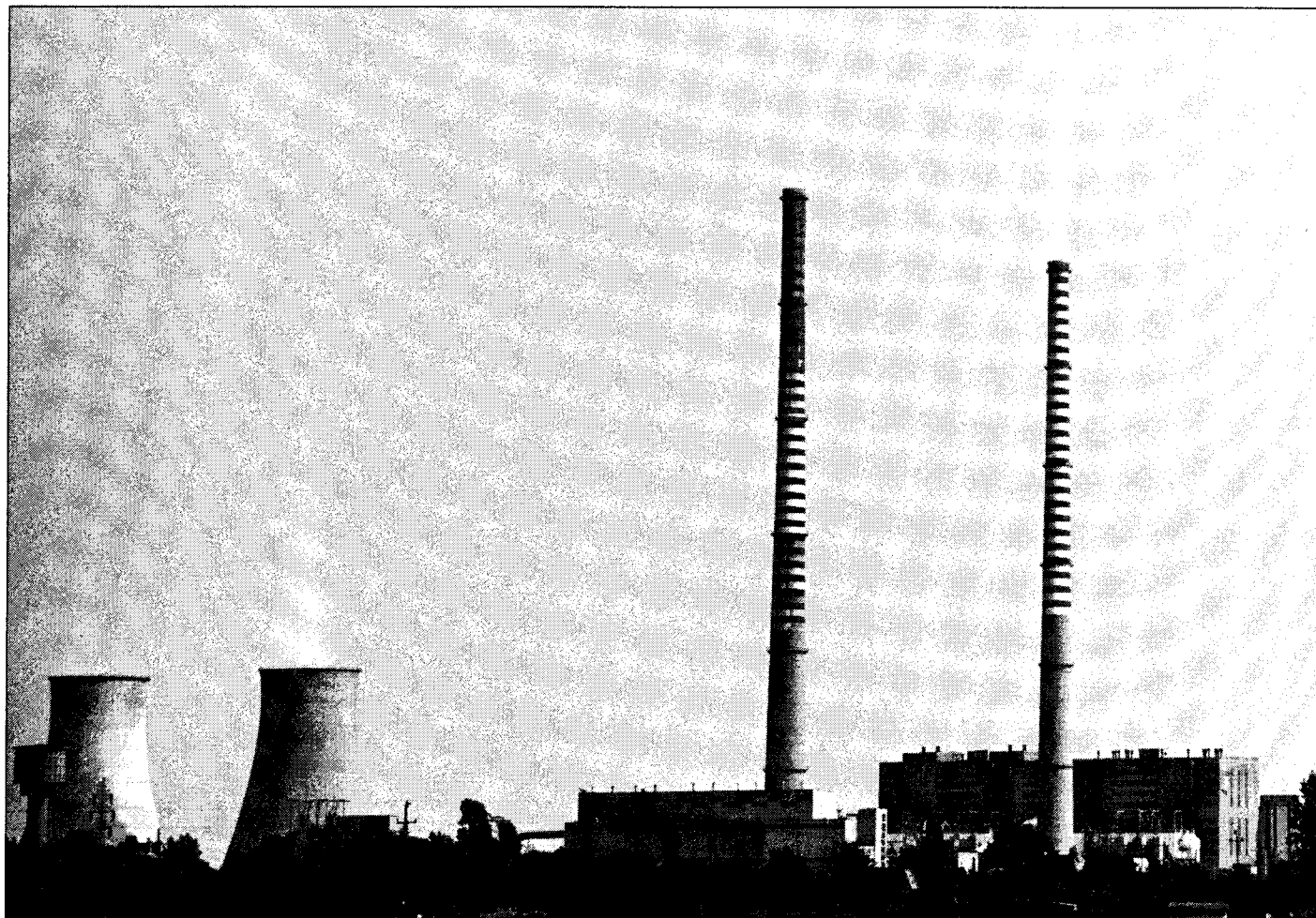


Acid News



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POLISH EMISSIONS

Explaining a decline

THE PERIOD FROM 1988 to 1994 was one of progressive transformation in Poland, with the country going from a planned economy via economic reform and severe recession between 1989 and 1991 to an increased market economy with subsequent growth. During that time the Polish emissions of sulphur dioxide diminished from 4.2 to 2.6 million tons – a decline of 37 per cent. Light has recently been thrown on the causes of this in a study* by Jürgen Salay, in which the Polish power sector is examined in detail.

Salay shows the decline of emissions from the power sector to have been as great as that for the country as a whole, which is remarkable,

seeing that power production was only 6.5 per cent lower in 1994 than it had been in 1988 (see charts on page 3).

Salay brings out three significant causes for this decline, apart from the drop in demand. The plant operators started to buy coal with a lower sulphur content and a higher heat value, while at the same time improving the power plants' total efficiency. Back of these changes were the tightened restrictions on their emissions of air pollutants that came in 1991, and the general restructuring of the power sector that was started at about the same time.

Both sticks and carrots were used to make power production more effi-

cient. One such stick has been the deregulation of coal prices, leading to a doubling of the price of hard coal and so making fuel consumption more expensive for combined heat-and-power as well as straight power plants. Because price reform coincided with the reorganization of the power industry – which turned the power producers into independent state-owned enterprises and gradually involved hard budget constraints – it provided a strong incentive for the operators to minimize fuel costs and improve generating efficiency. A carrot came from abolishing the central allocation of coal supplies, making it possible to buy

Continued on page 3

Acid News

is a newsletter from the Swedish NGO Secretariat on Acid Rain, whose aim is to provide information on the subjects of acid rain and the acidification of the environment.

Anyone interested in these problems is invited to contact the secretariat. All requests for information or material will be dealt with to the best of our ability. Acid News is distributed free of charge.

In order to 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 SECRETARIAT

The Swedish NGO Secretariat on Acid Rain was formed in 1982 with a board now comprising one representative from each of the following organizations: Friends of the Earth Sweden, the Swedish Anglers' National Association, the Swedish Society for Nature Conservation, the Swedish Youth Association for Environmental Studies and Conservation, and the World Wide Fund for Nature Sweden.

The essential aim of the secretariat is to promote awareness of the problems associated with air pollution, and thus, in part as a result of public pressure, to bring about the required reduction of the emissions of air pollutants. The eventual aim is to have those emissions brought down to levels – the so-called critical loads – that the environment can tolerate without suffering damage.

In furtherance of these aims, the secretariat operates as follows, by

- ☐ Keeping under observation political trends and scientific developments.
- ☐ Acting as an information centre, primarily for European environmentalist organizations, but also for the media, authorities, and researchers.
- ☐ Producing and distributing information material.
- ☐ Supporting environmentalist bodies in other countries by various means, both financial and other, in their work towards common ends.
- ☐ Acting as coordinator of the international activities, including lobbying, of European environmentalist organizations, as for instance in connection with the meetings of the bodies responsible for international conventions, such as the Convention on Long Range Transboundary Air Pollution.
- ☐ Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.

EDITORIAL

Ozone

SUMMER HAS COME, and with it the likelihood of fresh episodes with concentrations of ground-level ozone high enough to do damage to health, farm crops, wild plants, and forest.

In this issue we report on the concentrations recorded during the last two summers, when the threshold values for safety were regularly exceeded in all member countries of the European Union. Alarming though they may appear, these data are if anything an underestimate of the problem.

Firstly, the thresholds in the present EU directive are unduly high, considering what appears to be needed if damage to health and vegetation is to be avoided. Much new data has been acquired since the directive was adopted, and this will probably result in markedly lower thresholds being set in the coming revision (see pp. 7-9 in this issue).

Secondly, there is good evidence of the high concentrations noted in the Mediterranean region not being fully reported to the commission. The Spanish environmentalist organization AEDENAT, for instance, recently charged the city of Madrid before the EU commission with having failed to report 325 occasions where the threshold at which the public have to be informed had been overcrossed.

Ozone is in high degree a transboundary problem. Dealing with it

will require international cooperation to bring down emissions of the substances that lead to the formation of ozone, namely, nitrogen oxides and volatile organic compounds. It appears from computer modelling that both will have to be reduced by at least 75 per cent to keep ozone below even the present thresholds. A strategy to get at least some way towards that goal is currently being worked out within the EU commission, and ozone is among the pollutants being treated in the formulation of a new protocol under the Convention on Long Range Transboundary Air Pollution.

We shall all be in some way affected by a strategy that will effectively deal with the problem of ozone. But a far-reaching decision is hardly likely to come about unless our rulers feel the pressure of public opinion – and opinion can only be effective if based on real knowledge. Spreading correct information on the matter will therefore be of highest importance.

Great responsibility will also rest on those who set the rules to see that the limits are placed at levels where – on the basis of the latest scientific knowledge – even sensitive persons such as asthmatics, the elderly, and children can enjoy the summer outdoors, without any risk to health.

PER ELVINGSSON

Ratify!

AFTER A LENGTHY warming-up, the negotiations for a "super NO_x" protocol under the Convention on Long Range Transboundary Air Pollution have now got under way. The aim is to have the problems of acidification, eutrophication, and ground-level ozone treated in a single document (see article on p.6).

