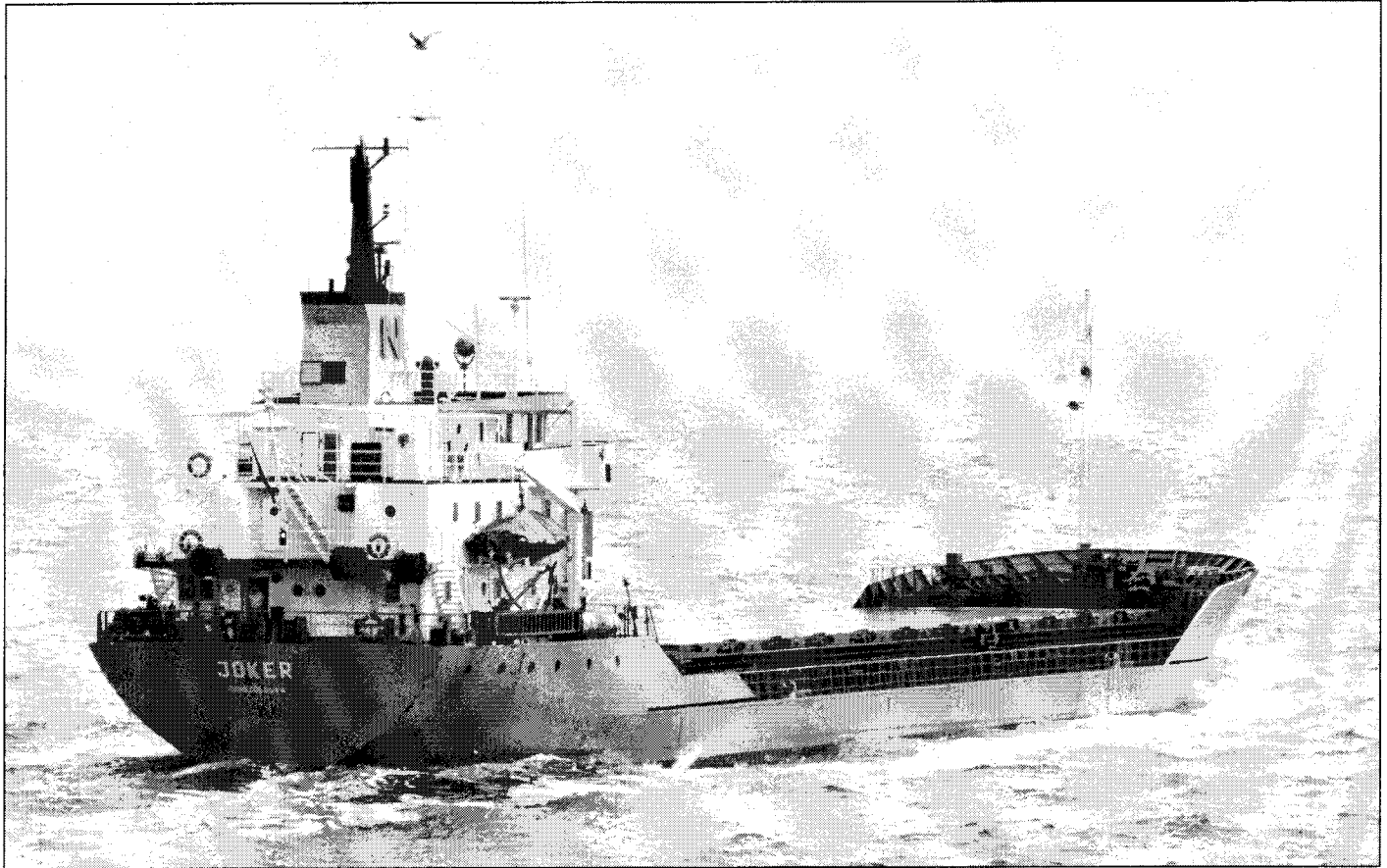


# Acid News



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## SHIPS' EMISSIONS

# No limit for North Sea

THE PROPOSAL of the countries bordering the North Sea to have that sea declared an SOx Emission Control Area did not get past at the IMO meeting in September. The meeting did however agree to make the Baltic such an area, which means that in due course it will be illegal for ships to burn fuel there with a sulphur content of more than 1.5 per cent.

The aim of the meeting, which took place in London and went on for ten days, was to try and reach agreement on an addition, or protocol, to the International Convention for the Prevention of Pollution from Ships, otherwise known as the MARPOL Convention. The addition, named "Regulations for the prevention of air pollution from ships," will take the form of a new annex to the convention. The IMO (International Ma-

ritime Organization) is the UN organ that is responsible among other things for the protection of the marine environment.

Among the matters that are covered by the new annex are the emissions from shipping of sulphur, nitrogen oxides, volatile organic compounds, and ozone-depleting substances. To take effect, it must have been ratified by at least fifteen countries, with a shipping total constituting at least 50 per cent of the world's merchant tonnage. This means that the annex will have to be signed and ratified by several of the countries with flags of convenience (such as Liberia, Panama, and Mexico) before it can come into force.

Since experience has shown that ratifications under the MARPOL convention can take many years, it was

decided that if, by the end of 2002, ratifications of the new annex should represent no more than 45 per cent of the world tonnage, the convention's Marine Environment Protection Committee (MEPC) should be allowed the possibility of modifying the conditions so as to enable ratification and implementation to proceed more rapidly.

The meeting did agree to set a global cap of 4.5 per cent on the sulphur content of ships' bunker oils. As regards the effects on the environment, such a limit is pointless, since it will do nothing to lessen the emissions of sulphur – the global average for sulphur in bunker oils now being estimated to be about 2.8 per cent, and according to a recent study,<sup>1</sup> in 1996 only 0.02 per cent of

*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. It has a board 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

# Stand fast

ONE OF the most important items on the agenda when the EU environment ministers meet on December 16 will be to decide on the fate of the acidification strategy.

Following the Commission's presentation of its proposal, several large industry groups (especially those representing oil, coal, and power interests) have been very active in questioning some of its theses – as have also some member countries, in particular from the Mediterranean area as well as Great Britain and Ireland. The tactics have been

To harp on uncertainties in the underlying data – concerning for instance emissions, costs, critical loads, and computer models.

To try and make out how expensive it will be to achieve the reduction of emissions that will be needed in order to reach the proposed interim target for curbing acidification.

Clearly the aim behind all this has not been to improve the basic data. During the time on which the strategy was being worked out, all the EU member countries and the above-mentioned industrial groups had been regularly consulted, but failed to produce any constructive proposals worth mentioning.

As for emission reductions, according to the strategy text these are to be set down in a new directive on compulsory national ceilings for SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub>, and VOCs, which is to be arrived at by the Commission in the course of 1998. Actual work on that will not start however until the Commission has agreed on an interim target for ground-level ozone, which should have happened early in 1998.

There will in any case be every possibility, while work on the ceilings directive is going on, to take note of fresh information and improved knowledge on every matter that the critics are now complaining about. The Commission has made that plain in the text of the strategy.

The real aim of the industrial groups is to delay discussion of the strategy and so put off the measures contained in it for a further curbing of emissions. But instead of saying so openly, they are taking refuge behind seemingly scientific arguments.

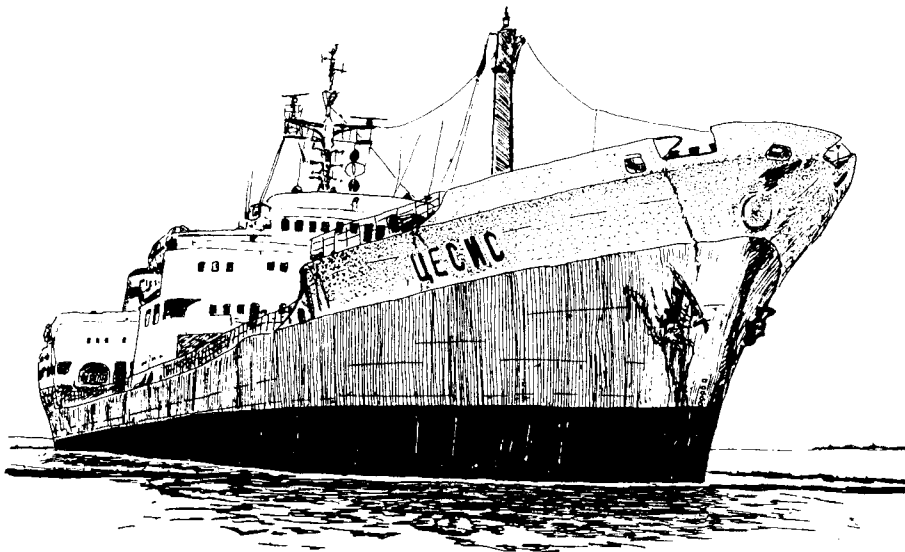
Were public decision-makers always to require such unshakeable scientific data as the industrialists and some member countries are now demanding, no decision could ever be arrived at. Decisions have to be based, as always, on some degree of uncertainty. But that is no reason for delaying them in acute cases – and acidification and ground-level ozone are acute cases.

Here it is also worth noting that the preliminary estimates of the costs of limiting emissions, given in the strategy document, are gross over-estimates. For one thing they take account only of technical measures, and for another the assumed energy scenario is an exaggeration. The energy use it assumes for 2010 would mean an unacceptable increase of 10 per cent, from 1990, in the emissions of carbon dioxide from the EU countries.

The environmentalist organizations are also critical of the strategy as it now appears, considering it to be setting the sights too low (see e.g. AN 1/97, p.2). They have shown, on the basis of the Commission's own analysis, that it would be profitable from the points of view both of the environment and health to reduce emissions both more and more rapidly. It would also pay in terms of money, since the gains from the avoidance of damage would far exceed the cost of the measures themselves. These organizations have, too, put forward precise proposals for more far-reaching measures.

The European Union needs a modern environmental policy – one that is based on the requirements for environmental quality as well as on cost effectiveness. It is therefore highly important that both the Environment Council (of environment ministers) and the European Parliament should give their blessing to the acidification strategy – an act that would give a clear signal to the Commission and to the member countries to adopt the legislation and means of control, such as the ceilings directive, that are necessary for the carrying out of the strategy.

CHRISTER ÅGREN



*Continued from front page*

the fuels used worldwide in shipping had a sulphur content of more than 4.5 per cent.

Some industrial pressure groups had suggested that they might accept a lower global cap, of 3-3.5 per cent, if the proposal to institute SOX Emission Control Areas were withdrawn. The idea was however rejected by the Baltic and North Sea countries on the grounds that such a concentration would still be far too high to have any real effect on European emissions.

This group of countries has striven all along, with the support of the EU Commission, to get both the Baltic and the North Sea declared SOX Emission Control Areas. And just before the IMO meeting Great Britain had proposed the Irish Sea as well.

There can be no doubt that for the effect on acidification it would be extremely cost-effective to cut down sulphur over all three seas. In its proposal for a strategy to deal with acidification, presented last March, the EU Commission had stated that lowering the maximum sulphur content of the marine fuels used in these northern seas would bring down the total cost of the measures needed for the strategy by about 15 per cent. A relatively inexpensive measure at sea would reduce the need for much more expensive ones on land. See Acid News 1/97.

After lengthy debate it was decided to make only the Baltic an emissions control area. Since the reasons for doing so apply almost equally to the North Sea, there are no grounds in principle for choosing

the one sea and not the other. The resistance to the inclusion of the North Sea is based on the idea that the North Sea is a place of international traffic, whereas the Baltic is a sort of inland sea. In this way the oil and shipping industries, together with the registration countries, were able to accept a clearly defined area such as the Baltic, despite their fears of regulation being extended to other seas as well.

Of tradition, the oil companies use bunkers as a way of getting rid of their high-sulphur residues. A greatly increased demand for low-sulphur fuel could bring a need for big investments in technical development at the refineries. The feared effect on the profitability of the companies' operations was probably the main reason for refusing to allow the North Sea to be made a control area.

The North Sea countries made it quite clear however that they would be returning to the fray next year and demanding that this sea be made such an area, and probably the Irish Sea as well. In which case the matter will be up for debate at the next MEPC meeting. Should their demand be accepted (unlikely though that may be), the North Sea could become a control area almost simultaneously with the Baltic, that is, one year after the necessary ratification.

