2 rue André Pascal, F-75775 Paris Cedex 16, France.

(A second volume, **Climate change: designing a tradeable permit system**, has also been published by the OECD.)

### Market and government failures in environmental management: the case of transport (1992)

Although transport is one of the most regulated sectors in any economy, government intervention often fails to take into account the environmental dimension. This study analyses and documents government intervention in the form of pricing, taxation, and regulations which often result in environmental degradation. It also proposes ways to correct the failures of intervention.

90 pp. £14.00. Can be ordered from the OECD, as above.

### Critical loads for nitrogen (1992)

Ed. P. Grennfelt and E. Thörnelöf. Report from a workshop arranged in April 1992 by the Nordic Council of Ministers in collaboration with the Convention on Long Range Transboundary Air Pollution. The purpose of the meeting was to evaluate present concepts and propose new concepts for the determination of critical loads for nitrogen. The report contains background papers as well as the outcome of the workshop.

428 pp. Published by the Nordic Council of Ministers (Nord 1992:41). Can be ordered from Allmänna förlaget, S-106 47 Stockholm, Sweden.

### The effectiveness of international environmental agreements (1992)

A UN survey of existing legal instruments, edited by Peter H. Sand. The adoption of Agenda 21 at the Rio Conference was preceded by an intensive debate on the adequacy and effectiveness of the existing international legal mechanisms. This report is the result of a survey of 124 multilateral environmental instruments, related bilateral agreements, and their interface with relevant trade and development regimes.

548 pp. £40.00. Published by Grotius Publications Limited, P.O. Box 115, Cambridge, England CB3 9BP.

## Television

ELEVEN OF THE TWELVE member states of the European Community are prepared to back a plan costing ECU 850 million to kick-start the development of high-definition television (HDTV). The aim is to support the EC electronics industry in the face of Japanese and North American competition.

But it seems no one has given a thought to the environmental aspects. An HDTV set uses about four times as much current as an ordinary one. If the technology should come to dominate the market it could cancel out the benefits of the Community's energy-efficiency program. The environmental group Euronatur points out that 500 million HDTV sets could be in use worldwide by the year 2010 – which would mean an increase in electricity consumption of 164 TWh a year.

There is a striking contrast in EC priorities. The Community's SAVE and ALTENER programs, designed to encourage renewable energy forms and energy efficiency, will each receive only ECU 40 million over the next few years.

At a meeting on December 15 the EC Telecommunications Ministers failed in any case to reach agreement on a plan of action for the HDTV proposal. Although only the United Kingdom was opposed, it would have required unanimity to proceed with it.

Sources: **ENDS Report** No. 215, December 1992, **New Scientist**, December 12, 1992.

## Computers

THE AMERICAN electronics firm Intel is to apply energy-saving technique in its microprocessors. When the computers are not in use, but are still plugged in, they will fall into a state of "repose," and only consume about 30 watts instead of a normal several hundred watts.

According to the US Environmental Protection Agency, the saving in power cost engendered by this new technology could be about \$1 billion in the United States. And it is said that it will not add to the cost of the computers.

Source: **Ny Teknik**, No. 42, 1992.

# Cooperating for reconstruction

*Last November, at the Vienna Conference on the Ecological Reconstruction of Central and Eastern Europe, delegates from more than 150 environmentalist groups in eastern and western Europe met to discuss ways of influencing political and financial decision-making for the region. Arranged by the Austrian environmentalist organization Global 2000 conjointly with Greenway and Friends of the Earth European Coordination, the conference resulted in a plan of action in respect of ecological reconstruction. Here follow some of the principal policy statements and action programs that were the outcome – concerning the activities of the multinational development banks, trends in transportation, and energy policies in central and eastern Europe.*

## Role of the development banks

IMPORTANT SOURCES OF FUNDS for the countries of eastern and central Europe are the multinational development banks. So far however their lending has not been combined with any proper environmental assessments and they have failed either to give adequate information to the peoples of these countries or to make provision for public participation.