A task formidable enough in itself, now made unnecessarily complicated by the fact of the two latest protocols under the Convention still having to take effect. Consequently it will be difficult to draw their pollutants – sulphur and volatile organic com-

pounds – into the negotiations for a new one. The protocol on VOCs, dating from 1991, has so far only been ratified by eleven of the parties that signed it, and that of sulphur, from 1994, by no more than five: Norway, Sweden, the Netherlands, Luxembourg, and Great Britain. In each case sixteen ratifications will be required for the protocol to take effect.

This is a situation that need not have arisen, since it appears to be mostly due to sluggish bureaucratic procedures. For surely it cannot be reluctance on the part of the laggard signatories... ☐



Continued from front page

coal directly from the mines at prices and in quantities that better suited plants' individual needs.

Incentive to reduce emissions also came with the re-regulation of air-pollution control. Here again both sticks and carrots were brought into play. The operating conditions for power production were profoundly changed as a result of stricter emission standards and intensified environmental inspection, in combination with increased charges on emissions and fines for exceeding emission limits. More rigorous procedures for obtaining licences to operate boilers also forced operators to pay more attention to emissions.

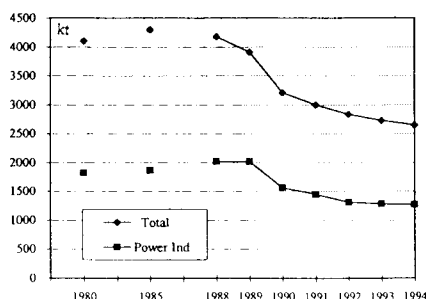
Emission charges have to be paid for each unit of emitted pollutant, up to the limit set in the licence for each plant. For emissions above the prescribed limit the polluter has to pay fines that are ten times higher per unit of pollutant than the emission

charge. In 1996 the emission charge for one ton of sulphur dioxide was 240 zloty, approximately equivalent to US\$100. In the heavily polluted regions of Katowice and Cracow the charges were twice as high.

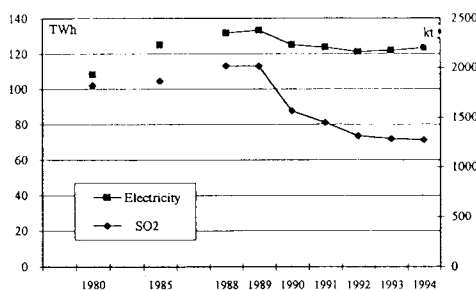
So much for developments up to 1994. Turning to the following period, after transition to a market economy, Salay forecasts continued growth in the next five to ten years, with a consequent increase in the demand for electricity and so increased coal burning and greater emissions of sulphur dioxide. Unless accompanied by flue-gas cleaning, there will be little chance of offsetting the threatened increase in emissions through better-quality coal and greater plant efficiency.

Poland has however undertaken, through the second sulphur protocol under the Convention on Long Range Transboundary Air Pollution, to reduce its emissions of sulphur dioxide

Continued on page 4



Emissions of sulphur dioxide (kt) in Poland 1980-1994. Total for the country and for the power industry.



Emissions of sulphur dioxide (kt) from the power sector and gross production of electricity (TWh) 1980-1994.

ON THE FOLLOWING PAGES

Air quality 7

The EU commission is proposing, in a preliminary document, new standards for sulphur dioxide, nitrogen dioxide, particulates, and lead. A directive setting limit values for the concentrations of these substances in the air is expected shortly. In most cases the new values will represent a distinct tightening over present standards.

Transport freight 10

The enormous movements of freight by road in Europe are inevitably having a severe effect on the environment, and the trend is ever upward. Not only are the distances over which freight is being carried increasing, but the volume is tending to shift away from other modes that have less effect on the environment. Companies are now finding that the pollution they cause is coming more from their transport operations than from manufacturing, and many are taking steps to deal with this new situation.

Island electricity 12

The demand for electricity on the Greek island of Crete is rising rapidly, so that by 2005 there will probably be a need for twice the present generating capacity. In the view of this, the state power company is proposing to build a new oil-fired generating plant – although this would add 630,000 tons a year to the island's emissions of carbon dioxide. The potential for renewable energy, especially from sun and wind, is however very great on Crete, and Greenpeace is urging a more efficient use of energy and the development of solar and windpower, coupled with pumped storage, as a means of freeing Crete from dependence on fossil fuels for power production.

Negawatt 14

The idea comes from America. It means saving energy in order to avoid a need for new generating capacity. It is being applied in Sacramento, California, to make up for the closing down of the city's nuclear power plant, and is now being studied by experts from Hanover, Germany, where the aim is also to avoid building a new power plant. Saving however itself costs money, which may not be available, and a way out has been found in contracting. A consultant firm undertakes to make all the arrangements for saving as well as the financing, taking its profit from the difference between the client's former and subsequent bill for energy.

Poland..

Continued from page 3

by 37 per cent by 2000 and 66 per cent by 2010, as from 1980 levels. According to Salay, this will entail, besides putting in installations for flue-gas cleaning, switching from coal to other sources of energy, closing down the oldest power plants (the least efficient), increasing the share of combined heat-and-power, and making electricity and heat use more efficient.

Recently the operators have been making arrangements to install pollution-abatement technology at several power plants (Salay assumes that they are anticipating further increases in emission charges). By the end of 1995, decisions had been made to install equipment for fluidized-bed combustion or desulphurization of the flue gases in at least six of the larger plants for the generation of electricity or combined heat-and-power. They include Turów and Belchatów, the two largest power plants burning lignite, and several burning hard coal, among which can be named Rybnik, Skawina, and Opole.

The country's changed environmental policy has made it easier for power operators to finance such investments – loans and grants now being obtainable from national and regional funds for environmental protection. Salay emphasizes however the need for careful analysis of the alternatives in order to arrive at the best solution in each case. He considers installing flue-gas desulphurization at the Belchatów and Turów power plants to be justified, since they are jointly responsible for 39 per cent of the emissions of sulphur dioxide from all the country's power plants. Belchatów is also one of Poland's newest plants, built early in the eighties.

In other cases Salay thinks other solutions should be sought, to ensure cost effectiveness. It may for instance be best to close down old plants and make arrangements for a more efficient use of energy instead, or replace them with gas-fired installations.

PER ELVINGSON

***Electricity Production and SO₂ Emissions in Poland's Power Industry.** By Jürgen Salay, 1996. IMES/EESS Report No. 23. Available from Department of Environmental and Energy System Studies, Lund University, Gerdagatan 13, S-223 62 Lund, Sweden.

AUTO FUELS

Need for less sulphur

IT IS IMPORTANT, and according to a study by the consultants Arthur D. Little should not be too expensive, to reduce the sulphur content of petrol and diesel fuel.

The matter is pressing because the EU commission's proposals for new standards for these fuels are now under political scrutiny. They were part of the so-called auto-oil package that was presented last June (see AN 4/96) and would apply from the year 2000. Their rather lenient requirements for sulphur content – 200 ppm for petrol and 350 ppm for diesel – were immediately criticized by environmentalists as well as by several member countries and the EU parliament.

The new study, which was commissioned by the Swedish and Finnish governments, shows that the commission has greatly overestimated the cost of reducing the sulphur content still further. Reducing it to 50 ppm in diesel would in fact cost 55 per cent less than estimated. It also emerges from the study that the fuels' sulphur content is much more important for air quality than the auto-oil package indicates.

The sulphur contents proposed by the commission will, according to

the consultants, hinder the introduction of the much more fuel-efficient direct-injection petrol engines, as well as the new abatement technology that would reduce the emissions of nitrogen oxides by a further 30 per cent. Lowering the sulphur content of diesel fuel from 350 to 50 ppm would moreover lead to a reduction of the emissions of particulates from heavy vehicles by a factor two or three.

The environment ministers in Sweden and Finland have written to their counterparts in the other thirteen EU member countries urging the need for stricter fuel standards. The Council of Ministers is now expected to arrive at a common position at its June meeting. At its first reading of the commission's proposals on April 10, the European parliament – which shares the power of decision-making in these matters with the ministers – called for reductions of the sulphur content of petrol and diesel fuel to max. 30 and 100 ppm respectively.

Sources: **Environment Watch: Western Europe.** March 7, 1997. **T&E Bulletin** No. 56. March 1997. **New Scientist.** April 19, 1997.

COGENERATION

Very effective

PRODUCING heat and power simultaneously – so-called cogeneration – is a very effective way of utilizing the energy content of a fuel. Only about 8 per cent of the electricity produced in the European Union comes however from cogeneration. It is greatest in the Netherlands, where about 35 per cent is cogenerated, and lowest (less than 5 per cent) in Belgium, France, Ireland, and Greece.

Cogeneration enables up to 90 per cent of the fuel's energy content to be utilized, as against 30-55 per cent in the generation of power only, where the excess heat is simply cooled off, either into air or water. Besides being a more efficient way to use energy, cogeneration could also be a means of reducing the emissions of air pollutants.