In preparing a directive for national ceilings for emissions under its acidification strategy, the European Union needs to know what reductions of emissions can be expected from shipping. To wait for the annex to be ratified, perhaps with the in-

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## ON THE FOLLOWING PAGES

### Already happening 6

Report from the WWF warns that climate change is already upon us. Glaciers are melting away, the effects of a hotter and dryer climate can be seen in southern Africa, Mongolia, and around the Mediterranean. Sea levels are rising as a result of global warming, plants and wildlife – and even health – are being affected everywhere.

### Before Kyoto 7

In preparation for the third conference of the parties to the Climate Convention in December, the EU Commission has presented a plan for reduction of the emissions of greenhouse gases, which it claims would be cost-effective and feasible.

### NW Russia 8

Although improvement in the economy is likely to bring an increased demand for electricity, studies have shown that by turning to energy from renewable sources, and generally using it more efficiently, industrial output could be increased in this part of Russia, and living standards improved, yet without any undue rise in the emissions of air pollutants.

### Spanish emissions 11

Spain is the third largest emitter of sulphur dioxide among the European members of the OECD, with emissions much higher than the average for that group. Reviewing the situation, the OECD notes that the country will have to take extra steps if it is to live up to its commitment to reduce emissions of sulphur by 35 per cent by 2000.

### Europe's forests 14

Last year's survey showed every fourth tree to be suffering from abnormal thinning of the crown. The percentage of damaged trees is still especially high in central and eastern Europe.

### Emissions 16

Once again, the annual report from EMEP shows the European emissions of sulphur and nitrogen oxides to be going down.

### Energy revolution 18

It is difficult, writes Preben Maegaard of the Folkecenter for Renewable Energy, Denmark, to see how large-scale generating systems, based on uranium and coal, will be able to compete with the system of small units under local ownership, using gas engines, such as recently has spread with surprising speed all over Denmark.

Continued from page 3

clusion of the North and Irish Seas as special areas, would leave too long a period of uncertainty. The question is what the Commission and the EU member countries can and will be determined to do to hasten the use of low-sulphur fuel oil in ships plying in these seas.

The EU's possibilities of influencing the procedures within the MARPOL convention are obviously limited, not least because the EU is not a member of the IMO but only has observer status. Collective action on the part of the EU member countries seems to be hindered, too, because Greece is against making the North Sea a special area.

There are however several ways of getting around the problem.

□ The EU could extend the recently proposed directive for limiting the sulphur content of certain kinds of oil to include marine bunker fuel (see AN 3/97, pp.8-9). Thus a legal limit could be placed on the sulphur content of bunker oil sold within the union and used in EU-registered shipping in EU territorial waters. It is on the other hand doubtful whether such a directive could also be made to apply to vessels traversing EU territorial waters that are not registered in any EU country.

□ The EU and/or EU member countries could apply economic instruments of the kind that Sweden will be introducing as from January 1998 (see AN 1/97, p.3).

□ Both the Baltic and North Sea countries could "pre-implement" the expected limits – applying them in practice, without waiting for the final ratification of the new MARPOL annex. Such a step would be facilitated if individual countries and/or shipping interests were to make bilateral or multilateral agreements, voluntarily, to the same end.

The above steps could be taken either separately or in combination.

It is not impossible either that several of the Mediterranean countries will soon start agitating to get the Mediterranean included among

the special-area seas. Emissions of sulphur and nitrogen oxides contribute to a number of environmental problems in that region, such as acidification, damage to health, corrosion of monuments and buildings generally, eutrophication, and the formation of ground-level ozone. Although no detailed analysis has yet been made, it would probably also be profitable to impose the kind of rules that

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*The lack of action  
means a high bill  
for Europe's taxpayers*

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are now being discussed for the Baltic and the North Sea, to limit the emissions of air pollutants from shipping, in the Mediterranean as well.

The new annex to the convention also includes requirements concerning the maximum permissible emissions of nitrogen oxides from some types of diesel engine with a power output of more than 130 kW. These requirements are not particularly onerous, and a number of engine types are excluded. In view of that, and the fact that the turnover rate for ships is very slow, it seems hardly likely that the new rules will have any great effect on emissions.

The technology for the denitrification of ships' exhaust gases does now exist – in selective catalytic reduction. It can be used on all large new vessels, and even be installed on many existing ones. It eliminates about 95 per cent of the nitrogen oxides, as well as much of the VOCs. Selective catalytic reduction has already been fitted on a number of ferries operating between Sweden and Denmark.

Norway has long been urging measures to bring down the emissions of nitrogen oxides from all existing marine engines, and has actually shown how it can be done to reduce them by up to 40 per cent at a low cost. But the Norwegian proposals

were not accepted at the IMO meeting, most countries seeming disinclined even to consider them.

Obviously no move of any significance to reduce the emissions of nitrogen oxides from shipping can be expected of the IMO within the near future. Alternative ways will therefore have to be staked out. Possible solutions include legislation at the EU or the national level, the use of environmentally differentiated harbour and fairway dues, voluntary agreements, and the setting of conditions when negotiating transport services (see AN 3/97, p.12).

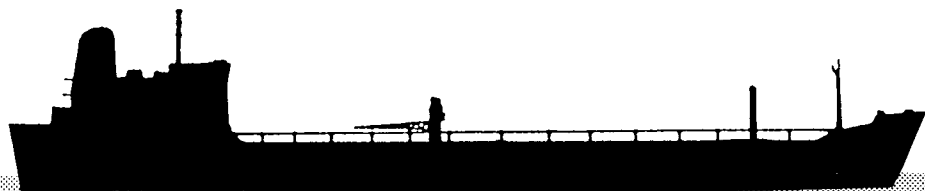
To the environmentalist organizations the outcome of the MARPOL meeting in London appears a great failure.<sup>2</sup> As one press release expressed it: "The lack of action means a high bill for Europe's taxpayers and business. Now that no adequate action is taken to combat emissions of acidifying air pollutants at sea, the EU will have to take much more expensive measures on land. The extra costs will be more than 1 billion ecu annually."

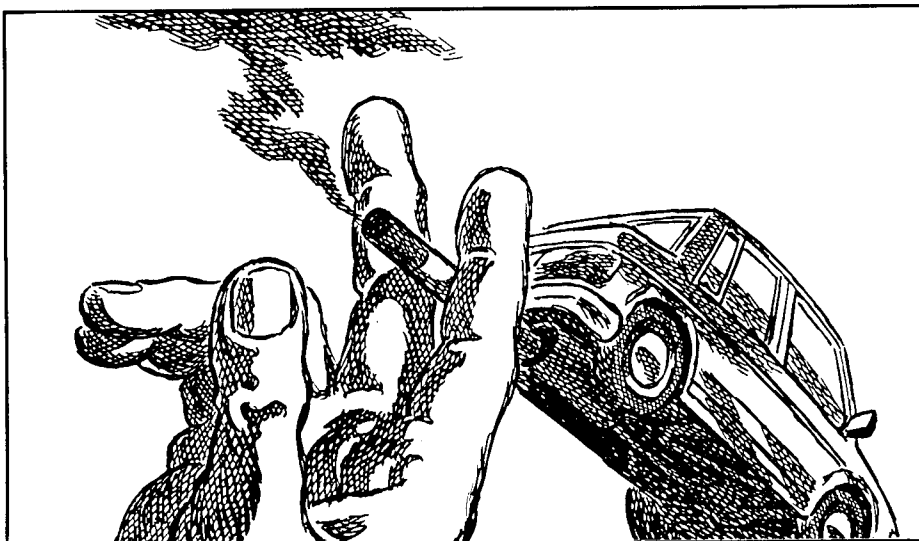
Environmentalists are demanding a global cap on the sulphur content of bunker oils of 3 per cent as a start, with stepwise reductions to follow. They are also calling for making the North Sea as well as the Baltic an SOx Emission Control Area, where the limit for the sulphur content of fuel oil would be 0.5 per cent. Seeing that the North Sea was not made such an area, they are urging the littoral states to take unilateral action to curb the emissions from shipping. That might mean legal limits, fiscal incentives and/or voluntary agreements to the same end.

CHRISTER ÅGREN

<sup>1</sup> *Marine Fuels – Worldwide Sulfur Levels* (1997). Statistical report produced for the Norwegian Maritime Directory by W.P. Cullen, Det Norske Veritas Petroleum Services Inc.

<sup>2</sup> Leaflet and press releases from the European Federation for Transport and Environment, the European Environmental Bureau and the Swedish NGO Secretariat on Acid Rain.





EU AIR QUALITY

## New directive puts onus on member countries

ON OCTOBER 8 the EU Commission finally issued its proposals for new limit values for concentrations of sulphur dioxide, nitrogen dioxide, particulates, and lead in the atmosphere. In each case a date is proposed for implementation.

The Commission's proposals, which agree mainly with those in the preliminary document that was reported in *Acid News* 2/97, would make the member countries responsible for elaborating and implementing action plans to reduce emissions and ensure that the standards will be met by the required date. Matters such as the way concentrations are to be measured, and citizens' rights for information, also find regulation in the proposal.

There is a divergence from the preliminary document as regards particulates, PM<sub>10</sub>. The limit value may now be exceeded more often: twenty-five times a year as against fourteen. "Ironically, the pollutant for which the WHO could not determine a safe exposure level is precisely the one where the Commission has watered down the expert working group's compromise," notes Annette Hauer of the European Environmental Bureau. According to EEB the less stringent requirements that are proposed for the period from 2005 to 2010 will carry a risk of 50,000 additional deaths as a result of particle pollution.

The Commission estimates that meeting the proposed limits for sul-

phur and nitrogen dioxides will call for a reduction of the emissions of each of these pollutants by 10 per cent over and above any reductions that should have taken place by 2010.

In the case of sulphur this could probably be accomplished through adoption of the Commission's proposals for new requirements concerning the sulphur content of fuel oils (see *AN* 3/97, pp. 8-9). For nitrogen dioxide energetic measures will also be needed for dealing with the particular problems of urban air. Although no great reduction of the overall emissions would immediately follow, reduced traffic, especially with diesel-driven vehicles, would be a necessary part of the effort.

Particles would have to come down by about 50 per cent from present levels, if the limit values set for 2010 are to be met throughout the union.

The Commission's proposals will now be passed to the Council of Ministers and the European parliament.

PER ELVINGSON

**Note.** The proposals take the form of a daughter directive to the framework directive on ambient air quality assessment and management (96/62/EC) that was adopted by the Council of Ministers in the autumn of 1996. The proposed directive as well as its likely economic effects were described in some detail in *Acid News* 2/97, pp. 7-9. The Commission has aligned its proposals with the guidelines presented by the World Health Organization last year (*AN* 1/97, p.9). It is now proceeding with the establishment of limits for other pollutants, among them ozone, benzene, and carbon monoxide.

EU

## The cost of accession

IT WILL BE EXPENSIVE for the eastern countries that are seeking admittance to the EU to attain the union's environmental standards. The European Commission estimates that the ten countries that are now lining up for membership will need to invest altogether 120-130 billion ecus, of which 40 per cent would be for dealing with air pollution.

The necessary investments would correspond to 3-5 per cent of these countries' gross domestic product for the next ten years, according to the Commission. (According to other studies, such as one from the Danish environmental protection agency, the cost would however only be half as much.) As regards air pollution, the Commission believes that all the candidate countries will encounter considerable difficulty in meeting current EU criteria within the given time period. An 80-per-cent reduction of their emissions of sulphur and nitrogen oxides would, in the Commission's estimate, cost these countries about 50 billion ecus, and in most of them the necessary legislation is still lacking. The Czech Republic is however praised for having adopted a stringent program for reducing air pollution by 1998, in part by closing down the most polluting plants.

In view of the high costs of coming into alignment with EU environmental requirements, the Commission has suggested the possibility of candidate countries having to have complied only with the priority requirements by the time they join the union. Timetables for achieving full compliance could then be written into their treaties of accession. The idea has however met with protests, Denmark for instance having pointed to the risk of firms moving eastwards to circumvent the EU's environmental controls. A fear has been expressed, too, that such a strategy would prevent any development of EU environmental standards during the time needed for the candidate countries to catch up with the present requirements.