The European Investment Bank (EIB) has for instance lent over \$500 million in the region, but without publishing any environmental procedures. In 1991 the World Bank approved more than half of its loans in these parts, a sum of \$2000, without requiring any assessments of the environmental impact prior to approval. The European Bank for Reconstruction and Development (EBRD) has yet to commission a full environmental impact assessment for any projects.

Other multinational development banks making loans to east-central Europe are the International Finance Corporation (IFC), and Nordic Investment Bank.

The failure of these banks to make environmental assessments has meant that they have in fact been supporting some environmentally damaging activity. They have for instance backed the development of energy supply rather than supporting measures for the conservation and more cost-effective manage-

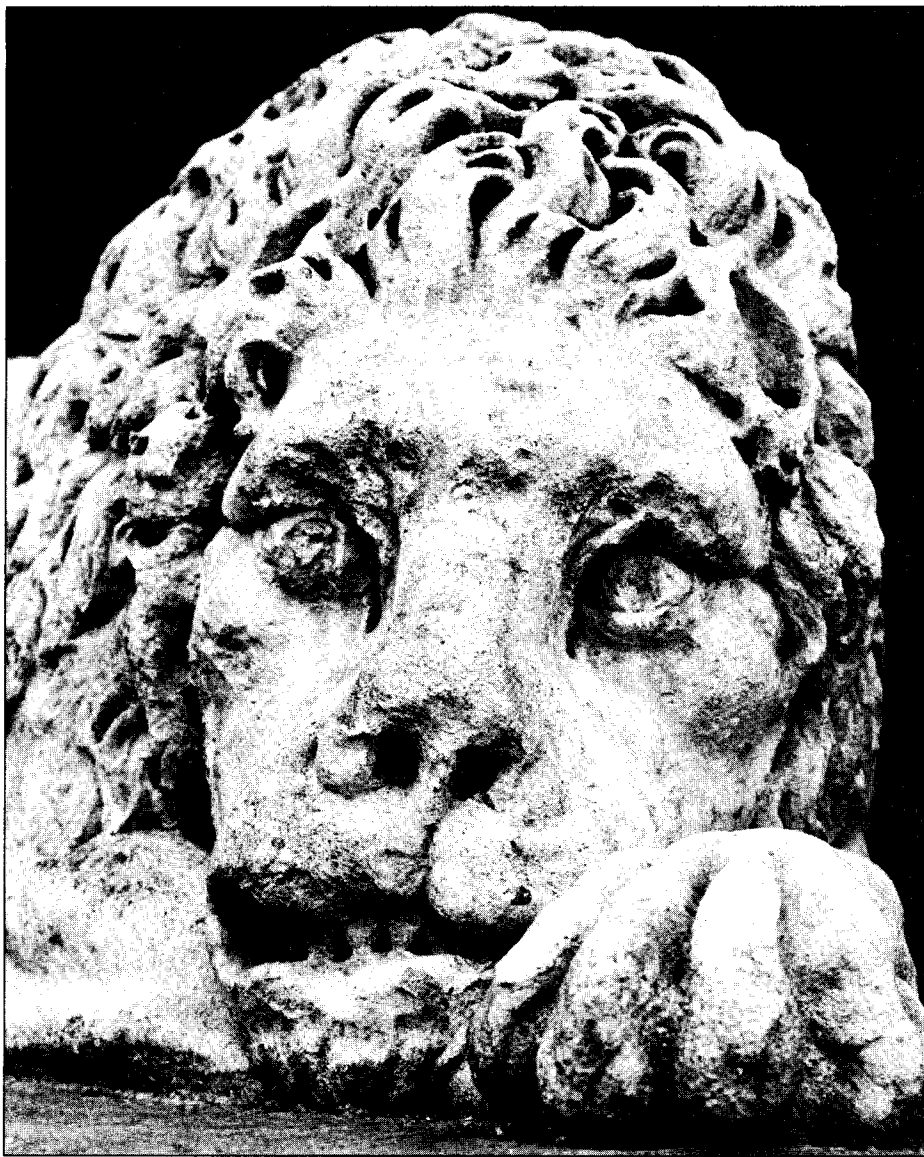
ment of energy. They have also favoured private car purchasing over and above the financing of public transport facilities.