Cogen Europe, which is an association for the promotion of cogeneration, estimates that it would be "quite feasible" to produce 30 per cent of the European Union's electricity by cogeneration – provided the EU adopts a plan to tap the full potential of combined heat-and-power technology. Since the EU commission is now in the process of preparing a draft communication on the matter, Cogen has put forward a number of proposals, among which is that the internalization of external environmental costs should reflect and promote the efficient conversion of energy that can be achieved by cogeneration.

Source: **Europe Environment** No. 494. February 25, 1997.

Tighter standards for light vehicles

MATCHING THE PROPOSAL for new emission standards for passenger cars that was put forward by the EU commission in its auto-oil package last summer (AN 4/96), comes one now for light commercial vehicles, meaning those weighing 2.5 to 3.5 tons, as well as off-road types.

The proposal is similar to that for cars, except that it splits the vehicles into three weight categories, tapering off somewhat in strictness for the heavier types. As a first stage it sets compulsory requirements that are to apply from the year 2000 (with one or two years' respite for the heavier categories). So-called indicative standards – those that are likely for 2005 – are set forth as a second stage. These should be confirmed at the latest by the end of 1998.

The commission calculates that its proposals for the years 2000, 2001 and 2002 will result in the following percentage reductions beyond the requirements of the present direc-

tive (96/69/EC) that came into force as late as last January:

	NOx	HC	Particles
Petrol vehicles	-40	-40	-
Diesels	-20	-65	-35

The indicative requirements for stage 2 will involve a further screwing down of 50 per cent beyond those of stage 1.

These proposals for light commercial vehicles are hardly likely to be dealt with either by the Council of Ministers or the EU parliament before each of them has got through its first reading of the proposed directive for cars that was presented last summer.

The proposals for definitive directives springing from the auto-oil program – for emission limits for heavy vehicles and periodic tests for roadworthiness – are awaited later this year.

Source: *Environment Watch: Western Europe*. March 7, 1997.

CLIMATE

Time getting short for a protocol

THERE IS LITTLE TO REPORT from the latest attempt, under the Climate Convention, to reach a binding agreement for reducing the emissions of greenhouse gases. The meeting of the Ad Hoc Group on the Berlin Mandate in Bonn, Germany, on March 3-7, did indeed succeed in condensing ninety pages of proposals to a manageable negotiating text, but it was one with innumerable square brackets (signifying lack of agreement). Only really new was the proposal from the EU members to the effect that the industrialized countries should reduce their emissions of greenhouse gases by 15 per cent between 1990 and 2010 (as reported in *Acid News* 1/97).

The industrialized countries are however in disagreement on a number of vital points, such as the size of the reductions required of each, which gases are to be counted, the

actual distribution of the burden of reduction, the possibility of emission trading, and so-called joint implementation (by which one country could pay the cost of another's reductions, and account them as its own).

The Ad Hoc Group now has only two more scheduled meetings in which to arrive at a new protocol, one in late July, the other in October, before the third Conference of the Parties to the framework convention on Climate Change, which is to be held in Kyoto, Japan, in December. By then the disagreements must have been resolved, since the intention is to have a protocol ready for signing in Kyoto.

Source: *Environment Watch: Western Europe*, March 21, 1997.

Note. The Climate Convention's secretariat has a home page on Internet: www.unfccc.de.

BRIEFS

Taxing of energy

Last March the EU commission presented a draft directive setting minimum levels for the taxation of energy. As was expected, their proposal involves extending the scope of the present common excise duties on petroleum products to include coal, natural gas, and electricity. Although it would also mean relatively big increases for petrol and diesel fuel, the environmental effect is likely to be small, since the tax levels in most of the member countries are already higher than those now proposed. The exemption from taxation of aircraft fuel and fuel used on ships plying in European waters would be retained. It would also be open to member countries to exempt fuel used for transportation by rail or on inland waterways, as well as biofuels.

When the EU ministers of finance met in May, they asked for a detailed analysis of the consequences that the proposal might have for inflation, industrial competitiveness, and the environment.

T&E Bulletin No. 57, April 1997. *Environment Watch: Western Europe*. May 16, 1997.

Road charging

The transport ministers of the EU countries have expressed support for an overall increase in the cost of road use – the so-called Eurovignette – with the price differentiated to accord with the amount of damage caused to the infrastructure and the environment (see AN 4/96, p.5). In order to ensure a similar rate of taxation on all Alpine routes, too, the ministers agreed to link the level of the new road-user charges with those now being proposed in discussions with Switzerland. The commission's proposal for the Eurovignette would have permitted an additional charge for transit through sensitive areas, such as the Brenner and Mont Blanc passes. Switzerland has offered to lift its ban on trucks of more than 28 tons in return for charging 600 francs (355 ecus) per vehicle, and the EU has countered by proposing a maximum of 100 ecus per truck between 1999 and 2004, and 200 ecus thereafter.

T&E Bulletin No. 57. April 1997.

Safe routes

According to a British study, a network of safe routes to school would reduce the number of escort journeys by car in London – currently amounting to 16 per cent of the rush-hour traffic – by 20 to 50 per cent in the course of ten years. In 1971 80 per cent of the seven and eight-year olds went to school on their own, mostly walking or cycling. By 1991 it was only 9 per cent. The main reason parents gave for escorting children was fear of traffic.

Alarm Bells No. 20, 1997.

To control VOCs

A strategy to enable Norway to meet its commitments to reduce emissions of volatile organic compounds (AN 1/97 p.5) has now been worked out by the state pollution-control agency at the behest of the environment department. The great need is to control emissions from the loading of crude oil at the oilfields, since these account for half of the Norwegian total. The idea is that the tankships should be provided with equipment for returning the volatile substances to the buoys. Control of the evaporation of petrol at filling stations is also proposed, as is a wider use of heating devices for heating-up car engines (to avoid cold-start emissions). The total cost of the strategy – aimed at reducing the emissions of VOCs by 30 per cent by 1999 from 1989 levels – is put at Nkr 160 million.

Statens Forurensingstilsyn, March 6, 1997.

No more coal

Danish environment minister Svend Auken has announced that Denmark, so as not to jeopardize its target under the recent EU climate agreement to cut its emissions of greenhouse gases by 25 per cent between 1990 and 2010, will not build any additional coal-fired power plants. The country's two largest power companies had been planning to construct two new plants fuelled partly by coal and partly by biomass but now they will not be authorized to do so. The government wants the power companies to use natural gas rather than coal for district heating and the production of electricity.

Environment Watch: Western Europe. March 21, 1997.

Breaking the law

The big US carmakers – Ford, General Motors, and Chrysler – are breaking a law on fuel consumption. The Corporate Average Fuel Economy Law, CAFE, enacted after the 1974 oil crises, requires the average consumption of the company's whole output to be no more than 0.86 litres per 10 kilometres. For light trucks it is 1.14 litre, and it is these vehicles that are giving the manufacturers most trouble. The fuel consumption of the most popular types is far above the legal average limit, and fines have to be paid for not meeting the requirement. But instead of setting about to make more efficient vehicles, the makers are said to trying to get the law changed.

Ny Teknik No. 11, 1997.

Facing problems

THE DEVELOPMENT of a multi-effect/multi-pollutant protocol under the Convention on Long Range Transboundary Air Pollution is still proceeding, though slowly. The reason is that it is a complicated matter to gather several pollutants and effects under one hat. The pollutants in this case are nitrogen oxides, ammonia, and volatile organic compounds, while the effects are acidification, eutrophication, and the impact of ground-level ozone. Protocols under the Convention – the first and second for sulphur of 1985 and 1994, the nitrogen-oxide protocol of 1988, and that for volatile organic compounds of 1991 – have previously been confined to one substance or group of substances.

In working out this new protocol, the keywords are – as in the case of the last one for sulphur – critical loads and cost-effectiveness. But because nitrogen oxides are involved in all three effects, and it is complicated to calculate ozone concentrations, it is difficult and time-consuming to construct reliable computer models for determining the most cost-effective measures. Although a new model has been developed by IIASA, the International Institute for Applied System Analysis, it will not be available

for use in the negotiation process until the first half of 1998 at the earliest.

But there are two more factors adding to the complication. On the one hand there has to be coordination with what is going on within the EU for an acidification strategy, and on the other with a coming EU strategy for ozone. This need for coordination may either delay or hasten developments – either because of the working groups having to wait on each other, or because they can take advantage of each other's experience in developing models and strategies.

The matter is further complicated by the fact that it may well be cost-effective to cut back the emissions of sulphur dioxide more than already agreed, instead of those of nitrogen oxides and ammonia, if one wishes to curb acidification. It may be difficult however to take up sulphur again before the 1994 protocol has come into force, and for that eleven more ratifications are needed, only five countries having so far ratified.

MIKAEL JOHANNESSON

Note. Negotiations are also going on for a protocol on persistent organic compounds and heavy metals.

GERMANY

New vehicle taxes

ON JULY 1, a new system of vehicle taxation, based on the amounts of pollutant vehicles emit, will come into force in Germany. The tax for cars that meet the EU requirements for 1993 (which some 60 per cent of the German vehicles do) will remain unchanged, while for those that do not it will be raised by about 50 per cent. Vehicles that meet present EU requirements will get a slight reduction, and those that can meet the requirements proposed by the EU commission for 2000 and 2005 will for the time being go free of tax.