Sources: *Europe Environment* No. 506. September 16, 1997. *Environment Watch: Western Europe*, September 19, 1997.

# Ever more insistent warnings

Evidence is accumulating to show that the climate is already changing

THE EFFECTS of climate change can already be seen in every region of the world – and indeed in most countries, too. Copious evidence of this is given in a report published by WWF, the World Wide Fund for Nature, in view of the climate summit that is to take place in Kyoto, Japan, in December. Here are some examples of what is happening:

□ The warmest year on record was 1995, and 1997 appears likely to come a close second. The five warmest years to date had all occurred in the 1990s.

□ The greatest thaw since the last ice age is now taking place. Much of Siberia is 3-5°C warmer than it was earlier this century, the glaciers in the European Alps have lost half their volume since 1850, and those in the Peruvian Andes are also retreating. And according to US government predictions, there will be no glaciers at all in the Glacier National Park, Montana, by 2030. Some penguin populations in Antarctica have collapsed, and krill – a source of food for many marine animals – have declined, apparently as a result of higher temperatures in the water.

□ It has become hotter and drier in many parts of the tropics, and especially in the already arid belt stretching from western Africa to Indonesia. In the 1990s southern Africa had the five driest years of the century, with crop failures and water shortages as a result. During the past thirty years the Gobi region of Mongolia has been getting steadily less summer rainfall, and the drying trend extends even into Europe. Around the Mediterranean rainfall is down 20 per cent, and since 1991 Spain has had five years of continuous drought. The flow of the Achelooos, Greece's longest river, has declined by 40 per cent in four years.

□ Sea levels are rising and ocean temperatures are increasing. On an average, sea levels are now 10 to 25 centimetres higher than they were a century ago. Some 80 per cent of the world's beaches are eroding, often at the rate of many metres a year. The very existence of many coral-island

nations, such as the Marshall Islands, Anguilla, Tokelau, and the Maldives, is threatened by rising seas. The temperature of the surface water in the Pacific Ocean westwards California has risen by 1°C, triggering a decline of zooplankton – another key food source – and causing a collapse of anchovy stocks and the loss of four million seabirds.

□ Global warming is affecting wildlife and plants the world over. Trees are growing faster and dying younger in tropical Africa, Central and South America, Southeast Asia, and Australia. In Alaska the migrations of the great herds of caribou no longer coincide with the growth of the vegetation that is their main source of food, with resulting hunger. Red tides of toxic algae have returned to the Helgoland Bight, in the North Sea, after an absence of 300 years.

□ Evidence is also growing of the effects of global warming on human health. Doctors estimate that as a result of the heat waves in 1995, the warmest year so far, several thousand people died of heart attacks and respiratory diseases, both in Europe and North America. A heat wave

caused more than 500 extra deaths in Chicago alone. During the 1990s, plagues of mosquitoes have been carrying malaria, dengue and yellow fever to new places in Latin America and Africa. Malaria is reaching further up the hillsides in central Africa. Dengue fever is also penetrating higher in Costa Rica, Colombia, and Mexico, and yellow fever has struck Ethiopia.

Concerning the causes of warming, the WWF refers to the United Nations' Intergovernmental Panel on Climate Change (IPCC), embracing some 2000 of the world's leading scientists in various fields. The panel concluded in 1995 that warming was real, serious, and accelerating, giving as the most likely cause the burning of fossil fuels, with a consequent increase in the amounts of carbon dioxide and other greenhouse gases in the earth's atmosphere.

**The State of the Climate: A Time for Action.** Available from WWF International, Avenue du Mont-Blanc, 1196 Gland, Switzerland. Fax. +41 22 364 53 58. The whole report, together with updated commentary, can be found on internet: [www.panda.org/climate/climate.htm](http://www.panda.org/climate/climate.htm).



*Diminished rainfall around the Mediterranean is one of many signs supporting the belief that climate change is already taking place.*

# Cost-effective strategy outlined for Kyoto

THE DIRECT COST to the European Union of reducing the emissions of greenhouse gases by 15 per cent, from 1990 to 2010, is estimated to lie between 15 and 35 billion ecus in 2010, or about 0.2 and 0.4 per cent of gross domestic product in that year. The overall macro-economic effect on GDP may range from 1 per cent positive to 1.5 per cent negative, depending on the measures chosen to carry out the reduction – all according to estimates released in a new communication from the EU Commission.<sup>1</sup>

The communication refers to a number of studies showing the overall costs of a 17-per-cent reduction of CO<sub>2</sub> emissions by 2010 to vary between a 1.5-per-cent decrease in GDP in 2010 and a 1-per-cent increase.

"These costs are very low when compared with the expected growth in GDP of 50 per cent between 1990 to 2010. The fact is that according to the Commission's own estimates it is extremely unlikely that Europeans will experience any financial disadvantages from a 17 per cent cut in the EU's CO<sub>2</sub> emissions. Indeed, it is very possible that this type of action will make them wealthier," says Aphrodite Mourelatou of Greenpeace International's European Unit.

Last March, in preparation for a coming meeting of the climate convention, the EU environment ministers agreed the following negotiating position: that all industrialized countries that are parties to the climate convention should reduce their emissions of the three greenhouse gases carbon dioxide, methane, and nitrous oxide, individually or jointly by 15 per cent by 2010, as from 1990.<sup>2</sup> See AN 1/97, p. 16.

At the June meeting of the Environment Council, the ministers also agreed to include an intermediate reduction objective of at least 7.5 per cent, for 2005. The EU position envisages an average reduction for a basket of the above gases.

The ability of the EU to attain the proposed objectives has since been much discussed and put in question. What the Commission wanted to

show in its communication was that those objectives would not be unrealistic. The technical possibilities for reduction are set forth for all sectors: transportation, manufacturing industry, power generation, etc.

The Commission bolstered the communication with the following exhortations:

- The potential future damage and cost resulting from climate change makes it imperative to urgently reduce greenhouse-gas emissions.
- Industrialized countries must continue to take the lead.
- The reduction targets are technically feasible and economically manageable if all industrialized countries simultaneously make a comparable reduction effort.
- Many of the measures identified in the communication for a cost-effective strategy will be applicable in industrialized countries generally.
- The choice of the right mixture of instruments is essential for a cost-effective climate strategy.
- The involvement of all parts of society will be needed.

The communication implies that the EU will only do what the Kyoto protocol requires, even if that means less than a 15-per-cent reduction.

"This makes a mockery of the communication's case that 15 per cent is feasible and cost effective," says Aphrodite Mourelatou. "If this is the case, then the EU should implement a strategy to achieve this target unilaterally."

PER ELVINGSON

<sup>1</sup> Climate Change – The EU Approach for Kyoto. COM (97) 481. Available from the Commission's internet site: <http://europa.eu.int/en/comm/dg11/dg11home.htm>.

<sup>2</sup> By far the most important of the gases in the EU's negotiation basket is carbon dioxide (CO<sub>2</sub>), which alone is responsible for about 80 per cent of the climate effect when the gases are weighted in accordance with their so-called global warming potential. A cost-effective strategy might involve reducing the other two gases more than 15 per cent and CO<sub>2</sub> less, but it would still be necessary to reduce the latter by more than 10 per cent if the 15-per-cent overall target is to be met.

## Pre-meeting split on emissions

AS WAS EVIDENT when the last preparatory meet before Kyoto ended in Bonn on October 31, the industrialized countries will be going to the meeting in December deeply divided as to the way to reduce emissions of greenhouse gases. On the one side is the EU, proposing a 15-per-cent reduction by the industrialized countries between 1990 and 2010 (article alongside), and on the other are the United States and Japan, both wanting to postpone implementation of the commitments they made at Rio in 1992. At that conference the industrialized countries agreed to have brought their emissions back to 1990 levels by the year 2000.

While the Americans are proposing that the stabilization deadline should be put off until 2012, the Japanese would allow the industrialized countries to have reduced their emissions by 5 per cent either by 2008 or 2012, as from 1990 levels. Both would allow great "flexibility" – by making it possible for instance to calculate reductions in different ways, trading in emission permits, or "borrowing" from future emission accounts. The Japanese proposals would mean in effect that instead of 5 per cent, Japan would only need to reduce by 0.5 per cent if it made use of all possible loopholes. The same would apply to the United States as well as many other developed countries.

The Japanese and American bids have both met with strong criticism, not only from the environmentalist organisations but also from the EU. A spokesman from the Commission has declared "it is hard to understand that what can be done in the EU cannot be done in Japan or the US." WWF International takes the view that President Clinton will now have to become the "Houdini of climate change" and escape from the grip of American coal and oil interests.

China and the G-77 group, which comprises a great number of developing countries, are said to be generally in favour of the EU proposals – which should mean they will have the support of some 150 nations.

## Switch them off

Some 11 per cent of the electricity used in German homes – or about 14 TWh per year – is wasted because electrical apparatuses are left idling. The figure for places of work would be 6.5 TWh. It has been calculated in a study made by Umweltbundesamt, the federal environment office, that by switching off computers, telephones, TV sets, and water heaters when they are not in use, more electricity could be saved in a year than is consumed by the whole city of Berlin. It would also cut 1 per cent off the German emissions of carbon dioxide.

New Scientist, September 20, 1997.

## Freer information

A Convention on Access to Environmental Information and Participation in Environmental Decisionmaking is at present being drafted under the auspices of ECE, the UN Economic Commission for Europe, as a result of recommendations made at the last pan-European environmental conference, which was held in Sofia, Bulgaria, in 1995. The aim is to bring about improvement in regard to access to justice as well as environmental information, and to ensure better public participation in decision making. If adopted as it now stands, the convention would expand the rights of individuals and NGOs in the former eastern-block countries in particular, but also in most of the countries of western Europe. Whether it will embrace the EU and its institutions as well is as yet unclear. The main brake on the negotiations, which are in any case proceeding at snail's pace, is Germany, which claims to lack the time and resources needed to provide information to the extent proposed in the convention. The aim is still to have it ready for signing when the European environment ministers meet at the next pan-European conference, at Aarhus in Denmark, in June next year.

Environment Watch: Western Europe. September 19, 1997.

## Environmental aid

Sixty projects carried out in the Baltic States by the Swedish energy authority NUTEK, in collaboration with local bodies, are expected to reduce the emissions of carbon dioxide, sulphur dioxide, and nitrogen oxides by 300,000, 3100 and 170 tons per annum. Since the start in 1993, the projects have included the conversion of boilers fired with coal or oil to heating plants burning biofuels, measures to cut heat losses in district heating systems, and introducing energy-efficiency in buildings.

Energikällan. No. 3, 1997.