All of these banks are internationally accountable. In view of their importance in the reconstruction of east-central Europe, it is essential that they should be made to incorporate environmental factors in their decision-making and become more open in their relations with the peoples of eastern and central Europe.

### The onus on the banks

- The development banks must make a full assessment of the environmental effects in all cases of loans currently classed as A or B. The effects of technologies and products so financed must be assessed for the whole of their life-cycle.
- The procedures for loan appraisal must rest on robust indicators of sustainable development instead of traditional measurements of growth such as gross national product.
- Priority should be given to loans with high external benefits such as energy conservation, public instead of private transportation, and clean technologies.
- The banks must respect the public right to the environmental information relevant to the loan decisions.

Furthermore, loans to the private sector should be accompanied by the following conditions: Formal and open public involvement in the initial environmental assessment; an annual, publicly available environmental audit; the systematic release



of site-specific and disaggregated emissions data (which should, as a minimum, be as comprehensive as the US Toxic Release Inventory); conformation of operations at least to EC environmental standards.

Development banking loans must include provisions ensuring: Compliance with the US Pelosi Amendment; provision of systematic and open public access to information and involvement in decision-making from the start of the project: public disclosure of the final report on project assessment before approval by the bank's board of governors.

### ... and what NGOs must do

Both eastern and western NGOs have so far concentrated their efforts on influencing the EBRD, and four international seminars on the development of its operations have been arranged by Friends of the Earth's European Coordination, the last taking place in Warsaw in March

1992, with the participation of twenty-three groups from twelve central and eastern European countries.

There have been two reasons for this. In the first place EBRD is a new bank, and so NGOs had a chance to influence its direction. Then it is, unlike other MDBs, mandated to promote environmentally sound development.

Pressure has mainly been directed at the bank's staff, and with some success, although most of the NGOs' major criticisms and concerns remain at issue.

This sort of pressure will continue, as will the approach through the bank's Environmental Advisory Council.

The NGOs must however look beyond the EBRD and also focus effort on the World Bank Group – mainly the International Bank for Reconstruction and Development (IBRD), the International Finance Corporation, and the European Investment

Bank (EIB). All of these are significantly engaged in central and eastern Europe. It was agreed at the Vienna conference that:

□ Public access to information and participation in discussions were key issues in the public relations of the international development banks. Although there are documents on environmental procedures, these are being withheld. The NGOs agreed to carry out research on the banks and submit their findings to Friends of the Earth in London for coordination and compilation. The main object will be to gather information on specific lending projects in central and eastern Europe. Western NGOs will aid in this by approaching the banks at their headquarters and handing on information to NGOs in the east.

The results will be compiled in a document for use in lobbying the banks in regard to their record on public access.

□ Greenpeace International also agreed to collaborate with eastern and central European NGOs in matters concerning EBRD funding of nuclear power projects.

## Trends in transportation

THERE IS AN EVIDENT RISK of the countries of eastern and central Europe going the same way as the West in respect of transportation, and ending up by having to grapple with the very problems that the West is already having to face. There is a strong trend in these countries towards an increasing ownership and use of cars for passenger transport, as well as towards freight carrying by road. Such traffic developments are also finding strong financial backing, as is the concomitant building of motorways. Too little attention is being given to the possibilities of public transportation systems, while the inevitable increase in environmental damage tends to be ignored. But the opportunity needs to be taken now, before it is too late, to develop a general system of transportation that will be environmentally and socially acceptable.

