

Acid News

NO. 4, DECEMBER 2003

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COAL

Doing away with it

The simplest and cheapest way to bring down European emissions of carbon dioxide as well as several other air pollutants would be to phase out the use of coal.

COAL gives rise to much greater emissions of carbon dioxide, per unit of energy generated, than either oil or gas. That alone would be sufficient reason for cutting down its use, but there are several others.

A greater part of the sulphur dioxide let out over Europe also comes from burning coal. It causes corrosion, acidification of soil and water, and is damaging to health. Other air pollutants due to a large extent to the burning of coal are nitrogen ox-

ides and the poisonous heavy metal mercury.

The mining of coal gives rise to emissions of considerable quantities of methane, a greenhouse gas. And in the case of open-cast operations, coal mining means enormous damage to the landscape.

Globally, about half of the carbon dioxide that is emitted comes from the generation of power with coal as the fuel. Two third of all the coal

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Acid News

is a newsletter from the Swedish NGO Secretariat on Acid Rain, whose primary 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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Published by The Swedish Society for Nature Conservation.

Printed by Trio Tryck AB, Örebro.

ISSN 0281-5087

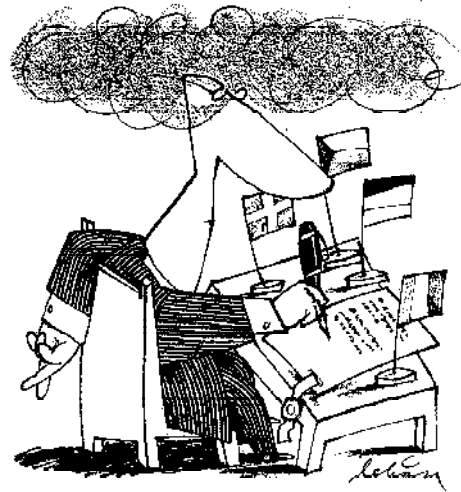
THE SECRETARIAT

The Secretariat 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 needed reductions in the emissions of air pollutants. The aim is to have those emissions eventually 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 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 information material.
- Supporting environmentalist bodies in other countries 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 Convention on Long Range Transboundary Air Pollution and policy initiatives in the European Union.
- Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.



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EDITORIAL

Need for a shake-up

IN SEPTEMBER the Implementation Committee of the Convention on Long-range Transboundary Air Pollution (CLRTAP) met to continue its scrutiny of the way various protocols under the convention are being complied with. It had appeared from last year's scan that several countries had failed to fulfill their legally binding commitments, either to bring down emissions or to report on their national situation in this respect. See AN 4/02, pp. 18-19.

Despite the sharp reprimands from the Executive Body of the convention (on which all the member countries are represented) that were issued in December 2002, several countries have still not reduced their emissions as required by the protocol. Among them are Norway, Italy, Greece, Ireland and Spain. And despite repeated reminders from the convention's secretariat, some of these – notably Greece, Ireland and Spain – have not even taken the trouble to assemble and report the basic information needed by the committee for carrying out its controlling function.

As reported in this issue of Acid News, too, the EU is experiencing similar problems concerning the member countries' obligation to report under the NEC directive (p.7). Almost all have been inexcusably late in reporting, and most of the reports that have come in seem to be defective. The worst offenders in this case seem to be precisely those that have been neglectful in respect of the LRTAP convention.

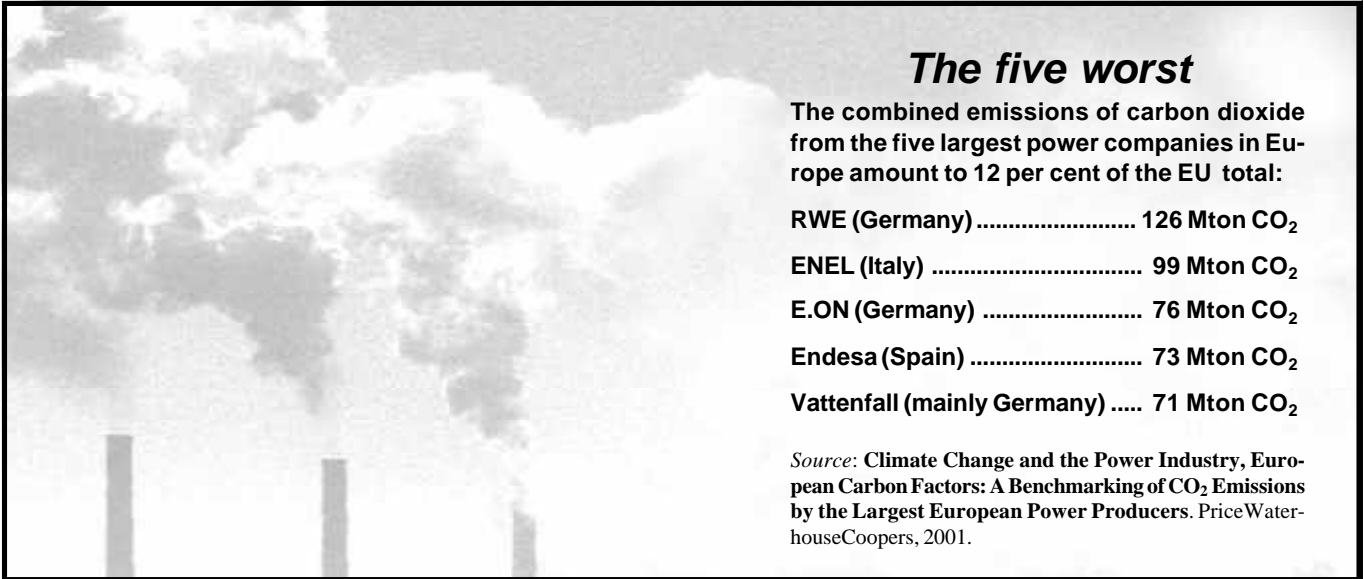
The inadequate reporting is especially serious, because the information that is being asked is essential not only for tracking compliance with agreed commitments, but also for providing material for the coming reviews and possible revisions both of the NEC directive and the Gothenburg Protocol.