## ENERGY

# Northwestern Russia

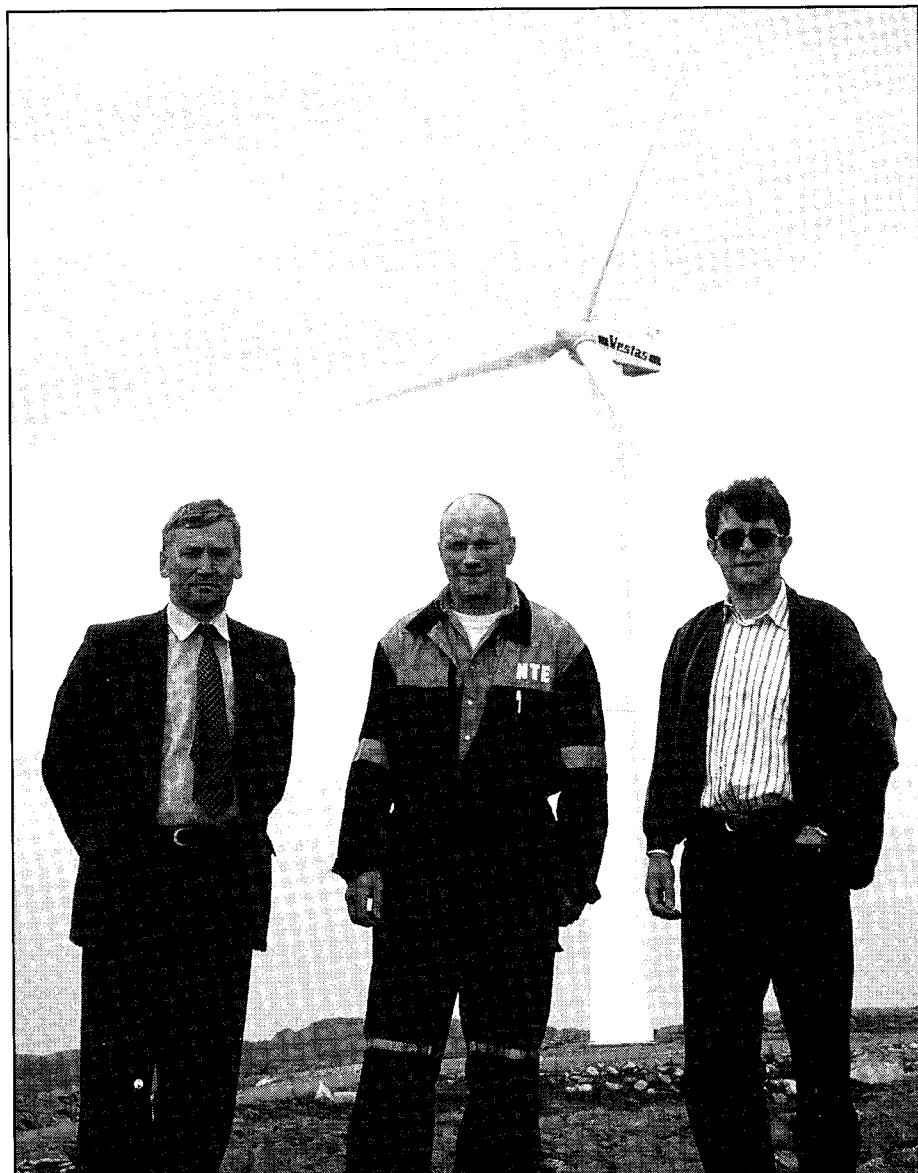
Even with economic recovery, the production of electricity in this part of Russia need not to be as bad as now for the environment.

Since the collapse of the planned economy in Russia in 1990, energy consumption and air pollution have both dropped by about a quarter. Forecasts point however to a renewed increase in energy consumption and a consequent increase in the emissions of air pollutants.

The average figures for energy use hide however the differences in development between sectors. While households and the service trades have increased their use, there has been a dramatic reduction in industry. Nevertheless industry is still

using almost 60 per cent of the electricity in northwestern Russia, and households only 10-15 per cent. Growth in the household and service sectors is mainly due to an increasing use of domestic appliances and a budding space heating with electricity.

Household use will probably continue to grow, being still low in comparison with that of the country's western neighbours. The great question is whether industrial use will regain its previous heights. Although there are forecasts pointing in that direction, it is difficult to see how



Russian environmentalists on a study tour to Norway.



large parts of heavy industry will find a market for the same enormous output as they had in the eighties.

Developments in the energy sector will depend on the kind of energy policy that is pursued – and that is now largely determined at the regional level. Several studies of the possibilities in northwestern Russia have shown that by turning to energy from renewable sources and using energy more efficiently, industrial output could be increased and living standards improved, yet without causing the emissions of pollutants to rise again.

A study of the likely trend of electricity consumption in northwestern Russia, commissioned by Greenpeace, was published this last summer by the Öko-Institute in Germany.<sup>1</sup> It found most of the projections to have been far too optimistic. A more sober view of the outlook for the economy suggests that demand will remain more or less stable for some years, before a slight increase sets in. With a generally more efficient use of energy, electricity consumption may be expected merely to keep pace with the increase in economic growth, so that in northwestern Russia by 2010 it should be no more than 5 per cent over the 1995 level. That would mean a reduction in total power production from 75 TWh in 1990 to 57 TWh in 2010.

Assuming the Öko-Institute's forecast to be realistic, there would appear to be a good likelihood of the electricity produced in northwestern Russia being much less environmentally detrimental than it is today.

Now about half of the electricity in that part of Russia is generated in nuclear plants (28 TWh in 1996). The region's total installed capacity for nuclear power is 5760 MW. The reduced demand of the last few years has meant less production from combined heat-and-power plants, where the coal-fired capacity is 3778 MW and the oil-fired 5257 MW. As in Russia generally, a rapid switchover to gas is now taking place. During the last winter gas was for instance led through a new pipeline to Petrozavotsk, the capital city of Karelia.

Safety has been neglected in all the nuclear plants in northwestern Russia – half of which have moreover been in operation for more than twenty years. There are indeed grandiose plans, urged forward by Rus-

sian nuclear interests in cooperation with Siemens in Germany, to replace the old plants with new ones. The power from them would not however replace that from the old Chernobyl-type generators, but partly be an addition to it and partly be exported in payment for western participation in the project.

On the Kola peninsula the idea has been shelved for lack of funds, and there seems little hope of any result from "creative" proposals for financing it either. A new reactor would cost the equivalent of US\$1.5

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*The conditions for  
windpower are among  
the best in Europe*

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billion, and there are much more reasonable alternatives. The authorities have however made no preparations for closing down the old plants – in fact rather the contrary. They wish to extend the life of the two oldest reactors at the Kola plant to forty years. For want of any realistic proposals, the old reactors are in fact likely to be kept going until they come to a natural stop.

The region's potentials for renewable energy are good. The conditions for windpower on the north coast of the Kola peninsula are among the best in Europe. The meeting of the cold arctic continental air mass with the warm air from the Gulf Stream gives a strong, stable winter wind, with an average speed approaching 10 metres per second. Compared with one in a North Sea location, a windfarm on the Barents Sea would produce twice as much electricity.

A report based on twenty years of meteorological observations, entitled *The perspectives of wind energy development in the Kola Peninsula*<sup>2</sup> has recently been produced by the environmentalist organization GAIA, according to which the cost of windpower generated there would be as low as 2 US cents per kilowatt-hour. Such windpower, produced mainly in winter, would make a good complement to the existing hydroelectric system on the peninsula, with a capacity of 1500 MW. One of the likely locations for large-scale windpower production lies just 100 kilometres

northeast of Murmansk. Here there is all the necessary infrastructure already in place on account of the existing hydroelectric developments. A windfarm with the capacity of 1000 MW – more than enough to replace a nuclear reactor – would only need to take up 5 per cent of the area of a square measuring 40x40 kilometres.

In 1992 the Karelian Autonomous Republic said definitely no, after a year-long debate, to the building of a nuclear plant on its territory – mainly because of a desire to go in for a more decentralized system for energy supply. Today Karelia is a large importer of energy, covering half of its need from fossil and nuclear sources on the Kola peninsula.

The Karelian section of the All-Russian Union for Nature Conservation has been active in the debate on future energy forms for the republic. Last year it took energy producers and representatives of the authorities and the media on a study tour of the adjoining parts of Finland, where a third of the total needs for energy are supplied from bio sources. The possibilities of this kind would be even greater in Karelia. Using forest waste there would not only make a considerable contribution to the republic's energy supply, but also provide employment and reduce the cost of importing energy.

Through cooperation with the Russian Socio-Ecological Union and environmentalist organizations on the Finnish side, the Karelian section has become a prime mover in assessing resources and promoting the use of biofuel. It will be necessary however to develop a domestic production of firing equipment, since customs and other duties have made imported equipment exorbitantly expensive.

DAG ARNE HØYSTAD

The writer acts as coordinator of the work of the Norwegian Society for the Conservation of Nature and the Swedish NGO Secretariat on Acid Rain with that of the Russian environmentalist organizations.

<sup>1</sup> Northwest Russia: Energy report. Published by Greenpeace International. English, German and Russian editions. 60 pp. Can be ordered from Öko-Institute, Berlin. Fax. +49-30-2016 5088.

<sup>2</sup> The report was published by Kola Ecological Centre GAIA. English and Russian editions. 85 pp. Available from D-A Høystad, fax. +47-2299 2210. E-mail: mirnrv@online.no.

# Increasing road traffic stirs political debate

## Less traffic, more jobs

Cutting back road traffic by 10 per cent from its 1990 level by 2010 would, according to estimates published by Friends of the Earth, result in a loss of 43,000 jobs in the car-repair and maintenance sector. Increased travelling by public transport and cycling would however create 90,000 new jobs on the railways, 31,000 in the manufacture and use of buses, and 9000 in bicycle making and servicing. Net gain in jobs would be altogether 87,000.

**\* Less Traffic, More Jobs: the Direct Employment Impacts of Developing a Sustainable Transport System in the United Kingdom.** Available from FoE Ltd, 26-28 Underwood Street, London N1 7JQ, England. Fax +44-171-490 0881.

## Smog in Paris

On October 1 all cars with number plates ending in an even figure were banned from the streets of Paris and its immediate environs. Excepted from the ban were only some public-service vehicles and cars with at least three passengers. Travel by mass transportation was free. This was the first time the inhabitants of the French capital had to put up with such a drastic measure – made possible by a new law on air quality that was passed last year (see AN 2/97, p.9). The decision to cut traffic was made the day before, after the concentration of nitrogen dioxide in the air had gone past the alarm limit of 400 µg/m<sup>3</sup>. According to the police, car traffic was about a third of that on an ordinary day, jams were only half as long, and travel by public transportation increased by 10 per cent. Ny Teknik. No. 41, 1997.

## Focus on paints

Paints will probably be the next target of EU efforts to reduce the emissions of volatile organic compounds, with car body paints used in vehicle refinishing workshops coming first. But decorative paints, which constitute a much bigger sector, will presumably also become regulated, either in the same directive or in a second stage.

The reason for paints now coming onto the agenda lies largely in the decision made by the Environment Council in June concerning a directive to regulate emissions of VOCs arising from the use of organic solvents in some twenty industrial processes (AN 1/97, p.8). Because of the difficulty of controlling observance the ministers decided that enterprises using less than half a ton of solvents a year should be excluded from the regulation. They sought a "product-based approach" instead, for controlling emissions from the vehicle-coating and refinishing sector. Environment Watch: Western Europe. September 5, 1997.

In its pre-election campaign, the Labour Party held out promises of extensive measures to curb road traffic in Britain. That aim has recently been repeated in a consultation paper. Critics maintain however that this sixteen-page document contains little that is new.

Following a report from the Royal Commission on Environmental Pollution that was issued in 1994 (see AN 1/95, p.9), the effects of road traffic on the environment rose to the forefront of the political agenda in Britain. In a subsequent report last September the commission remained critical of actual policy, and especially of the unambitious approach of the green paper published by the preceding government in 1996.

The coming into office of a new government aroused hopes of a more radical attitude. In a policy paper issued before the election, the Labour Party had called for the establishment of national targets for transportation, stronger backing for public transport, a major shift from road to rail, and a review of the taxing of transportation and company cars. The party also said it would be introducing a graded system for the excise duties on vehicles in order to favour more fuel-efficient and less polluting types.

There is hardly any question that something must be done. According to official forecasts, the volume of road traffic in Britain will, unless measures are taken to check it, increase by 23-46 per cent in the next twenty years. But how much of its election promises the Labour government is prepared to fulfill will appear from the White Paper on transport that is due for publication next year, after consideration of the outcome of its consultation paper.

That paper seeks views on twenty-seven "key questions," many of which are extremely broad. Among them are whether there is a need for transportation targets, how far the government should consider the possibilities of restraining road traffic, what should be the role of economic instruments and regulation, and what might be done to improve public

transportation. This continuing of consultation has been condemned by Friends of the Earth, which comments that Labour had produced "numerous transport policy statements" while in opposition, and sees no signs of rethinking in the new paper. While taking a somewhat less critical attitude, the National Society for Clean Air nevertheless agrees with Friends of the Earth that there are a great many measures that could be taken without delay.

Together with a number of other organizations, Friends of the Earth is pushing for a bill to reduce road traffic. One they have partly drafted has been put forward by a parliamentary representative of Plaid Cymru, the Welsh Nationalist Party. It will be up for debate at the beginning of next year, and if passed will set binding targets for reducing road traffic nationally by 5 per cent by 2005 and 10 per cent by 2010, as from 1990 levels.