The influence of western business in the development of transpor-

tation in eastern and central Europe is already strong. Car makers such as GM, Fiat, and Volkswagen, for instance, are either planning or have already set up plants in Poland, what was Czechoslovakia, and Hungary. They are also advertising heavily to create a further demand for cars and trucks. Western companies are moreover promoting freight routes with cheap rates that take no account of the environmental and social costs.

Austrian and German construction companies and financial institutions are already involved in motorway projects in Hungary, Poland, and the former Czechoslovakia. As a result of a lobbying by the European Table of Industrialists (ERT) and the International Road

Federation (IRF), the EC Commission is moreover planning a TransEuropean Network of motorways to link central Europe with the eastern and southern periphery. With 12,000 kilometres of new motorways it would fundamentally change the region's infrastructure and transport system.

Eastern governmental action is also contributing to the trend. Well functioning urban public transport systems are being laid down, as are even small connecting services in rural areas. This only increases the demand for private cars.

**What governments need to do**

International political, financial, and technical support is needed to im-

prove public transport systems. A clear priority should be given to modernization of the railways. Until a proper rail network has been completed, western financial support for motorway projects should be cancelled.

In general no international financial support should be given to motorways or other traffic-inducing projects in central and eastern Europe.

As regards freight carrying, governments should ensure a modal split that will be to the advantage of the railways. Strong action should be taken to avoid the development of transportation patterns like those that have grown up in western Europe.

Governments should require an environmental impact assessment of all major road or traffic-inducing

**NGO statement on energy policy in CEE**

We call upon the governments of East and West to seize the opportunity for innovation in energy policy development offered by the period of transition in economic and political systems in Central and Eastern Europe. Such innovation would address the serious economic, environmental and social problems in this region, avoid the mistakes of other industrialized countries, and contribute to global sustainable development.

Detailed analysis of energy policies by environmental organizations from Central and Eastern Europe has established that:

- The highly inefficient production and use of energy in this region imposes unnecessary costs on the economy and adds to the significant damage and risks to the environment and human resources such as: acid rain, the accumulation of dangerous wastes, the risk of nuclear accident and the threat of global warming.
- Through innovation in the development of energy policy, the demand for energy services can be met while cutting energy sector costs, improving social conditions, and reducing the production of energy-related environmental pollutants.
- Improvements in the efficiency of end-use, distribution and supply of en-

ergy represent the most appropriate policy options for our countries. These options are found to be substantially cheaper and cleaner than the provision of more energy supply.

The hidden long-term economic costs of environmental damage from the use of fossil fuels and nuclear power highlight the need to develop the use of renewable energy sources.

Decentralized energy planning involving public interest groups and non-governmental organizations offers the most appropriate mechanism for energy policy development.

Such energy policies can also increase the energy security of our countries by reducing reliance on important fuels and electricity. In addition, the establishment of national production capacity for energy efficient and renewable energy technologies can offer long-term economic and social stability.

We conclude from this analysis that:

**A. Governments and utilities in Central and Eastern Europe should:**

- develop and implement economic concepts that favour environmentally sound forms of production that minimize use of energy;
- recognize the merits of broad public participation in energy debates and the potential of environmental groups in bringing forward constructive solutions;
- recognize that apart from the direct environmental effects in their own region, the wasteful energy sector in this region is a major contributor to the problem of climate change;
- examine both supply-side and demand-side options for meeting demand for energy services and introduce policies to favour those options which offer the lowest environmental and economic cost;
- recognize the unacceptable costs and

dangers imposed by nuclear power, the negative experience to date of most countries with nuclear power programs and the significant costs of clean up to be met in the future and start closing down nuclear reactors immediately;

encourage the use of renewable energy sources and development of new energy efficiency possibilities;

actively seek cooperation with other governments to exchange information about successful strategies, to solve energy problems with an international dimension in an environmentally sound way and to have more strength in negotiations with western governments, institutions and companies that want to push the region in an opposite way.