Objections have been raised to having taxes based on standards that have not yet been accepted. Accord-

ing to the usual EU practice, member countries can use EU standards for tax breaks only if they have been adopted and become EU law – which the proposals for 2000 and 2005 have not. The commission has nevertheless decided not to oppose the new German system, although without explicitly approving it. This leaves the way open for legal challenge.

Under the new system, too, cars with a fuel consumption of 5 litres per 100 kilometres will get a tax reduction of DM500, and twice as much if they use no more than 3 litres.

Source: Environment Watch: Western Europe. March 21, 1997.



EU COMMISSION

New standards for air quality

WITHIN THE EU commission work on new air-quality standards is on the way to resulting in detailed directives. The commission is proposing, in a preliminary document, tightened standards for sulphur dioxide, nitrogen dioxide, particulates, and lead, and the resulting social gains are shown in an economic analysis to be very great.

The proposed new standards proceed from the framework directive – Ambient Air Quality Assessment and Management – that was agreed by the Council of Ministers on September 27, 1996 (96/62/EC). Its chief effect in the short term will be to establish common rules for measuring air quality throughout the European Union and also in the EEA countries. At present many EU countries have very little real knowledge of the quality of their air. Since they often use different measuring methods and procedures, it can be exceedingly difficult to make comparisons and trace trends.

The framework directive requires every country to adopt a measuring system in accordance with a common

standard, and in addition to report the results regularly to the commission. Should the concentration of a pollutant in the air be higher than an EU directive allows, they are obliged to tell the commission what they intend to do to bring them down to below the directive's limit values. Daughter directives covering in total thirteen substances will gradually be added to the framework directive, setting the exact figures.

As a first step groups of experts, consisting of representatives from the commission, the European Environment Agency, the World Health Organization, member states, industry, and environmentalist NGOs, have made proposals, as above, for standards for sulphur dioxide, nitrogen

dioxide, particulate matter, and lead, and a directive with the limit values will probably be presented any time now. The new standards are intended to take effect in 2005, or in the case of nitrogen dioxide, in 2010.

The limit values in the commission's document are largely the same as those proposed by the groups of experts (see tables on p. 9). In most cases they amount to a distinct tightening in relation to the present standards. While on the whole in agreement with the proposals, the environmentalist organizations have other ideas as to the time schedule: □ The proposed limit values for NO₂ should take effect from January 1, 2005, instead of 2010.

- Stage II for particulates should also start from January 1, 2005.
- The limit value for lead should apply everywhere from January 1, 2005.

The framework directive allows the possibility of setting alert thresholds – for very high concentrations where the authorities will be obliged to take acute action such as stopping traffic or advising people to remain indoors. Both the experts and the commission are of the opinion however that this possibility should only be used in extreme circumstances. Most experts agree that it is of little practical importance anyway, and that to focus attention on exceptional episodes would distract from an ordinary state of things which is more important both from an ecological and health point of view.

In addition to limit values the daughter directives will be setting rules for measuring the concentrations of the respective substances in the air, and also saying exactly how the EU commission and the public are to be informed about the state of the air at any time.

As regards measurements it will be a matter on the one hand of harmonizing the methods, and on the other of obtaining the best way of presenting a clear picture of the effects on people and ecosystems. In the case of some substances, such as lead, it is mainly of interest, from the point of view of health, to know about the long-term exposure. In other cases, especially as regards NO₂, occasional high concentrations are most important.

The measuring system will thus have to be arranged so as to strike where it is most relevant: at the right time and in the right place. Properly placed measuring points – in street environments, residential areas, parks, and beyond the confines of the cities, to give a few examples – would make it possible to get a good picture of the situation even with relatively few measuring stations. Then, after having obtained detailed figures, it will often suffice in continuation to use so-called indicative methods to size it up at any given time. One indicative method might be, for instance, to count

the number of vehicles passing a certain point in a certain street.

The requirements in the directive in regard to measuring vary on the one hand according to population density, and on the other to the pollution level. They are stricter for agglomerations – areas with more than 250,000 inhabitants – than for rural areas. The call for continuous measurements is also stronger for

*The proposed standards
will in most cases be highly
profitable to society*

areas with high concentrations of pollutant than for those with a cleaner air. Each kind of pollutant has been given an upper and a lower assessment threshold. Depending on the pollutant, the thresholds are put at 60-70 and 40-65 per cent, respectively, of the limit value. When concentrations are above the upper assessment threshold, continuous, exact measurements are obligatory. If they fall between the two thresholds, only indicative measurements are required. When under the lower threshold, measurements only have to be made in agglomerations and for those pollutants for which an

alert threshold has been prescribed (probably only likely for sulphur dioxide).

One part of the proposed directive that is important in a democratic aspect will be the strict requirement laid on the authorities to keep the public continuously informed of the situation as regards air quality. In the words of the draft: "Member States shall actively and regularly disseminate timely information on air quality to the public and mass media by means for example of press, broadcast media, information screens or computer network services."

As soon as the directive comes into force, those countries where the limit values for pollution are not being met will have to inform the commission of their proposed action plans, saying what they intend to do in order to meet the standards that will apply in 2005 and 2010.

An economic analysis of the effects of the proposed limit values has been made by the commission at the request of the Council of Ministers. Only the positive effects on health of the stricter standards have been taken into account, leaving out the lightening of the load on ecosystems, reduced corrosion, etc. The assessment of the advantages to health is based on proven methods which include not only the cost of medical services, lost working time, and so

forth, but also some of the more subtle aspects of life quality. The conclusion of the study is that the proposed standards for air quality will in most cases be highly profitable to society, even if the ecological effects and lessened damage to buildings, cultural monuments, etc., are disregarded (see table). The greatest gain from the point of view of health will come from the reduced concentrations of particles, although all the other changes, with the exception of the standards for lead, will yield a large social surplus.

Work on daughter directives for benzene, carbon monoxide, and ozone has already begun, that for the last being coordinated with the development of a strategy for ozone such as that presented

**Costs and health benefits of pollution reduction
(million ecus per year).**

	Costs	Benefits	Benefit/costs ratio
SO ₂	35	800-4,000	22.8-114
NO _x	72.5	700-1,700	9.6-23.4
PM ₁₀	200-500	9,000-85,000	18-425
Lead	12-40	3.2-5.8	0.08-0.48

**Approximate relation between different types of
1-hour limit values for NO₂.**

350 µg/m³ as a max value (100-percentile) is equivalent to:

- 200 µg/m³, 99.9 percentile (max 8 exceedings/year)
- 100 µg/m³, 98 percentile (max 175 exceedings/year)

200 µg/m³ as a max value (100-percentile) is equivalent to:

- 100 µg/m³, 99 percentile (max 87 exceedings/year)
- 90 µg/m³, 98 percentile (max 175 exceedings/year)

The proposal from the NO₂ working group is thus equivalent to a maximum value of 350 µg/m³. The new WHO guideline is set considerably lower: 200 µg/m³ as a maximum value.

in March for acidification (see AN 1/97, p. 7). The turn will then come to polyaromatic hydrocarbons, cadmium, arsenic, nickel, and mercury.

MAGNUS NILSSON

Note. In the work on the first four daughter directives the environmentalist organizations were represented by Annette Hauer (SO₂ and lead), Karola Taschner (SO₂), Magnus Nilsson (NO₂), Catherine Legrand (lead) and Duncan Laxen (PM₁₀).

Sulphur dioxide

Time period	Limit value ($\mu\text{g}/\text{m}^3$)
1-hour average value, 99.7 percentile	350
24-hour average value, 99 percentile	125
Yearly average value	20

The yearly average value (calendar year average + average October 1 - March 31) is for areas outside agglomerations and other built-up parts. Takes effect immediately on adoption of the directive. The other two values apply everywhere and take effect from January 1, 2005. The 99.7 percentile of the 1-hour average means that the value may be exceeded at the most 24 times a year (0.3 per cent of the year's 8760 hours). A 99 percentile for the 24-hour average value allows it to be exceeded three times a year (1 per cent of the year's 365 days).

Because of uncertainty, according to WHO, as to the health effects of sulphur dioxide, the commission is proposing that a review of the limit values should take place at the latest by 2003. For areas with sensitive cultural objects or especially sensitive ecosystems, the member states are urged to impose stricter standards than those set down in the directive. To protect objects of zinc and iron, a yearly average value of 15 $\mu\text{g}/\text{m}^3$ is suggested as suitable, and for bronze, limestone, and sandstone 10 $\mu\text{g}/\text{m}^3$.

Nitrogen dioxide

Time period	Limit value ($\mu\text{g}/\text{m}^3$)
1-hour average value, 99.9 percentile	200
Yearly average value (health)	40
Yearly average value (ecosyst.)	30

The yearly average value of 30 $\mu\text{g}/\text{m}^3$ applies for NO+NO₂ and takes effect concurrently with the directive. Applies outside of agglomerations and other built-up parts as well as in transition areas. The other two values apply everywhere and take effect from January 1, 2010.