"Every year thousands of people die prematurely as a result of traffic related pollution. Urgent action is needed to allow us to breathe clean and healthy air – this is why the government should give its backing to a new law, the Road Traffic Reduction Bill, setting national targets for reducing traffic," says Tony Bosworth, Air Pollution Campaigner at Friends of the Earth.

There may in fact be wide public support for measures to deal with air pollution from traffic. According to a survey by the National Society for Clean Air, released in September, 30 per cent of those polled were worried "a great deal" by such pollution, and almost 65 per cent were worrying at least "a fair amount."

PER ELVINGSON

Sources: ENDS Report 271. August 1997. Friends of the Earth, September 25, 1997.

# Must do more to control emissions



*Continued economic growth may lead to increased emissions of air pollutants and make it difficult for Spain to meet its environmental commitments.*

SPAIN COMES IN for relatively harsh criticism in an OECD review of the country's environmental performance. While recognizing that progress has been made in some respects, the OECD insists that Spain will have to make still greater efforts if it is to match its economic achievements with a better approach towards "environmental convergence" with the other EU member states.

The chief targets for criticism are water and waste management. As regards air pollution, praise is handed out for the reduction of sulphur-dioxide emissions and the ambitious efforts to develop a system for monitoring air quality. The praise is however qualified, since the OECD maintains that much remains to be done even in these respects. To improve air quality, Spain should, the organization says, consider ways of making more effective use of monitoring data when developing strategies for dealing with local air pollution, and assessing progress.

The OECD reviewers also note that Spain will have to take extra steps if it is to live up to the commitment made in the second sulphur protocol under the Convention on Long Range Transboundary Air Pollution – to reduce emissions by 35 per cent between 1980 and 2000. They seem however to have overlooked the fact that at the time of the signing of the

protocol, in 1994, it was thought to be cost-effective on a European scale if Spain were to reduce emissions by 55 per cent. Acidification tends on the whole to be played down in the report, which says that Spanish emissions have not caused any trouble in neighbouring countries, and that the critical loads have only been exceeded here and there in Spain itself.

Spain's emissions of nitrogen oxides and volatile organic compounds are on the way up. Between 1987 and 1994 the emissions of nitrogen oxides increased by 40 per cent, despite Spain having signed the 1988

NOx protocol, also under the Convention, by which it undertook to have kept concentrations in 1994 to 1987 levels.

While noting that Spain's emissions of carbon dioxide are low in comparison with those of other EU countries, the OECD reviewers add that special measures will be needed to ensure that economic growth will not produce excessive emissions. Pointing to the fact that transportation is now expanding at a much greater rate than the gross national product, they also urge the need for a national policy – to combat noise and pollution – in this sector too.

Acknowledging Spain's evident progress in matters concerning the environment during the last decade, the OECD nevertheless takes the view that legislation ought to be streamlined and codified in order to improve implementation and enforcement, and that the specific responsibilities of the central and regional authorities be clarified. It also suggests that financial instruments and the polluter-pays principle should be employed to a greater extent, and that access to environmental information should be improved.

**OECD Environmental Performance Reviews: Spain.** Can be ordered from OECD Publications, 2, rue André-Pascal, 75775 Paris cedex 16, France. Fax +33-1-4910 4276.

## Spanish emissions

Spain is the third largest emitter of **sulphur dioxide** among the European members of OECD, after Germany and the United Kingdom. Per capita and per GDP, its emissions are much higher than the average for OECD Europe. In 1993 they amounted to more than 2 million tons, with power plants accounting for 62 per cent and industry for twenty-six. Large combustion installations – particularly at power stations burning high-sulphur coal – are the principal sources in each case.

In the same year the emissions of **nitrogen oxides** amounted to 1.2 million tons. Counted per capita and per GDP they were similar to the OECD average. Mobile sources contributed most, with 62 per cent of the total. Power

plants emitted 21 per cent, and industry 15 per cent.

The emissions of **volatile organic compounds** also totalled 1.2 million tons, 45 per cent coming from mobile and 55 per cent from stationary sources. The use of solvents is biggest among the latter.

The emissions of **carbon dioxide** arising from the use of energy came to 223 million tons. Per capita they were 25 per cent lower than the OECD Europe average, and per GDP 13 per cent lower. By 1993 they had however increased by 17 per cent since 1985. Energy transformation accounted for 35 per cent, industry for 21 per cent, other sources 10 per cent.

# Shipping and acidification

Emissions now found to be two to three times greater than previously assumed

IT APPEARS from a recent report from EMEP, the European Monitoring and Evaluation Programme, that the emissions of sulphur and nitrogen oxides from shipping contribute more to the acidification of the environment than had previously been assumed. The reason is mainly that the size of the emissions had been underestimated. With a decrease of the emissions from sources on land, they have however also increased relatively.

The report contains calculations of the extent to which depositions of acidifying sulphur and oxidized nitrogen compounds in various parts of Europe are due to emissions from shipping in the North Sea. The calculations are for each of the two years, 1990 and 1995.

Starting from 1997, the EMEP has revised its data for emissions from shipping in the North Sea and the northeastern Atlantic. The impulse to do so came from an extensive survey of the situation that had previously been carried out by Lloyd's Register of Shipping (AN 4/95, p.5). The figures now given by the EMEP are 1,080,000 tons of sulphur dioxide and 1,550,000 tons of nitrogen oxides (1990). The previous estimates gave 490,000 and 541,000 tons respectively – so the emissions are 2.2 and 2.8 times higher than before.

In relation to the total emissions for Europe in 1990, sulphur from shipping accounted for 2.6 per cent, and nitrogen oxides for 6.5 per cent. But as the overall totals fell by 26 and 15 per cent between 1990 and 1995, while the emissions from shipping are assumed to have remained more or less constant, by 1995 the share from shipping would have increased to 3.5 and 7.5 per cent.

The greatest part of the emissions occur in the English Channel and in a belt running from France along the Belgian and Dutch coasts. The North Sea alone is now a greater source of emissions than many single countries in Europe – again emphasizing the need to take action against marine sources as well, instead of doing nothing about them as hitherto.

As regards depositions of sulphur, marine emissions account for more than 10 per cent in southern England, northern France, and the coastal regions of Belgium and the Netherlands, as well as North Denmark (Jutland) and south Norway. The percentage for nitrogen oxides is somewhat lower, but geographically largely the same. Over great areas of Ireland, Great Britain, France, Belgium, the Netherlands, Germany, Denmark, Sweden, and Norway, North Sea traffic accounts for 5 to 10 per cent of the depositions.

Portugal gets worst hit by emissions from the northeastern Atlantic, receiving 24 per cent of the total depositions of oxidized nitrogen compounds stemming from the area, and 12 per cent of the sulphur. But also Ireland (15 and 6 per cent), Spain (10 and 3), and Britain (7 and 2) get their share.

The EMEP has also estimated that about 90 per cent of the marine emissions of sulphur and nitrogen oxides in the North Sea and the English Channel come from ships sailing within 50 nautical miles from the coast. (One nautical mile=1.85 kilometre.) More than 40 per cent of the combined emissions from the English

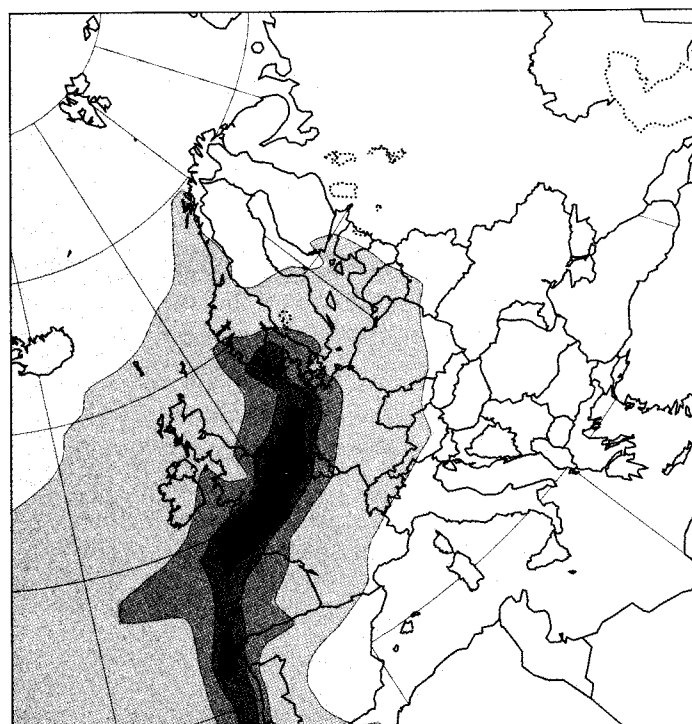
Channel and the whole North Sea come from the former area. Nearly 97 per cent of the total emissions from the North Sea are estimated to come from shipping plying in international trade within a limit of 100 nautical miles from the coast.

Although the EU Commission has used only the old figures when developing its strategy for dealing with acidification, it nevertheless found it would be highly cost-effective to take measures to curb ships' emissions of air pollutants.

But ships' emissions do not only cause acidification. They also contribute to the formation of ground-level ozone, the eutrophication of soil and water, and the arising of so-called secondary particles of sulphate and nitrate that can be damaging to human health. The EMEP did not attempt however to analyze the extent to which these effects may be due to shipping.

CHRISTER ÅGREN

\* The contribution of ship emissions from the North Sea and north-eastern Atlantic Ocean to acidification in Europe. By S. G. Tsyro and E. Berge. EMEP/MSC-W 4/97. Available from the Norwegian Meteorological Institute, P.O. Box 43-Blindern, N-0313 Oslo 3, Norway.



Deposition of oxidized sulphur from international shipping in the North Sea and the north-eastern Atlantic Ocean in 1990. Unit: mg s/m<sup>2</sup>.

■	Above 200
■	150 - 200
■	100 - 150
■	50 - 100
■	10 - 50
□	Below 10

## Greatly exceeded for nitrogen in Switzerland

THE DEPOSITIONS of nitrogen are exceeding the critical loads on 90 per cent of the forest land in Switzerland. (The critical load is the amount of a pollutant that an ecosystem can take without suffering damage.) Probably 70 per cent of the rest of the country's natural environmental area is suffering in the same way.

The nitrogen falling from the air stems from anthropogenic emissions of nitrogen oxides and ammonia. When it lands on a natural ecosystem it causes damage, such as by acting as an acidifier, making the trees more susceptible to extremes of climate and attack from insects and fungi, but also by altering the conditions for competition between plants, thus leading to impoverishment of the biological diversity.

The Swiss study was commissioned by the Federal Office of Environment, Forests and Landscape. The critical loads for forest ecosystems were arrived at by the so-called steady state mass balance method – which, greatly simplified, means using the natural turnover of nitrogen in a given area to determine the limit for the critical load. Relatively large variations were found, depending on the type of ecosystem, the soil type, site altitude,

and other characteristics of the ecosystem. An empirical method was employed for the other, (semi) natural ecosystems, based on the judgments of biological experts concerning the results of field surveys, experiments, and computer simulations dealing with the effects of eutrophying nitrogen on various ecosystems.

The current loads (1993-95) range between 5 and 60 kilograms of nitrogen per hectare and year, with the highest values occurring in lowland areas. Judged by the empirical method, the critical load of 8 kilograms per hectare and year is being exceeded on all the raised bogs in the country, and for the most part by more than 200 per cent. As regards forest ecosystems, depositions up to 45 kilograms more than the critical load have been recorded in some places, reckoning by the mass-balance method. The calculations accord with the recommendations made under the Convention on Long Range Transboundary Air Pollution.

**Critical Loads of Nitrogen and their Exceedances.** Environmental Series No. 275. Available from Documentation Service, Federal Office of Environment, Forests and Landscape, CH-3003 Bern, Switzerland.

### CATALYZERS

## Not altogether good

IT IS USUALLY assumed that by eliminating most of the nitrogen oxides and VOCs from the exhaust of petrol-driven cars, catalyzers give great environmental gains. But there is another aspect to the matter. A German researcher has found that the factories in Russia that produce the platinum and other precious metals used in many catalytic converters emit vast amounts of sulphur dioxide – which in terms of acidifying potential come to about a quarter of the amount of nitrogen oxides that a catalyzer can be expected to remove during its lifetime.