Through the actions outlined here, the countries of Eastern and Central Europe could set a leading example for the rest of the world in the necessary transition towards an environmentally sustainable future.

**B. The governments of the OECD-countries, the international financial institutions (EBRD, World Bank, IMF), and the European Commission (e.g. PHARE and TACIS programs) should:**

- give priority to projects which focus on improving energy efficiency within both the energy and industrial sectors and undertake consultation with NGOs of the region to establish environmental priorities;
- make assessments of the energetical and environmental implications of aid, investments and support to activities of the private sector in this region obligatory and positive results as a prerequisite for approval;
- actively support with grants and technical assistance rapid closing down decisions of eastern governments;
- contribute to a 10 billion dollar soft

projects, as well as proving the need for the project and its general concept. All the relevant NGOs should be allowed participation in the assessments;

Governments should impose strict limits on east-west transit traffic by truck;

In awarding contracts, preference should be given to business enterprises with a record for the construction of public transport and railway systems rather than to road-building and automotive firms.

### ... and the NGOs

There is a need for the NGOs to have a voice in matters concerning transportation. To this end, a formal working group, consisting of NGOs

both from east-central and western Europe, is to be set up for exchange of information, for pressuring governments as well as international political and business organizations, for developing strategies to promote public transport, and carrying out campaigns. While discussions are proceeding concerning details of the composition and activities of the working group, the following ideas have emerged.

**ROAD TRANSPORTATION** The aim should be to expose the real costs. Figures should be published to show the effects of road traffic on human health, and studies undertaken of its effects on natural ecosystems. Days of action against heavy trucks might also be arranged.

**RAIL** This mode should be pro-

moted by all means possible, as for example be pressure on the World Bank and the Bank of Reconstruction and Development.

A letter is to be drafted by the Clean Air Action Group and circulated for signature. Also needed are studies to avoid road transporting and to shift traffic to predominantly tracked systems, with the inclusion of the relative costs.

**SOCIALLY SUSTAINABLE POLICY** An appropriate transport policy should also take into consideration ways of maintaining the mobility of adult non-car users as well as children and old people. The effects of the traffic infrastructure on health and the physical environment, as well as the social costs, must all be taken into account.

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loans program to accelerate increase of energy efficiency and introduction of clean energy production.

### Specific energy policy recommendations

The following elements should feature in the energy policies of all countries, though country-specific details will alter the priorities and emphasis given to each.

#### GENERAL RECOMMENDATIONS

Decentralization of the energy industry, which will lead towards decentralized energy planning;

All new investments should be based on least-cost planning techniques.

#### ENERGY EFFICIENCY

Governments should establish the fiscal, institutional and legislative framework to encourage energy efficiency and discourage energy wastage. Such a comprehensive framework would include:

the provision of financial incentives for energy efficiency measures;

the introduction of energy utility regulations to promote energy efficiency ahead of energy supply;

the setting of rigorous energy efficiency standards for buildings, vehicles, appliances, lighting, and industrial processes and the introduction of regulation for labelling to inform the public;

the development of energy pricing policies to encourage energy efficiency and reflect environmental costs of energy sources, taking into consideration the socio-economic impacts;

the establishment of public education programs on energy efficiency and specialized education and training programs for industry and utility staff;

the encouragement of technical innovation and demonstration through government support and procurement policies;

the encouragement of co-generation and other more efficient energy supply-side technologies when replacing or reconstructing energy supply systems;

a move towards decentralized energy planning.

#### RENEWABLES

Governments should assess the renewable energy potential for our countries, taking into account the distinct environmental advantages offered by decentralized renewable energy technologies over fossil fuel and nuclear power technologies.

They should support research and demonstration projects for renewables as a long term strategy.

And establish appropriate regulation and incentives for the development of renewable energy sources.

#### NUCLEAR POWER

A moratorium should be imposed on the construction of nuclear power stations.

A comprehensive program should be urgently developed for the decommissioning of existing nuclear power plants and clean up of nuclear sites (including radioactive waste dumps, reprocessing facilities, test sites and uranium mines).