The 99.9 percentile of the 1-hour average value means that the value may be exceeded at the most 8 times a year. There have been proposals to continue to base the limit value on the 98 percentile (allowing it to be exceeded 175 times a year) but to lower the value to 90 or 100 $\mu\text{g}/\text{m}^3$ (from the present 200). The box on the previous page shows the correlation between maximum values and different percentiles.

Particulate matter

Measured as PM₁₀ = max. diameter 10 μm , or as PM_{2.5} = max. diameter 2.5 μm .

Limit values, stage I.

Taking effect January 1, 2005, applicable everywhere.

Time period	Limit value ($\mu\text{g}/\text{m}^3$ PM ₁₀)
24-hour average value, 96 percentile	50
Yearly average value	30

The 96 percentile of the 24-hour average value means that the value may be exceeded at the most 14 times a year.

Limit values, stage II.

Taking effect January 1, 2010, applicable everywhere.

Time period	Limit value ($\mu\text{g}/\text{m}^3$ PM ₁₀)
24-hour average value, 98 percentile	50
Yearly average value	20

The 98 percentile of the 24-hour average value means that the value may be exceeded at the most 7 times a year.

A member country may request permission to substitute the following "action values," based on smaller particulate fractions (PM_{2.5}) for the limit values, stage I. This may be permissible if the air contains high concentrations of naturally occurring particles (as may be especially the case in southern Europe). Such values would take effect from January 1, 2010 and be applicable everywhere.

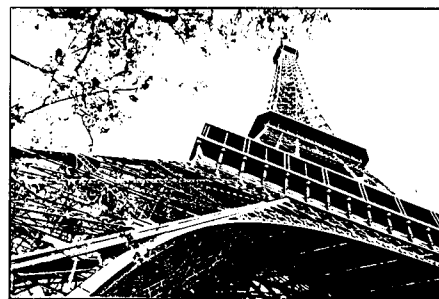
Time period	Limit value ($\mu\text{g}/\text{m}^3$ PM _{2.5})
24-hour average value, 98 percentile	38
Yearly average value	19

The 98 percentile of the 24-hour average value means that the value may be exceeded at the most 7 times a year.

Lead

The yearly average limit value of 0.5 $\mu\text{g}/\text{m}^3$ is applicable everywhere and takes effect from January 1, 2010 in industrial zones and from January 1, 2005 elsewhere.

BRIEFS



Restrictions on car use

The weakness of the air-quality law enacted by the French parliament earlier this year has caused the government to introduce a measure restricting car travel in Paris at times of severe air pollution. Use will be stopped on alternate days, according to whether the cars' licence-plate numbers are odd or even.

The restriction will apply if the level of one of three major pollutants – sulphur dioxide, nitrogen dioxide, ground-level ozone – reaches the second of three pollution levels and, in consideration of the prevailing weather conditions, appears likely to rise to the third on the following day. Level 2 thresholds for the three pollutants are 350, 300 and 180 micrograms per cubic metre respectively (exceeded fourteen times in 1994). For level 3 (exceeded twice in 1995) they are 600, 400 and 360 $\mu\text{g}/\text{m}^3$.

Although initially applying to Paris and immediate suburbs served by the métro system, the measure could be extended to other cities as well. Emergency vehicles, buses, and taxis will be able to circulate as usual – as will electric and gas-driven cars, and also (to encourage car sharing) those carrying at least three passengers.

Environment Watch: Western Europe. March 21, 1997.

Saving car trips

No matter how much improved, public transportation can hardly of itself solve the problem of city traffic – which does not mean however that it is ineffective for reducing car use. On Manchester's Metrolink, for example, 40 per cent of the journeys are made by people who have access to a car, and 10 per cent of the users had previously made the journey by car. Altogether one million private-car journeys are thereby saved yearly. In Belfast, too, a new commuter-express service, linked with road priority for buses, has siphoned off former car users. It has also been estimated that electrifying the trans-Pennine rail routes in North England would eliminate 2.3 million car trips and bring 2.7 million new train passengers instead.

Alarm Bells No. 20, 1997.



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MANUFACTURING

Greening the transport side

GIVEN THE PRESENT means of transport – largely by diesel-driven vehicles – the vast movements of freight by road in Europe are inevitably having a severe impact on the environment. They do in fact bear a major responsibility for the emissions of nitrogen oxides and particulate matter to the air, as well as for much of the noise. And the trend is ever upwards, despite the introduction of emission and noise controls. Not only are the distances over which freight is being carried increasing, but the volume is tending to shift away from other modes of transportation that have less effect on the environment.

Companies in several European countries that are engaged in various ways in moving freight are however trying to address the problem. As emissions from manufacturing decline, firms are discovering that the greatest effect they are having on the environment comes from transportation. Both manufacturers and carrier firms have consequently come to see advantage of improving their image in this respect too.

There are many ways of reducing the environmental impact of freight transport, but cost effectiveness will in each case depend on local circumstances. Here are some of the chief possibilities.

COOPERATION AND COORDINATION. Transport companies, their custom-

To the extent that their emissions from manufacturing decline, companies are finding that the weight of the pollution they are causing is shifting over to the transport side of their activities. Many have already started to do something about this, others are getting ready to follow suit.

ers, and haulage contractors can collaborate in coordinating deliveries, and are doing so in many cases. Transport companies are not only training their own employees in suitable practices, but those of their contractors as well. There are examples, too, of competing firms sharing their distribution networks in order to lessen urban congestion.

Recycling, both of packaging and products, has led to trucks returning loaded after making deliveries. Schedules are also being coordinated to increase vehicle utilization, and firms are putting pressure on their suppliers to use the same haulage contractor – again with the aim of utilizing vehicles better.

There is also a growing interest in shipping by sea or rail, for part of the distance if not the whole. Some companies are even investing in transshipment facilities for this purpose.

By consolidating shipments, others are finding they can fill whole trains, and thus speed up delivery by making it possible to take the most direct route and avoid shunting.

REDUCING THE DEMAND for transport – measured in ton-kilometres per unit of output – is one of the main ways of reducing the environmental effects of this side of a company's activities. In particular, significant savings can be made by choosing suppliers as nearly as possible in the vicinity. Demand can also be restrained by increasing load factors, reducing empty trips, and improving routeing. Here information technology can play a vital role.

CHOOSING OTHER MODES. Road transport usually has a greater environmental impact than either rail or water – although comparisons of the various modes' emissions of pollutants are difficult to make. The types of trucks, locomotives, and ships vary in Europe, as do the fuels used in vehicles and for generating electricity. Environmental benefits can accrue from using direct rail or water transport – or, if railheads and docks are some distance away, using combined transport.

USING THE BEST TECHNIQUE. Technical developments to enable goods to be transported in a more efficient and cleaner manner have been especially prevalent in the road-trans-

port sector. They include improvements to trailers to make them lighter and able to carry a greater volume of freight, the use of on-board positioning and communication systems, cleaner engines and fuels, and after-treatment devices. Less has happened in the rail and water sectors. Improvements in efficiency will be needed if these modes are to be more used, and emissions and noise reduced.

STAFF TRAINING is important for reducing the environmental impact of any mode, and especially for improving fuel consumption. Several companies have introduced incentive schemes to ensure that the initial benefits of training are not eroded over time.

A prerequisite for companies wishing to reduce their environmental impact is an environmental management system that is integrated into the company's other management systems. Only if the senior management puts care for the environment high on its agenda will the rest of the organization give it the attention it deserves – and it is important that responsibility for matters of the environment be given to a member of the senior management group. Training of the staff is essential if they are to know what is expected of them, and feel they can take local initiatives.

The new ISO 14000 environmental management standards are likely to become widely adopted in coming years. Among their most important aspects is the requirement for continuous improvement, enjoining a company to assess its environmental impact, set targets for improvement and monitor its achievements. Some companies are already including environmental conditions in their contracts for the transport of freight, and the introduction of the ISO 14000 standards should encourage others to follow suit, thus putting pressure

on the transport industry as a whole.

Assessment of the effects on the environment of various transport options, as well as the setting of targets, requires fairly sophisticated computer models – incorporating information on mileage, transport modes, types of vehicle, driving conditions, fuels, emissions, and costs. Once a company has quantified the effects of its transport operations on the envi-

Companies are beginning to regard investments in "greening" as vital

ronment, it then has to set targets for improvement in measurable terms and pick out the measures that will be needed to meet them. Targets will vary, depending on the situation from which firms have to start.

The measures that are available can be divided into three broad categories (see box). Companies that are seriously interested in improvement will probably have to use several of them. The development of environmentally efficient transport operations will also require close collaboration with competitors, suppliers, and customers.

There is a tendency, particularly among companies that have only recently started to consider the environmental impact of their operations, to assume that improvement will cost money while yielding little in the way of tangible benefits. A growing number of companies are however beginning to regard long-term investments in "greening" their operations as vital to their development.

Some environmental measures, particularly those that lead to less use of resources, can be shown to have direct financial benefits. Com-

puterized vehicle routing, for instance, can reduce vehicle kilometres and increase vehicle utilization by 10-15 per cent, while at the same time reducing the staff time needed for routing and scheduling. Other measures may have a less direct beneficial effect on company finances but yet be cost effective. Often they are justified by the public image benefits. Because of differing company circumstances, it is difficult however to quantify the cost effectiveness of the various measures.