The amounts of sulphur dioxide emitted in the production of precious metals vary however considerably.

In Canada, where the smelters are equipped for flue-gas cleaning, they amount to 1.7 kilogram per gram of purified metal, as against 10.9 kilograms in Russia where there is no cleaning of the flue-gases.

Taking into account the average global emissions from the production of precious metals, a catalyzer-equipped car would have to be driven 4900 kilometres before reaching breakeven in respect of acidification. But to get clear of the Russian average it would have to be run for 25,000 kilometres, or supposedly a quarter of the catalyzer's life. All as calculated by Christian Hochfeld of the Öko-Institut.

Source: *New Scientist*. September 20, 1997.

### BRIEFS

#### Charging aircraft

Zürich's Kloten airport is the first to have introduced landing charges that are differentiated according to the environmental effect of the aircraft. The system is based on their engines' emissions of nitrogen oxides. Aircraft with the cleanest engines – about half of those using the airport – pay a landing charge which is 5 per cent below the normal, while others have the charge raised by 5 to 40 per cent, depending on the size of their emissions.

As from January 1, 1998, there will be differentiated landing charges at all Swedish airports. The Swedish system will be similar to the Swiss, except that it will comprise volatile organic compounds as well as nitrogen oxides. According to reports, Geneva will soon be following Zürich's example, and emission-related landing charges are being discussed in government circles in Germany too.

**Environment Watch: Western Europe.** September 5 and 19, 1997.

#### Unlawful?

The European Commission is taking Austria to the European Court of Justice because it refuses to withdraw the greatly increased charges on transit traffic through the Brenner Pass that began to be applied in 1995-96. The Brenner is a key route for transit traffic over the Alps, and at least 90 per cent of the heavy traffic passing through this ecologically sensitive area consists of foreign vehicles. The Commission maintains that the Austrian levies are in contravention of the EU directive on road charging.

**Environment Watch: Western Europe.** September 5, 1997.

#### Petroleum products

A rapid rise in air traffic is among the facts that can be read from the latest statistics published by Eurostat, the EU's statistical office. In 1995 and 1996 the sales of aviation kerosene within the EU rose by 4.1 and 5.3 per cent. But in 1996 the consumption of residual fuel oil, used in power stations, fell by 5.7 per cent, mainly on account of a switch to natural gas in major consuming countries such as Spain, Britain, and Germany. The rise of almost 5 per cent for gas oil and diesel oil was due, according to Eurostat, to an increased demand for heating oil because of the cold weather. For petrol the demand fell by 1.4 per cent in 1995 and 0.2 per cent last year – probably reflecting the increasing popularity of diesel-driven cars in many countries.

**Environment Watch: Western Europe.** September 5, 1997.

# Still many trees damaged

While air pollution is clearly among the causes, interactions remain unexplained

LAST YEAR'S SURVEY of European forests\* showed every fourth tree to be suffering from abnormal thinning of the crown, with only slight differences between conifers and broad-leaved trees. The survey took in 116,000 trees in twenty-nine countries. To be classified as damaged, a tree must show a loss of leaves or needles of at least 25 per cent, as compared with a reference tree of the same species.

These surveys are carried out in collaboration with the UN Economic Commission for Europe, and the European Union. They constitute one of the world's largest biomonitoring systems, intended to detect environmental changes in forests, with a special emphasis on the effects of air pollution.

The percentages of damaged trees are still especially high in central and eastern Europe – as can also be seen from the results of the national surveys that are carried out in parallel with the all-European ones (see table). Despite a considerable lessening of the depositions of airborne pollutants in these parts of Europe since the early nineties, the critical loads both for acidifying substances and nitrogen are still being greatly exceeded over most of the area. The acid deposition has moreover been so great that the soil is showing a deficiency of nutrients. The forests in north Poland and eastern Germany have indeed recovered somewhat, but otherwise the situation remains poor, with more than 50 per cent of the trees damaged in the worst affected areas of this part of Europe.

A number of common sample trees are used to get an idea of the general trend – some 27,000 trees having been examined in western Europe every year since 1988, and close on

70,000, spread over the whole of Europe, between 1992 and 1996. While no clear trend could be distinguished for Scots pine (*Pinus sylvestris*) during the latter period, both Norway spruce (*Picea abies*) and European oak (*Quercus robur*) did show signs of steady deterioration. The proportion of damaged trees of the former species increased from 27 per cent in

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## *Air pollution increases the trees' sensitivity to drought*

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1992 to 33 per cent in 1996. The number of damaged oaks increased from 24 to 39 per cent during the same period.

As for the causes of damage, it may be noted that trees are affected by numerous natural and anthropogenic factors, all acting in different ways. The worst combinations for forest growth are found in areas where acid deposition have been taking place over a long period, there are high levels of air pollution, the quality of the site is low, and the climate frequently harsh. The forests in the southernmost parts of Poland, where the pollution is worst, are reported for instance to be decidedly more sensitive to drought than those in the north, thus indicating that air pollution increases the trees' sensitivity to drought.

A long period of drought is, according to the survey report, considered to be a notable cause of tree damage in southern Europe. In other places air pollution is thought to act as a predisposing or accompanying factor – or even, locally, a triggering

one. It is noted that other combinations of natural factors, or interaction between natural and anthropogenic factors, may be involved but that it is difficult to identify them.

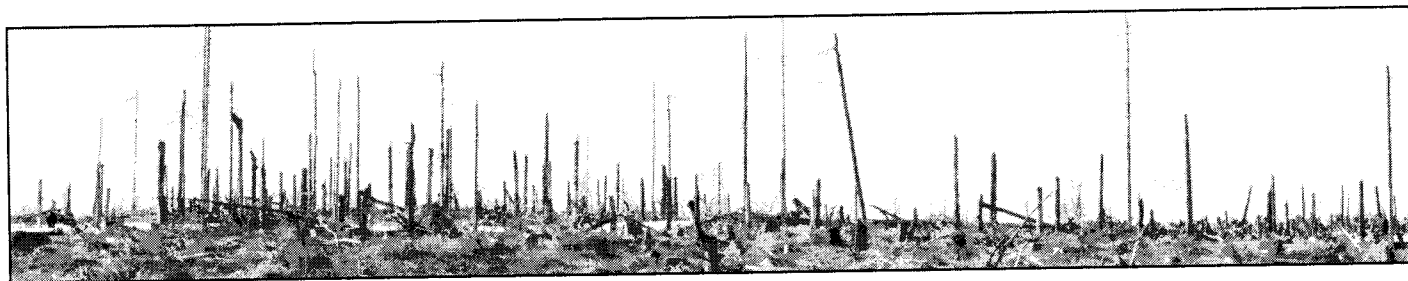
The results of soil sampling, which is a part of the expanded monitoring program, are presented for the first time this year, in a separate report. They reveal the soil in a good 40 per cent of the 4500 sampling plots to be disturbingly acidified, besides some correlation between depositions of acidifying air pollutants and soil chemistry. It will be difficult to interpret the findings before a new round of samplings has taken place in about ten years, when it will be possible to see if any changes have occurred.

Also presented in a separate report are measurements of the nutrient content in leaves and needles, made on 1400 sample plots in sixteen countries. Although the nutritional status of most trees was found to be adequate, there was a great variation in different kinds of nutrient all over Europe. The data is however still insufficient to draw any definite conclusions from it.

Another report, entitled *Ten years of monitoring forest condition in Europe*, attempts to correlate the results of the surveys of crown and soil condition with external data on natural and anthropogenic stress factors, all on a European scale. Nothing clear has however so far emerged.

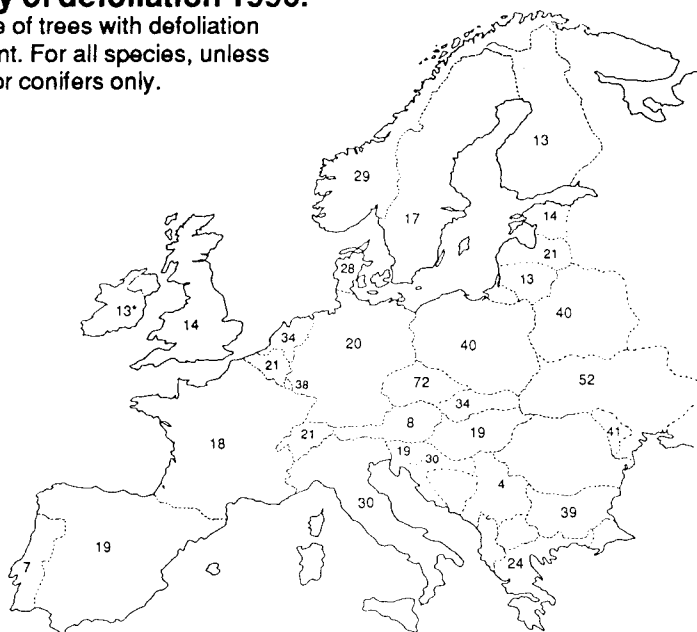
PER ELVINGSON

\*Forest Condition in Europe. Results of the 1996 crown condition survey. 1997 Technical Report. All the reports mentioned above are published in collaboration between UN ECE and the European Commission. For further information please contact European Commission, DG VIFIL.2, Rue de la Loi 130, B-1040 Brussels, Belgium.



## Intensity of defoliation 1996.

Percentage of trees with defoliation >25 per cent. For all species, unless marked \* for conifers only.



## Results from national forest-damage surveys 1986-1995. Percentage of trees in Classes 2-4 (defoliation >25 per cent). All species.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Austria	-	-	-	11	9	8	7	8	8	7	8
Belarus	-	-	-	67	54	-	19	29	37	38	40
Belgium	-	-	-	15	16	18	17	15	17	24	21
Bulgaria	8	4	7	25	29	22	23	23	29	38	39
Croatia	-	-	-	-	-	-	16	19	29	-	30
Czech Rep.	-	-	38*	-	47*	45	56	52	58	58	72
Denmark	-	23	18	26	21	30	26	33	36	37	28
Estonia	-	-	9*	28*	20*	28*	28	20	16	14	14
Finland	-	12	16	18	17	16	14	15	13	13	13
France	8	10	7	6	7	7	8	8	8	12	18
Germany	-	-	-	-	-	25	26	24	24	22	20
- f. East	-	-	14	16	36	-	-	-	-	-	-
- f. West	19	17	15	16	16	-	-	-	-	-	-
Greece <sup>1</sup>	-	-	17	12	18	17	18	21	23	25	24
Hungary	-	-	8	13	22	20	22	21	22	20	19
Ireland	-	0*	5*	13*	5*	15*	16*	30*	20*	26*	13*
Italy	-	-	-	9	15	16	18	18	20	19	30
Latvia	-	-	-	-	36	-	37	35	30	20	21
Lithuania	-	-	3	22	20	24	18	27	25	25	13
Liechtenstein	19	19	17	12	-	-	16	-	-	-	-
Luxembourg	5	8	10	12	-	21	20	24	35	38	38
Moldova	-	-	-	-	-	-	-	51	-	40	41
Netherlands	23	21	18	16	18	17	33	25	19	32	34
Norway	-	-	21*	15*	18	20	26	25	28	29	29
Poland	-	-	20	32	38	45	49	50	55	53	40
Portugal	-	-	1	9	31	30	22	7	6	9	7
Romania	-	-	-	-	-	10	17	20	21	21	17
Russia <sup>2</sup>	-	-	-	-	6*	4*	5*	4*	11	12	9*
Slovakia	-	-	39	49	42	28	36	38	42	43	34
Slovenia	-	-	-	23	18	16	-	19	16	25	19
Spain	-	-	8	4	5	7	12	13	19	24	19
Sweden	-	6*	12*	13*	16*	12*	17*	11*	16*	14	17
Switzerland	10	12	9	10	16	16	13	15	18	25	21
Ukraine	-	-	-	-	-	6	16	22	32	30	52
U.K. <sup>3</sup>	-	22	25	28	39	57	58	17	14	14	14
Yugoslavia <sup>4</sup>	-	-	-	-	-	-	-	-	-	-	4 <sup>4</sup>

\* Conifers only. <sup>1</sup>Excluding maquis. <sup>2</sup>Data only from Kaliningrad and Leningrad regions. In 1995-96 only Leningrad region. <sup>3</sup>Change of assessment method between 1992 and 1993, in line with that used in other states. <sup>4</sup>Serbia and Montenegro.