All existing nuclear power plants in Central and Eastern Europe should be closed, starting with the most dangerous types immediately:

- All 15 RBMK reactors in CIS and Lithuania
- All 10 VVER 440/230 reactors in the Commonwealth of Independent States.

- Kosloduy 1, 2, 3 and 4 (Bulgaria)

- All nuclear reactors in CSFR

- Paks 1 and 2 in Hungary and the remaining reactors within two years.

The costs of any improvements in nuclear reactor safety should be compared with the cost of displacing the need for the reactor through improved energy efficiency and the development of renewable energy sources.

The conclusions of the report of the International Atomic Agency on the Chernobyl Project should be questioned and fully independent long-term studies of the health effects of low level radiation exposure be established.

#### INVOLVEMENT & ACCESS TO INFORMATION

Accurate data on the costs, safety and environmental impacts of energy production and the potential for energy efficiency improvements and renewable energy sources should be accessible to the public.

The development of energy policies should involve public interest groups and non-governmental organizations at local, regional and national levels.

To reflect the need for better co-operation, information and skills exchange on energy issues at governmental and non-governmental levels in Central and Eastern Europe, NGOs of the region have agreed to establish a formal energy policy network as a part of Greenway.

This statement was first prepared by the Greenway/Friends of the Earth Energy Conference in Celakovice, Czechoslovakia in June 1991 and updated at the Vienna Conference in October 1992. It is supported by a broad coalition of environmental NGOs in Central and Eastern Europe.

# European attitudes

INDUSTRY ENJOYS the least credibility in matters concerning the environment, according to a recent poll\* carried out on behalf of the European Commission. Of the sample of 13,000 citizens of the twelve EC countries, only 4 per cent thought the statements of industrialists could be relied upon, while 63 per cent said they believed in environmentalist organizations.

Of particular interest is the fact that 72 per cent of those interviewed thought that environmental matters should for the most part be dealt with at Community level, instead of being left entirely to the national governments.