Companies that have done little about the effects of their activities on the environment will be able to make bigger improvements, and do it more cost effectively, than others that have already adopted the least expensive options. There is evidence suggesting that companies without any proper program for fuel management should be able to reduce their consumption by 10 per cent in the short term (one or two years). In the medium term (five years or so) even larger reductions in fuel consumption are possible, as well as in emissions of hydrocarbons, nitrogen oxides and particulates. In some cases the reductions could be as high as 50 per cent or more, depending on the pollutant, type of operation, and the local conditions. For shipping there is the potential for reducing emissions even more, and by using no more than existing techniques.

The above article is based on *The Greening of Freight Transport in Europe*, compiled by Claire Holman from country reports from Germany, the Netherlands, Sweden, and Norway. All of them are available from the European Federation for Transport and the Environment (T&E), Rue de la Victoire 26, 1060 Brussels, Belgium.

Both the compilation and the reports on which it is based give examples of the types of measure mentioned above, as well as names and addresses of the individuals who should be contacted for further information.

Measures available for reducing the environmental impact of freight transport

Reduce freight movements by:

- Using locally available raw materials
- Using local suppliers
- Changing the spatial organisation of production, storage and distribution
- Investing in increased stock-keeping capacity
- Improving vehicle routing
- Consolidating deliveries
- Increasing vehicle utilisation

- Return loading
- Using best available technology

Switch to more environmentally friendly transport chains:

- Train
- Ship
- Combined transport

Reduce the impact of each mode:

- Cleaner engines

- Exhaust-gas cleaning
- Cleaner conventional fuels
- Alternative fuels
- Cleaner lubricants
- Fuel consumption management techniques (monitoring of fuel consumption, setting targets, training drivers)
- Aerodynamic bodies
- Speed limiters on smaller vehicles
- Good maintenance procedures

For independence of fossil fuels

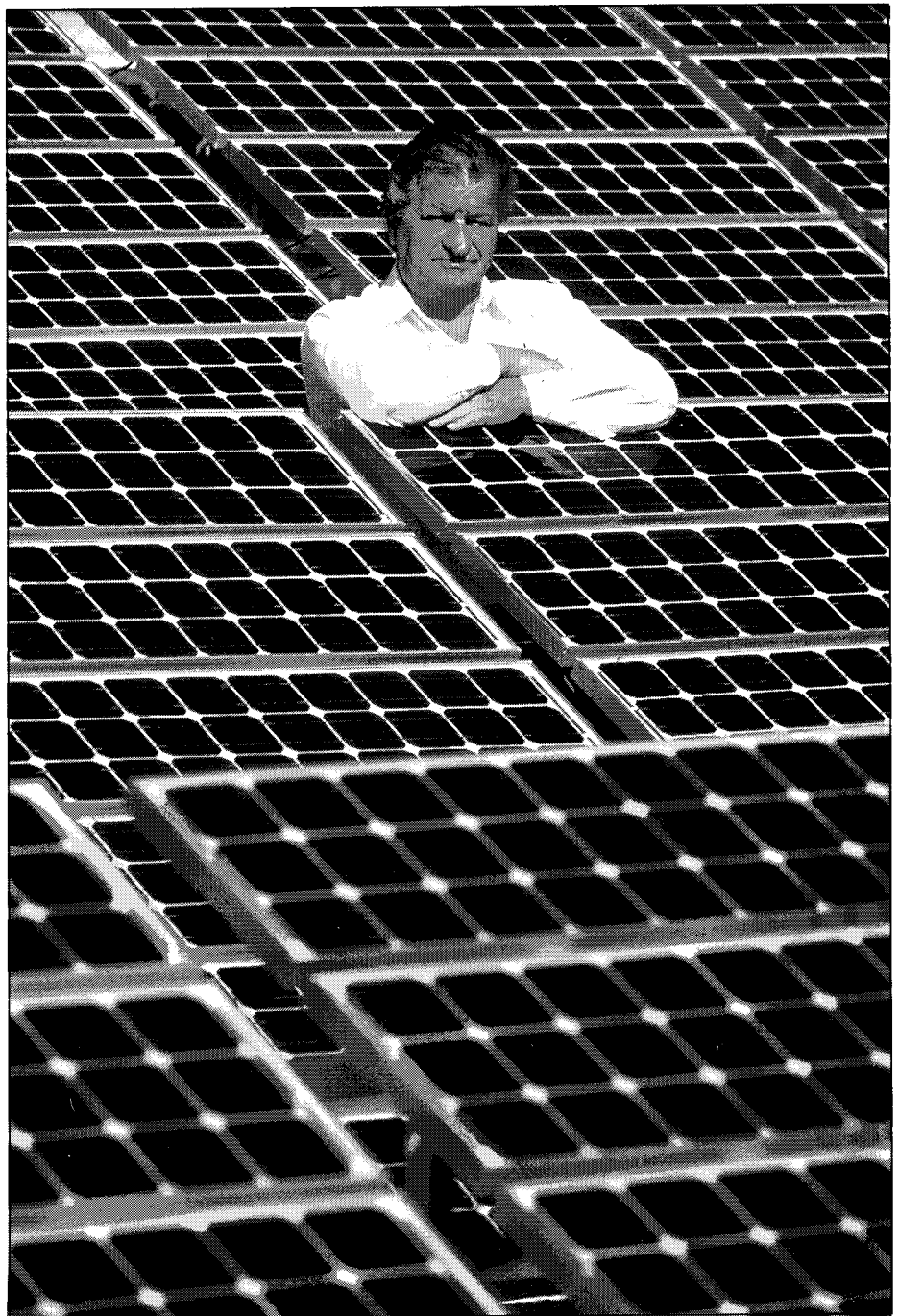
THE DEMAND for electricity on Crete, the large island off the southeastern coast of Greece, is rising by about 7 per cent a year, and indications are that by 2005 generating capacity will have to have been doubled. The Greek state power company, Public Power Corporation (PPC), wants to meet the increased demand by expanding fossil-fired capacity, but there are also proposals for making the island a model for the Mediterranean in independence from fossil fuels.

The population of Crete is just above half a million and the total demand for electricity on the island in 1995 was 1476 gigawatt-hours, but with tourism as one of the main industries, the demand varies greatly according to season, and this is a basic cause of the present problems of energy supply.

At present power is produced entirely in fossil-fired plants, which emit 1.3 million tons of carbon dioxide a year. Difficulties are already being experienced in meeting the demand during periods of peak load, and it will be impossible with the present capacity if demand increases as forecast. As it is, gas turbines often have to be used for dealing with peak loads, and at a high cost. Every extra kilowatt-hour of electricity that has to be produced in this way costs something like 50 drachmas or about 21 US cents.

The proposal most favoured by the state power company is to build a new 150-megawatt oil-fired plant. This would add 50 per cent, or 630,000 tons a year, to the island's emissions of carbon dioxide. Alternatives might be to increase gas-turbine capacity or lay a submarine cable to hook up with the mainland grid. Because of swift undersea currents and a high probability of earthquakes, the latter idea seems however less attractive.

The company has shown a clear lack of interest in renewable energy and alternative solutions. Of its 1994 investments only one-half per cent went to renewables – or just a quarter of the money actually earmarked for such purposes. The present installed capacity for electricity from renewable sources – mainly water and windpower – is 7.7 MW, as



At Hotel Elounda Sands, Crete, solar cells with a capacity of six kilowatt have replaced an oil-fired electricity generator, saving US\$10,000 a year in oil costs. The owner expects to break even within a space of four to five years.

compared with almost 400 MW for fossil power.

The potential for renewable energy, especially from sun and wind, is however very great on Crete. In its report on a study made for the European Union, which was presented in March 1996, the Centre for Renewable Energy Sources in Athens stated clearly the island is "one of

the most favourable and promising Greek regions for the development of renewable energies." It is also pointed out that the use of energy from renewable sources could lower the cost of power production, since gas turbines would then only need to be used during maximum-load hours. As further advantages it mentions that production could be decen-

tralized, thus reducing distribution losses and favouring local economic development into the bargain.

Greenpeace has proposed four lines of action for freeing Crete from dependence on fossil fuels for power production. These are:

EFFICIENT USE OF ENERGY. Substituting compact fluorescent lighting for one million ordinary light bulbs would cut out the need for 30 megawatt of capacity. As a result of urgings from Greenpeace a pilot project has been started, by which incentives are given to householders to replace one to four of their traditional light bulbs. The aim is to save a modest 8 megawatt. Greenpeace has also started cooperating with the Hotel Association of Crete to save 5-10 megawatt in a single year.

Greenpeace has further put forward a scheme for demand-side management, with PPC paying half the cost of installing solar thermal units for heating water, as an alternative to building more power plants. Putting 25,000 such systems in place would reduce the need for generating capacity by 6 megawatt, and 70,000 by the year 2000 would cut it back 20 megawatt.