## Recent publications

### Power from the Waves (1996)

By D. Ross. Considers the possibilities of utilizing wave power to generate electricity, and describes the various methods that have been tried so far. Energy captured from the waves could, according to the author, provide more than 20 per cent of the UK needs by the year 2025.

224 pp. £19.99. Published by Oxford University Press, Walton Street, Oxford OX2 6DP, England.

### Renewable Energy, Power for a Sustainable Future (1996)

Edited by G. Boyle. A review of the principal renewable sources of energy. Covers the economic, environmental, and social aspects, as well as the physical and engineering problems associated with renewable energy. Examines in conclusion the way energy systems are likely to change in the 21st century in order to incorporate an increasing proportion of renewable power.

479 pp. £22.95. Available from Oxford University Press, address as above.

### Earth Under Siege: From Air Pollution to Global Change (1997)

By R.P. Turco. A textbook primarily for university students treating the causes and effects of air pollution, and the possible ways of dealing with them.

542 pp. £15.95. Published by Oxford University Press, address as above.

### Air Pollution in Slovenia 1995 (1996)

Gives figures for emissions and monitoring results for the year 1995, as well as the current legislation for protecting air quality and the country's commitments to reduce emissions.

107 pp. Available from Hydrometeorological Institute, Vojkova 1b, Ljubljana, Slovenia.

### Nitrogen from Mountains to Flords (1997)

Special issue of the scientific journal *Ambio*, with an account of a five-year study of the uptake and release of nitrogen in various ecosystems in South Norway. Among the matters treated are the significance of nitrogen depositions for the acidification of soil and water, and for the eutrophication of coastal waters. Concludes that nitrogen does play a distinct part in the acidification of the low-productive ecosystems that were studied.

74 pp. Can be ordered from *Ambio*, Royal Swedish Academy of Sciences, Box 50005, S-104 05 Stockholm, Sweden. Fax. +46-8-166251.

# Monitoring figures show decline

ONCE AGAIN, the annual report from EMEP, the European Monitoring and Evaluation Programme, shows the emissions of sulphur and nitrogen oxides to be going down. In 1995 the European emissions of sulphur dioxide came to 30.7 million tons, as against 31.8 the previous year and 59.3 in 1980. Those of nitrogen oxides are also continuing their slow decline from a peak in the later eighties, now being 9 per cent lower than they were in 1980.

The EMEP figures are based on data supplied by each of the countries participating in the program. These in turn form, together with meteorological data, the basis for calculations in a computer model describing the transformation and deposition of pollutants as they move about over Europe. Field checks of concentrations and fallout are carried out in order to control the computer's results.

Since some of the depositions cannot be traced to any specific country, they have to be assigned to indeterminate sources (IND) in the tables. About two-thirds of them are thought to emanate from within Europe, the rest being carried in by the winds from North America and Asia.

In the tables (2 and 3) showing exports and imports of sulphur and oxidized nitrogen, two-thirds of the indeterminate depositions have been redistributed to each emission area in Europe. Since the transports of pollutants may vary considerably, on account of the weather and air currents, the values in the tables represent an average for the period from 1985 to 1995.

Besides the country figures, the report includes estimates of the natural emissions of sulphur from the seas (production of dimethyl sulphide by phytoplankton). The estimates of emissions from shipping in international trade in the North Sea and the northeastern Atlantic have recently been revised upwards (see p.12), but not those from the Baltic, the Mediterranean, and the Black Sea, which must still be underestimates.

Over the last few years the EMEP has developed a new, so-called

multi-layer eularian computer model, which is described in this year's report. It uses a resolution of 50x50 kilometres, as against 150x150 in the present model. Although it has been tested with good results, it will probably be about a year or two be-

fore it can take over from the present one.

CHRISTER ÅGREN

**Transboundary Air Pollution in Europe.** MSC-W Report 1/1997. Available from the Norwegian Meteorological Institute, Box 43-Blindern, N-0313 Oslo 3, Norway.

**Table 1. Emissions of sulphur and nitrogen oxides (1000 tons a year).**

		Sulphur dioxide			Nitrogen oxides (as NO <sub>2</sub> )		
		1980	1990	1995	1980	1990	1995
Albania	AL	[72]	[72]	[72]	[24]	[24]	[24]
Austria	AT	397	90	74*	246	222	177*
Belarus	BY	740	637	275	234	285	195
Belgium	BE	828	317	253*	442	352	345*
Bosnia & Herzegov.	BA	[480]	480	[480]	[80]	[80]	[80]
Bulgaria	BG	2050	2020	1497	[416]	376	266
Croatia	HR	150	180	63	[83]	83	55
Czech Republic	CS	2257	1876	1091	937	742	412
Denmark	DK	450	184	150	282	279	250
Estonia	EE	[239]	239	110	[93]	93	50*
Finland	FI	584	260	96	295	300	259
France	FR	3338	1298	989	1823	1585	1666
Georgia		[162]	[162]	[162]	[188]	[188]	[188]
Germany <sup>1</sup>	DE	7514	5326	2995*	3334	2640	2210*
Greece	GR	400	510	[556]	[306]	[392]	[357]
Hungary	HU	1633	1010	699	273	238	171
Iceland	IS	18	24	24	[18]	20	23
Ireland	IE	222	178	166	73	115	116
Italy	IT	3800	1678	[1437]	1480	2047	[2157]
Kazakhstan <sup>2</sup>		[140]	[140]	[140]	[76]	[76]	[76]
Latvia	LV	[57]	57	38	[90]	90	29
Lithuania	LT	311	222	107	152	158	67
Luxembourg	LU	24	14	8	23	23	20
Macedonia	FYM	[106]	[106]	[106]	[39]	[39]	[39]
Moldova	MD	308	231	59	58	39	25
Netherlands	NL	490	205	147	583	575	518
Norway	NO	140	53	35	192	227	222
Poland	PL	4100	3210	2337	1229	1279	1120
Portugal	PT	266	283	272*	[96]	221	254*
Romania	RO	1055	1311	912*	523	546	319*
Russian Federation <sup>2</sup>	RU	7161	4460	2983*	1734	2675	1995*
Slovakia	SK	780	543	238*	[197]	227	173*
Slovenia	SI	234	195	119	51	57	67
Spain	ES	3319	2266	[2061]	950	1178	1223*
Sweden	SE	508	136	94	448	411	362
Switzerland	CH	116	43	34	170	165	136
Turkey <sup>2</sup>	TR	860	[354]	[354]	[175]	[175]	[175]
Ukraine	UA	3849	2782	1639	1145	1097	530
United Kingdom	GB	4913	3756	2365	2416	2897	2295
Yugoslavia <sup>3</sup>	YU	406	508	462	47	66	59
Baltic Sea	BAS	[72]	[72]	[72]	[80]	[80]	[80]
North Sea	NOS	[475]	[475]	[475]	[710]	[710]	[710]
Remaining NE Atl.	ATL	[891]	[891]	[891]	[1275]	[1275]	[1275]
Mediterranean Sea <sup>2</sup>	MED	[12]	[12]	[12]	[13]	[13]	[13]
Natural oceanic	NAT	[724]	[724]	[724]	[0]	[0]	[0]
Volcanic <sup>4</sup>		[2144]	1645	[2235]	[0]	[0]	[0]
<b>Sum</b>		<b>59,345</b>	<b>41,804</b>	<b>30,724</b>	<b>23,215</b>	<b>24,480</b>	<b>20,903</b>

The table shows national official data received at the ECE secretariat. Data estimated by MSC-W/CCC are given in square brackets. \* 1994 figures. <sup>1</sup>Including East Germany in 1980 and 1990 figures. <sup>2</sup>Part within the EMEP area of calculation. <sup>3</sup>The Federal Republic of Yugoslavia (Serbia and Montenegro). <sup>4</sup>Natural emissions reported by Italy.





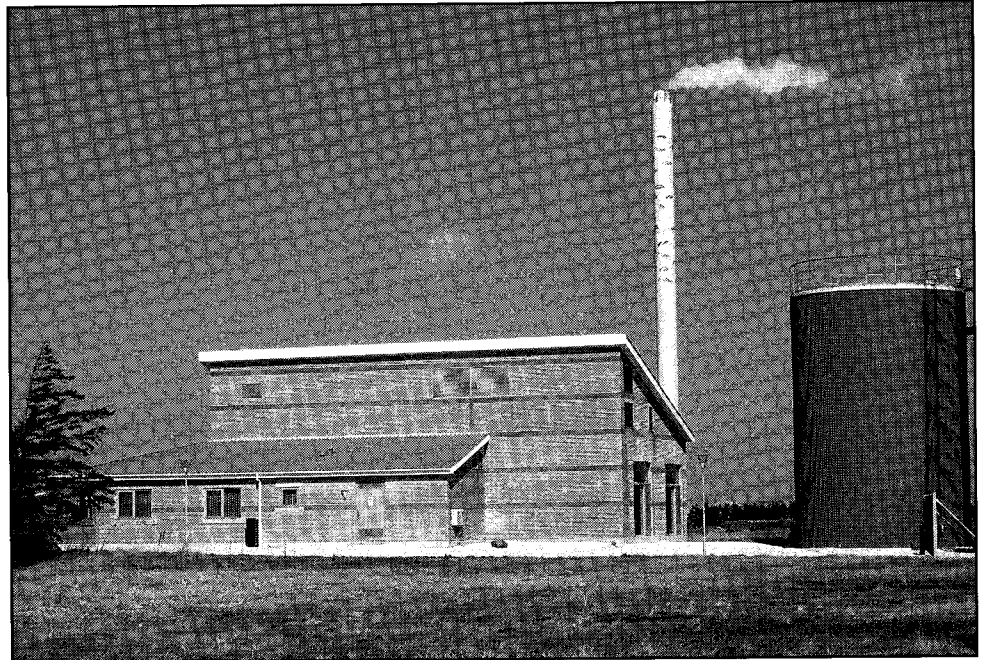
# A revolution in generation

A decentralized system of power generation, using small units for the combined generation of heat and electricity, which has lately been developed in Denmark, bids fair to put even windpower in that country in the shade, writes Preben Maegaard of the Folkecenter for Renewable Energy, Denmark.

The decentralized heat-and-power units that have been installed in Denmark during the last six years have a total capacity of 1600 MW. Most of them are fired with natural gas. Although they include some gas turbines and combined-cycle plants, the real breakthrough has come from the use of gas engines of the lean-burn type. Plants with these engines are now found in hundreds of towns, villages, industries, etc. in Denmark. Outside the Copenhagen area they are all privately owned and operated. The owners use the heat themselves and sell the electricity to the grid. By now 35 per cent of the electricity produced on the Jutland peninsula and the island of Fyn comes from these small decentralized plants.

The new-type generators are always connected to the national grid. The government pays the owners 0.10 kroner per kilowatt-hour as a CO<sub>2</sub> refund, money that has been collected as a coal tax and used to subsidize the new, clean technologies. Altogether 1 billion kroner was thus redistributed in 1996 alone. Every kilowatt-hour from an ordinary coal-fired plant that is replaced by electricity from one of the new, highly efficient units fired by natural gas eliminates three-quarters of the emissions of carbon dioxide. The improvement will be still greater when natural gas is replaced by renewable energy in some form.

The breakthrough for decentralized heat and power came between 1991 and 1996, as a result of a demonstration drive operated on a meagre budget of 12 million kroner. Expansion became rapid after the government had started to pay out the CO<sub>2</sub> refund of 0.10 kroner per kilowatt-hour as a clean-technology subsidy. The new heat-and-power sector now boasts a cash volume running into billions of kroner, with an important potential for export of the technology.



*The inhabitants of Nr. Vorupør on the North Sea coast of Jutland have got together and built a gas-fired heat-and-power plant (2x750 kW<sub>el</sub>) supplying heat to 250 households and enabling electricity to be sold to the national grid.*

An interesting aspect of this new development is that a traditional fossil fuel – natural gas – should pave the way for a new, decentralized energy structure, which in turn will be a prerequisite for a switch to renew-

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*Difficult to see how conventional technology will be able to compete*

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able sources for energy. The renewable sources are by nature decentralized, and moreover incapable of alone ensuring a stable supply of power and heat. Being split into innumerable small units, a decentralized system can act as a connecting link, enabling a fast response to fluctuations in the supply of solar and windpower and thus a meeting of the demand at all times.