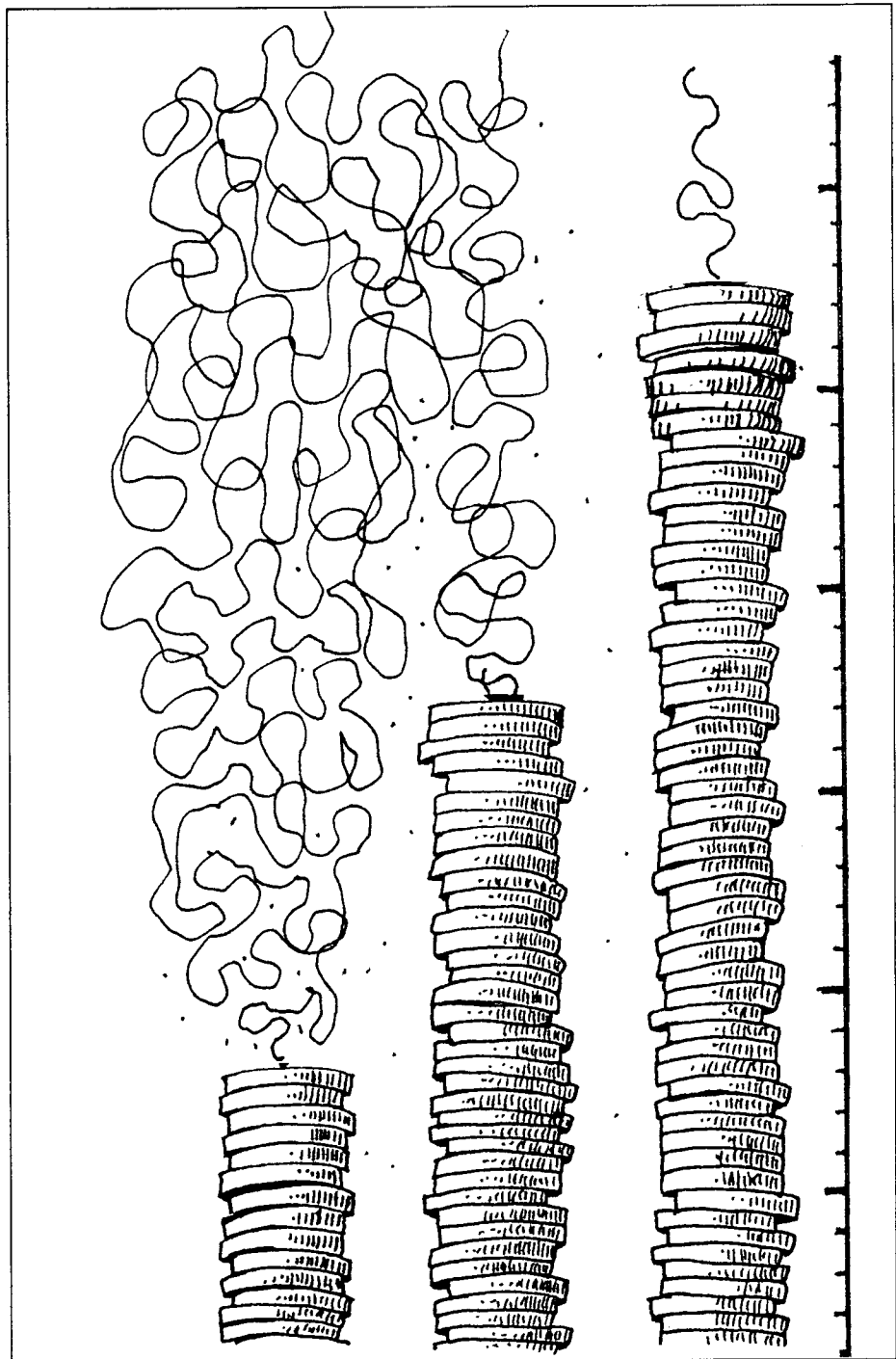
\* **Europeans and the Environment** as reported in Miljörapporten No. 1, 1993.

# A leader in spending

AUSTRIA HEADS THE LEAGUE in respect of environmental spending if seen as a percentage of gross national product, having allocated 1.94 per cent for such purposes during the last calendar year. The next highest spender in 1991 was Germany, with 1.74 per cent. Of the four industrialized countries that had increased their percentages since 1980, Austria had also done most.

According to the *Institute der Deutschen Wirtschaft*, which had made this survey, such efforts do, despite the high cost, pay off ecologically – although they may bring some disadvantage to domestic industry, especially as regards export business.

Country	In percentage of GNP	
	1980	1991
Austria	1.22	1.94
Germany	1.45	1.74
Netherlands	1.10	1.46
USA	1.62	1.36
Canada	2.04	1.30
Finland	1.30	1.05
Japan	1.84	1.02
Great Britain	1.54	0.93
France	0.87	0.91
Sweden	0.99	0.87
Denmark	1.02	0.78
Norway	1.25	0.57



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# There's money in it

GERMANY'S ADVANCED environmental legislation has put it in the lead among countries selling the necessary equipment and know-how. In 1990 such sales brought in more than DM70 billion, a figure that is expected to be doubled by 1995.

As pointed out by Heinz Riesenhuber, of the Ministry of Research and Technology, Germany is now the largest manufacturer of equipment for bettering the environment. It takes 21 per cent of the world market, followed by the United

States and Japan, with 16 and 13 per cent respectively.

The value of the equipment for treating water, sewage, and air that was exported in 1990 amounted to DM 35 billion. That is 5.5 per cent of the country's total exports. In the same year domestic sales accounted for DM40 billion. The general outlook is also bright – by 1995 investments for improving the environment within the European Community alone being expected to have risen to the equivalent of DM140 billion. □