SOLAR POWER. The possibilities are being discussed of building solar power plants of various sizes and types on the island. One business firm has expressed an interest in setting up a 50 MW plant with solar cells, and another has made an EU-

Aiming high

Buying a solar thermal system in Greece is as simple as buying an electric water heater. By preheating the water, such rooftop systems provide about 80 per cent of the energy need for heating it. By mid-1995, some 600,000 households had them in Greece, thus avoiding emissions of carbon dioxide to a total of 1.5 million tons a year. The proportion of households so equipped in Greece, 15 per cent, is however low compared with that on Cyprus and in Israel, where over 90 per cent have them. The Greek Solar Industry Association is aiming to have installed 1.3 million systems by 2005, increasing the total surface area of the collectors by 5 million square metres. If achieved, it would prevent the emissions of 2.5 million tons of carbon dioxide a year, and create 5500 jobs. This is nevertheless a conservative target, since it would still leave more than 50 per cent of the potential untapped.

Source: Greenpeace International.



Installing the first grid-connected solar photovoltaic system in Greece – at a school in Goudouras, in the southern part of Crete. The system was a gift from Greenpeace, as a part of its campaign to switch the island over to generating power by solar means.

funded feasibility study for a 52 MW solar thermal power station on the south side of the island.

Greenpeace is promoting solar cells in the hope of seeing hundreds of roof-top systems installed on residential property, schools, hotels and in other places. Its campaigns to this end have met with great interest. The Ministry of Development pays 55 per cent of the installation costs for such schemes, and is aiming to have 3 MW in place in Greece as a whole during the next three years. Greenpeace hopes for 1 MW on Crete.

WINDPOWER. After the passing of a renewables law in 1994, a wind-power capacity of 200 MW of was proposed for Crete, and contracts for 20 MW were signed in September 1996, with another 50 MW to be built this year. Theoretically there is a very great potential for windpower on Crete, about 400 MW. Fully carrying it out must however await some means of storing energy.

PUMPED STORAGE. As a means of dealing with unevenness both of demand and production, Greenpeace is proposing a system of pumped storage whereby water would be pumped up into reservoirs, for instance with electricity from wind farms during periods of high wind. From a leaked PPC document it appears that it would be more expensive to build the proposed fossil-fired power plant than facilities for pumped storage – which would in any case entirely eliminate

the need for new fossil-fuel capacity. Another PPC document has shown that a developed pumped-storage system on Crete in 1995 would have saved US\$ 16.5 million in fuel costs.

Greenpeace maintains that by taking advantage of the possibilities of using power more efficiently and by developing renewable sources of energy, the whole of the island's demand for energy could be met. A "fossil-free" Crete could, it says, be a possibility as early as only a few years on in the 21st century. Herein would lie the model for the whole Mediterranean region, where the demand for electricity is forecast to increase by a factor 4.5 over the next twenty-five years.

PER ELVINGSON

For further information, please contact Greenpeace Greece, Zoodohou Pigis 52c, 106 81 Athens, Greece. Fax. +30-1-380 4008.

Please help!

Join in a public protest to the Greek Government urging it to desist from constructing a new fossil-fired power plant on the island of Crete and direct the PPC to carry out the conversion of an electricity supply based entirely on fossil fuels to one using solar-power technologies. Letters should be addressed:

Ms Vasso Papandreou
Minister for Development (Energy)
Mihalakopoulou 80,
GR-10192 Athens, Greece.
Fax. +30-1-7788279.

Recent publications

Evaluating Economic Instruments for Environmental Policy (1997)

Examines the actual performance of economic instruments in the environmental policies of OECD countries – particularly ecotaxes, charges, and tradeable permits. It also proposes a general evaluation framework, integrated into the implementation process for these instruments.

150 pp. 120 francs. Can be ordered from OECD, 2 rue André-Pascal, 75775 Paris cedex 16, France.

OECD Environmental Performance Reviews: France, Spain (1997)

Reviews of environmental conditions and progress in France and Spain, scrutinizing in each case the efforts to meet both domestic objectives and international commitments, and evaluating progress in reducing the pollution burden, improving the management of natural resources, integrating environmental and economic policies, and strengthening international cooperation.

175 and 142 pp. 180 francs per volume. Obtainable from OECD, address as above.

Response to the European Commission's Auto Oil Proposals (1996)

A résumé of the views of the European Federation for Transport and Environment in regard to the auto-oil package and proposals for amendments.

10 pp. Free of charge. Available from T&E, Rue de la Victoire 26, 1060 Brussels, Belgium.

Naturens tilgrænselse for luftforurening (1996)

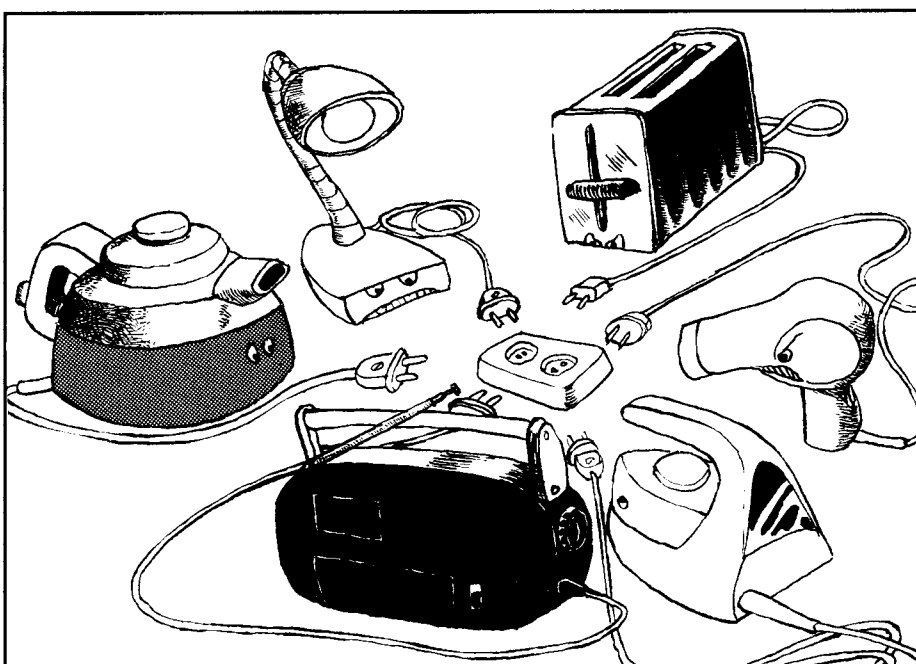
By M. Strandberg and L. Mortensen. A popular-scientific survey of the effects of air pollutants on the natural environment in Denmark, how much it can tolerate, and what is being done internationally to control emissions.

40 pp. 60 kroner. TEMA-rapport fra DMU 1996/7. In Danish only. Can be ordered from Danmarks Miljøundersøgelser, Frederiksborgvej 399, 4000 Roskilde, Denmark.

Air Pollution and Biodiversity (1996)

By N. Dudley and S. Stolton. A report aiming to give an overall idea of the effects of air pollutants on biological diversity.

Available from WWF International, Avenue du Mont-Blanc, CH-1196 Gland, Switzerland. Fax +41-22-364 53 58.



ENERGY USE

Save and avoid

NEGAWATT is the name for it – saving the energy that might otherwise have been used unnecessarily. The idea comes from America. In least-cost planning one first has to determine how great the potential is for energy saving, and then calculate how much it would cost to do it. Then that cost has to be compared with the amount that would be needed for building new generating capacity. If it turns out to be cheaper to save than to build, a program has to be started for steering the demand for energy – which must be planned and organized with as much care as for the construction of a new power plant.

In Sacramento, California, saving and using energy more efficiently are the means being employed to make up for the closing-down of the city's nuclear power plant, and the project is now being studied closely by German experts from Hanover, where the aim is also to avoid building a new power plant. There programs are being tested for nine different groups of consumers, for each of which a set of measures is to be made. Households, for instance, will be given subsidies for purchasing energy-saving appliances, large companies will get premiums for lowering energy consumption. Lighting especially has been found to offer great possibilities for savings. About 5.5 per cent of the city's consumption of

electricity has turned out to be sheer waste, so everybody is being encouraged to buy energy-saving lamps.

The electricity supply company has engaged a consultant to find out what people think. "Only if they like the project will it have a long-term effect," says Hr Meissner, company representative.

The possibilities for saving among very large consumers are certainly very great – one has only to think of hospitals, municipal offices, hotels. But it costs money, which is often needed for something else. A way out has however been found – in contracting.

Contracting is a means of financing and carrying out energy-saving programs that is being more and more employed in Germany. The principle is simple: A contract is signed between a consultant firm, which may either be private or municipally owned, and a large-scale consumer of energy. The consultant undertakes to make the arrangements to bring down the client's energy consumption markedly and by cost-effective methods, and takes responsibility for the whole procedure: financing, installation of the equipment, and follow-up.

The client pays nothing more than he was doing to start with. He just goes on paying his usual cost for energy, but now to the consultant

firm. The consultant pays the lower bill for the client's energy that has resulted from his efforts – and keeps the difference until the whole investment has been paid off and leaves him with a profit. The client subsequently gains by getting his energy at a lower cost than before.