Another advantage of combined production of heat-and-power is its

highly effective utilization of the energy content of the fuel. The units in the new system have an efficiency of more than 90 per cent: 40-45 per cent for electricity and about 50 per cent for heat. It is simplest to start with natural gas as the source of energy, and convert later to bio-gas or hydrogen produced from some renewable source. The important thing at the moment is to ensure a decentralized basic structure.

The new heat-and-power technology is cheap to install. Whereas a modern coal-fired plant equipped for cleaning sulphur and nitrogen oxides can cost more than 10,000 kroner per kW<sub>el</sub> of installed capacity, an advanced heat-and-power plant will cost 5500-7000 kroner per kW (for engine sizes of 500 to 3000 kW<sub>el</sub> per unit). The core of this technology is the gas engine, in turn connected to a generator and a heat exchanger.

Unlike condensing plants, decentralized heat-and-power units yield heat as a free byproduct, thus providing a possibility for so-called bare-

ground projects, with district heating even for scattered properties out in the countryside and 50-100 consumers for heat. It would seem that the end to the process has still not been reached. Mini heat-and-power plants, suitable for single houses, with a capacity of 5 kW<sub>el</sub> or even less, are already poised to enter the market.

It is difficult to see how conventional large-scale power technology, based on uranium or coal, will be able to compete in future with mass-produced small-scale units using gas. It is likely to be politically impossible, in the long run, to shore up energy monopolies when there is a new technique available which is much cheaper and pollutes less. There appears to be nothing less than a new energy revolution ahead of us. This will, incidentally, be to the advantage especially of that 50 per cent of the earth's population which up to now has had no access to electricity.

The address of the Folkecenter for Renewable Energy is Kammersgaardsvej 16, Sdr. Ydby, Postbox 208, DK-7760 Hurup Thy, Denmark. E-mail: fcenergy@www.nvn.dk.

## Rail freeways

Because of variations between the EU member states in regard to rail regulations, track charges, and train connections, freight currently travels at an average speed of 16 km/h by rail. If rail travel is to become competitive with other forms of freight transportation, it will have to be speeded up. The EU Commission has now put forward a proposal for bringing this about in a communication entitled *Intermodality and Intermodal Freight Transport in the EU*. The Commission believes the solution lies in rail "freight freeways" – a series of rail routes where forwarders can make just one booking for their freight, and know that it will not be delayed by unnecessary border checks or differing regulations among rail companies and track operators. To encourage the growth of combined transport, the freeways will have to be linked up with ports, inland waterways, and the road network.

The commission's proposal has been well received, and a group of rail operators from the Netherlands, Germany, Austria, Italy, and Switzerland is already working on a series of north-south freeways which could be in operation by the end of this year.

T&E Bulletin, No. 59, June 1997.

## Further publications

### Independent NGO Evaluations of National Plans for Climate Change Mitigation: Central and Eastern Europe (1996)

Environmental NGOs in nine central and eastern European countries have here analyzed their countries' plans for reducing emissions of greenhouse gases, and shown that in this respect they could be in the lead among nations.

76 pp. Published by Climate Network Europe, 44 rue du Taciturne, B-1000 Brussels, Belgium. Fax. +32-2-230 5713.

### Policy of Air Protection in Poland (1996)

In this third report, the Institute for Sustainable Development examines the ways the Polish authorities are attacking the problems of air pollution. Local and regional policies are also described, in an annex.

Published by the Institute for Sustainable Development, ul. Kowicka 31, 02-502 Warszawa, Poland. Fax +48-22-646 0174.

### Alternative Transport Policy in Poland (1997)

A discussion paper, No. 2 in a series aimed at defining a transportation policy that can be accommodated within the bounds set by nature. Includes, too, an estimate of transportation costs, particularly the external ones.

Available from the Institute for Sustainable Development (address as above).

### Climate Change and the Energy Sector: A country-by-country analysis of national programmes (1997)

By D. Anderson, M. Grubb, and J. Dpledge. A two-volume report, summarizing the current climate-change programs both of EU and non-EU countries within the OECD. Assesses the effect on the energy sector of present and future climate-change policies and provides an insight into the direction that new and tougher climate-related policies might take.

Volume 1: The European Union. Volume 2: The non-EU OECD Countries. £350 each, or £550 for both. Available from Financial Times Energy, Maple House, 149 Tottenham Court Rd, London W1P 9LL, England. Fax +44-171-896 2275.

### International Politics of Climate Change. Key Issues and Critical Actors (1997)

Ed. G. Fermann. Reports on the development of the international climate-change regime and the state of scientific knowledge, while also describing the intricate task of making political decisions when there is scientific uncertainty. Discusses responsibility and burden sharing and examines efforts for cost-effective abatement. The climate-change policies

in some industrialized as well as developing countries are also analyzed.

472 pp. Published by the Scandinavian University Press, P.O. Box 2959 Tøyen, N-0608 Oslo, Norway. Fax +47-22-575353.

### The Endangered Atmosphere: Preserving a Global Commons (1997)

By M. S. Soroos. The author describes the atmosphere as a global commons, and its limited capacity to absorb and disperse pollutants. The approach taken by the international community for the preservation of that commons is analyzed through case studies of the problems of nuclear weapons, acidification, ozone-layer depletion, and climate change.

\$19.95. 360 pp. Published by the University of South Carolina Press, 937 Assembly Street, Carolina Plaza, 8th Floor, Columbia, South Carolina 29208, United States. Fax. +1-808-7770160.

### Environmental Agreements: Environmental Effectiveness (1997)

Scrutinizes the advantages and disadvantages of environmental agreements – a type of policy tool that has increasingly come to be used by EU member states during the last decade. Gives a number of recommendations for future work on such agreements.

Environmental Issues Series No. 3. Volume I (main report) 96 pp. 15 ecus. Volume II (case studies) 150 pp. Free of charge. Published by the European Environment Agency, Kongens Nytorv 6, DK-1050 Copenhagen K, Denmark. Fax. +45-3336 7199. E-mail: information.centre@eea.eu.int. The reports are also available on the agency's website: www.eea.eu.int.

### Environmental taxes in Sweden (1997)

An inventory of Swedish environmental taxes such as those on emissions of sulphur dioxide, nitrogen oxides, and carbon dioxide, with an account of their effectiveness.

134 pp. 160 kronor. Report No. 4745. Obtainable from the Swedish Environmental Protection Agency, S-106 48 Stockholm, Sweden. Fax +46-8-698 1515.

### Transport Blueprint. National study for Romania (1996)

Examines the country's transportation sector and related national policies in Romania, as well as projects in that sector carried out with the aid of international financial institutions. By the environmentalist organization Ecosens.

69 pp. Available from Ecosens, Str. Paul Greceanu 9, Bl.20A, Ap.38, sector 2, 72119 Bucharest, Romania. E-mail: office@ecosens.sbnnet.ro.

## HEALTH

# Powerful mutagen found in diesel exhausts

AN EXTREMELY carcinogenic compound has been found by Japanese scientists in diesel exhausts. Laboratory tests have shown it to be the most powerful mutagen yet seen.

This new compound, 3-nitrobenzanthrone, is a nitrated polycyclic aromatic hydrocarbon (nitro-PAH) produced during reactions between ketones – byproducts of burning fuel – and airborne nitrogen oxides, reactions that take place on the surface of hydrocarbon particles in diesel exhausts.

The researchers used the Ames test, a regular way of measuring the carcinogenic potential of toxic chemicals, to determine the number of mutations the compound caused in the DNA of standard strains of bacteria. For 3-nitrobenzanthrone it was more than 6 million per nanomole – as against 4.8 million for 1,8-dinitropyrene which had previously held the record. This latter chemical also occurs in diesel exhausts.

Tests of the effects of 3-nitrobenzanthrone on mice revealed “considerable chromosomal aberrations” in

the blood cells, suggesting that they would be similar in other mammals, including humans.

Neither of these two mutagens amount to more than a few parts per million of the particulates in diesel exhausts. But as the Japanese researchers say, they are so toxic that “it is easily understandable that they would contribute considerably to the total mutagenic activity of diesel exhaust particle extracts.”

The Japanese study also reveals a “remarkable increase” in the emissions of 3-nitrobenzanthrone and other nitro-PAHs when diesel engines are working under heavy load. Moreover they are formed more quickly in smoggy air with high concentrations of nitrogen oxides and ozone.

PER ELVINGSON

Source: New Scientist. October 25, 1997.

The findings of the Japanese study were published in the October number of *Environmental Science and Technology* (Vol. 31, p. 2772). The research had been carried out at the National Institute of Public Health in Tokyo and the Kyoto Pharmaceutical University.

## Aiming high

Denmark has held out a promise of installing 500 offshore windmills, with a combined capacity of 750 megawatt, by the year 2005. Presenting the scheme, Environment Minister Svend Auken described it as one way of bringing down Denmark's emissions of carbon dioxide. The electricity so produced will not only be clean, but also cheap. First-phase production prices of electricity from the turbines will be around 5.4-5.8 US cents per kilowatt-hour, comparable to the cost of electricity from CO<sub>2</sub>-emitting coal-fired plants. The Danes aim to be generating sustainable power via 4000 MW of offshore windmills by 2030. (In 1996 the world's total windpower generating capacity was 6000 MW.) Svend Auken says that by 2030, half of Denmark's elec-

tricity consumption will be in the form of windpower.

WWF International. September 29, 1997.

## No aid for lignite

In Germany, the state of Brandenburg has provided an investment grant of DM 50 million for building a new power plant, fired with lignite, at Cottbus – despite the fact that a gas-fired plant with the same capacity would cost only half as much to build and moreover be cheaper to operate. The EU Commission says that this goes against Germany's commitment to give no further direct or indirect state aid for lignite in power generation.

Environment Watch: Western Europe. September 5, 1997.

## Coming events

**Third Conference to the Parties of the UN Framework Convention on Climate Change. Kyoto, Japan, December 1-10, 1997.**

**Baltic Sea Region Agenda 21, Energy Workshop. December 8-9, 1997.** *Inquiries:* Danish Energy Agency, att. M.L. Lemgart, Amaliegade 44, DK-1256 København K, Denmark. Fax +45-3311 4743.

**Executive Body for the Convention on Long Range Transboundary Air Pollution. Geneva, Switzerland, December 16-19, 1997.**

**World Energy Efficiency Day. Wels, Austria, March 5, 1998.** The seminar will be followed by an “Energiesparmesse” taking place on March 6-8. *Inquiries:* O.Ö. Energiesparverband, Landstrasse 45, A-4020 Linz, Austria. Fax +43-732-6584 4383.

**Nitrogen: The Confer-N-s. Noordwijkerhout, the Netherlands, March 23-27, 1998.** International conference organized by the Dutch environment ministry and environment agency, within the framework of the Convention on Long Range Transboundary Air Pollution. *Inquiries:* Eurocongres Conference Management, P.O. Box 74713, 1070 BS Amsterdam, The Netherlands. Fax +31-20-673 7306. E-mail: eurocongres@rai.nl.

**Biomass for Energy and Industry: 10th European Conference and Technology Exhibition. Würzburg, Germany, June 8-11, 1998.** *Inquiries:* WIP, Conference Coordination, Sylvesterstrasse 2, 81369 München, Germany. Fax. +49-89-7201291. E-mail: renewables@mail.tnet.se.

**Environment for Europe. 4th Pan-European Conference of Environment Ministers. Århus, Denmark, June 23-25, 1998.** *Information:* Danish Environmental Agency, Strandgade 29, DK-1401 København K, Denmark. Fax +45-3266 0296. Internet: www.mst.dk/aarhus-conference.

**1998 World Renewable Energy Congress. Florence, Italy, September 20-25, 1998.** *Inquiries:* Prof. A. A. M. Sayih, 147 Hilmanton, Lower Early, Reading RG6 4HN, England. Fax +44-118-9611365.