The city of Offenbach in Hessen signed such a contract with LTG Consultants for reducing the energy consumption – both for heating and lighting – in its 18-story municipal building. Control apparatus was installed in the basement, and now both heating and ventilation are precision controlled by a computer coupled to sensors that react to temperature and humidity both indoors and out. The whole system, which cost around DM 400,000, was installed and paid for by the consultants, who also take care of the afterservice. The municipality's energy bill is now DM 90,000 lower than it was before. And the consequent drop in the amount of carbon dioxide so eliminated is the equivalent of what would normally come from the energy use of 130 households.

A project is currently under way in Berlin called Energy Savings Part-

nership. The city environment administration had requested bids for energy saving in 100 public buildings. Two groups received contracts for 50 buildings each, the one being headed by the Berlin electricity works, the other by a district-heating company – which have undertaken to reduce energy costs by 9 and 11 per cent respectively. The contracts run for twelve years. The actual savings are expected to be much greater than the amounts specified in the contracts.

Installation contracts are another variant, this time for financing the installation of environmentally benign small-scale power generators. Small combined heat-and-power plants are being put in at swimming baths, hospitals, old-age homes, hotels, and residential areas. The heat is all used in the buildings, and any surplus electricity is sold to the local supply company. In this way 85-90 per cent of the energy is utilized, as against something like 40 per cent in the case of a largish power plant where the heat is wasted. In Germany these small installations will have been amortized in about ten years.

BODIL FREY

NEW TECHNIQUE

Cuts down nitrogen oxide emissions

THE GENERATOR Scottish Power has commissioned a novel gas-reburn system for its coal-fired Longannet plant which is claimed to be as effective as catalytic techniques in abating emissions of nitrogen oxides, but considerably cheaper.

A number of techniques are available for reducing the emissions of nitrogen oxides from combustion processes. A cheap one is to use low-NO_x burners, where the combustion chamber is modified so as to lessen the formation of nitrogen oxides, but this only cuts down the emissions by 30-50 per cent. At the other end of the scale is SCR, selective catalytic reduction, which is highly effective but expensive. Here the flue gases are sprayed with some reducing substance (usually ammonia), and then passed over a catalyzer which converts the nitrogen oxides into nitrogen gas. Used in combination with low-NO_x burners it can reduce emissions by about 95 per cent.

In the system that is being introduced by Scottish Power, natural gas is injected into the boiler's combustion chamber at high velocity above the coal flame. This creates a reducing environment that converts NO_x to nitrogen. With low-NO_x burners it is said to lower the emissions by about 80 per cent.

Scottish Power claims that the reburn system offers advantages over catalytic techniques in that it avoids the problems with ammonia emissions and the disposal of spent catalyst. Then, too, because the natural gas replaces about 20 per cent of the coal, the emissions of sulphur dioxide and carbon dioxide are also reduced.

Moreover the costs are distinctly lower. Whereas the additional cost per kilowatt-hour of electricity produced with SCR and low-NO_x burners is 0.23 pence (90 per cent reduction), with the reburn system and low-NO_x burners, giving an 80 per cent reduction of the nitrogen oxides, it is estimated to be 0.12 pence.

Source: ENDS Report 267. April 1997.

Imported acidity

Many of Japan's lakes and marshes will turn acidic within thirty years, seriously affecting animal and plant habitats, according to a report by the Japanese Environment Agency. The study reveals that despite stringent pollution controls, rainfall over Japan now has a pH value of between 4.4 and 5.4, making it as acidic as rain over parts of Europe and North America. The government scientists claim that much of the acidity is caused by pollution from coal-fired power plants in China.

New Scientist. May 3, 1997.

A new threat

The possible effect on the ozone layer of the emissions of nitrogen oxides from supersonic aircraft has long been debated. But now a further threat has come to light: the sulphur in the fuel. Recent research indicates that sulphur compounds emitted from the aircraft can hasten the thinning of the ozone layer. The process is similar to what happens in polar stratospheric clouds. The sulphur trioxide in the exhaust gases quickly becomes converted to sulphate particles, which by attaching chlorinated substances to their surface can attack the ozone.

At the non-supersonic flying height of about 10 kilometres these particles are no threat to the ozone layer. They can on the other hand contribute to global warming – which they do by acting as condensation nuclei for water vapour and thus helping to form high cirrus clouds that shut in some of the heat that would otherwise have escaped into space.

Ny Teknik No. 11, 1997.

A much cleaner car

It is expected that in November the Japanese carmaker Toyota will be presenting a hybrid vehicle that will have half the fuel consumption of an ordinary petrol-driven vehicle and 90 per cent lower emissions of pollutants. It will be driven by a 1.5 litre petrol engine and an electric motor getting power from nickel-hydride batteries. At speeds of less than 30 kph it will be propelled solely by the electric motor, after which the petrol engine will cut in to drive both the vehicle and a generator for charging the batteries. The combination with a petrol engine makes it possible to keep the battery size down to a sixth of what it would have to be for a purely electric vehicle.

Ny Teknik No. 14, 1997.

OZONE

Disturbing reports

DISTURBINGLY high concentrations of ground-level ozone were recorded in Europe during the summers of 1995 and 1996, according to reports from the European Topic Centre on Air Quality.

The annual tabulations are made from data that the EU member countries are obliged to submit to the commission in accordance with the ozone directive (92/72/EEC). The report covering the summer of 1995 reveals the following situation:

□ The threshold value for protection of human health – 110 micrograms per cubic metre of air, as an 8-hour average value – was exceeded substantially in all member states. Expressed as an average, the concentrations to which EU city dwellers were exposed exceeded the threshold value on 1-2 consecutive days. The longest episode lasted eight days.

□ Of the total urban population of 58 million covered by the monitoring stations, 78 per cent were exposed to ozone levels above the threshold value for health on at least one day of the year, and 9 per cent during more than fifty days.

□ The threshold value for the protection of vegetation ($65 \mu\text{g}/\text{m}^3$ as a 24-

hour average) was also substantially exceeded, the concentrations being up to three times the threshold value. Concentrations above the threshold value were experienced on more than 150 days over at least 27 per cent of the EU land surface.

Since the formation of ozone is dependent on weather conditions (it is favoured by sunshine), concentrations will vary considerably from year to year. Thus the report for 1996, referring to the period from April to July, reveals a somewhat better situation, with thresholds exceeded on fewer occasions and somewhat lower concentrations. The threshold for informing the public ($180 \mu\text{g}/\text{m}^3$ as a 1-hour average) was nevertheless exceeded at one time or another in all member countries except Ireland. In the 142 cities with at least one ozone monitoring station, 46 per cent of the population may have been exposed to concentrations above the value at which the public has to be informed on at least one occasion.

Both the above-mentioned reports will be published as EEA Topic Reports by the European Environment Agency, Kongens Nytorv 6, DK-1050 København, Denmark. They are also accessible on internet at www.eea.dk.

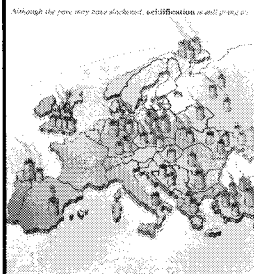
SPECIAL REPORT

Because sulphur is being emitted to the atmosphere at a somewhat slower rate than previously, people have tended to think that the danger from acidification is now over. But in fact the environment is still being affected, and the situation continues to get worse.

In the circumstances, where the dangers posed by acidification are seldom being brought to public attention, it has seemed opportune to the Secretariat to present an extensive résumé of the problem in all its aspects, in the form of this special report.

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

Still with us



Coming events

European Sustainable Energy NGO Seminar. Budmerice, Slovakia, June 22-27, 1997.

Inquiries: INFORSE Europe, Gl. Kirkevej 56, 8530 Hjortshøj, Denmark. Fax +45-86227096, e-mail: ove@inforse.dk.

EU Council of Environment Ministers. Luxembourg, June 23-24, 1997.

Third Pan-European Transport Conference. Helsinki, Finland, June 23-25, 1997.

Inquiries: Finnish Environment Institute. Fax. +358-9-40300291.

Ad Hoc Group on the Berlin Mandate. Bonn, Germany, July 28-August 7, 1997.

Meeting of the International Maritime Organization's Marine Environment Protection Committee. London, England, September 15-19, 1997.

International Conference on Air Pollution Prevention. London, England, September 22-26, 1997.

Inquiries: International Maritime Organization, 4 Albert Embankment, London, England SE1 7SR. Fax +44-171 587 3210.

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

International Symposium on Urban Air Pollution. Istanbul, Turkey, September 23-26, 1997.

Inquiries: World Meteorological Organization. Fax +41-22-7400984.

NGO Conference on Transport and Environment. Vienna, Austria, November 10, 1997.

Inquiries: European Federation for Transport and Environment, Rue de la Victoire 26, 1060 Brussels, Belgium. Fax +32-2-537 7394.

Regional Conference on Transport and Environment. Vienna, Austria, November 13-14, 1997.

Inquiries: UNECE. Fax. +41-917 0123.