The usual way of "reminding" negligent countries is to send a polite letter. But since that has evidently not sufficed, they have resorted, both within the EU and the LRTAP convention, to rather more drastic methods, such as "name and shame," to openly and publicly expose the offenders. For the EU there is moreover the possibility of imposing fines. But that would be a long-drawn-out process, often taking several years.

The above examples of countries' failure to comply are in any case a clear indication of the inadequacy of present ways of dealing with the problem. Both the EU and the LRTAP convention have every reason to revise their methods. Both the carrot and the whip are needed – measures to encourage countries to participate actively in the procedures, as well as to get them to act more quickly, and possibly to punish offenders.

CHRISTER ÅGREN

Note. The sixth report of the CLRTAP Implementation Committee (EB.AIR/2002/1 and Add.1) can be downloaded from: www.unece.org/env/eb/welcome.html



The five worst

The combined emissions of carbon dioxide from the five largest power companies in Europe amount to 12 per cent of the EU total:

RWE (Germany)	126 Mton CO ₂
ENEL (Italy)	99 Mton CO ₂
E.ON (Germany)	76 Mton CO ₂
Endesa (Spain)	73 Mton CO ₂
Vattenfall (mainly Germany)	71 Mton CO ₂

Source: Climate Change and the Power Industry, European Carbon Factors: A Benchmarking of CO₂ Emissions by the Largest European Power Producers. PriceWaterhouseCoopers, 2001.

Continued from front page

mined is so used. The United States alone accounts for 25 per cent of all coal consumption, followed by China with 23 per cent. The European countries answer for 15 per cent. (These figures are for 2001.)

The differences in the use of coal from place to place within Europe can be largely explained by history. It is usually the local availability that is back of most of this. Consumption is usually high in just those countries with their own deposits (see table overleaf).

Of late great changes have nevertheless taken place. During the nineties coal output fell by half in western Europe, and by almost as much in the eastern and central European countries. The UK, one of the leading users of coal ever since the start of the industrial revolution, cut its output by two thirds between 1990 and 2000. In the whole of Europe consumption dropped by 28 per cent during the same period. And these reductions have taken place at the same time as generation in nuclear plants was falling off.

Easily replaced

What will make it relatively easy and inexpensive to markedly bring down consumption is the fact that coal is mostly used in a limited number of large plants for the generation of electricity. There are alternative sources of energy available, and the use of electricity could also be made more efficient, thus eliminating much of the need for coal-generated power.

The Swedish energy analyst Fredrik Lundberg has just claimed in a

report¹ that if environmental aims are to be taken seriously, there can be no sustainable argument to support the continued use of coal in Europe.

EMPLOYMENT. Ceasing to mine coal would certainly have serious social consequences, both locally and regionally. But the trend towards fewer workers per unit of output can in any case hardly be checked. The

Carbon dioxide must be stored for thousands of years

loss of jobs at the pits could be compensated by suitable policies such as training and setting up other industries in the affected areas.

NUCLEAR POWER. Despite all the propagandistic efforts of the industry, not a single nuclear plant has been ordered in Europe since 1993, and the march of deregulation makes it unlikely that any more will be. One

reason is the high investment cost.

CLEAN COAL. A lot of the air pollutants arising from the burning of coal can indeed be captured, although not at any reasonable cost. A special problem is carbon dioxide, which must be stored in a way that will prevent its re-entry into the atmosphere for thousands of years. It would be better, both in the environmental and economic aspects, to invest in gas-fired plants rather than in clean coal. For comparison, see Lippendorf vs Baglan Bay.

ECONOMY. It is usually inexpensive to mine coal. But burning it in an environmentally acceptable manner costs about the same per produced kilowatt as windpower. And it would be cheaper to invest in a more efficient energy use. See New power plants or new light bulbs, box p.4.

More efficient use

Lundberg cites several reasons for the tendency to increase the availability of energy rather than to promote a more efficient use:

□ Throughout the post-war period, using ever more energy has been re-

Lippendorf vs Baglan Bay

One of the most modern coal-fired power plants is that at Lippendorf near Leipzig in Germany. This 2x933 MWe lignite-fired plant has a fuel-to-electricity efficiency of 42 per cent, total efficiency going up to 46 per cent if some of the capacity is used for heating – which is quite good for a coal-fired plant but poor in comparison with a contemporary gas-fired one such as that at Baglan Bay in Wales, with 60 per cent efficiency and less than half the specific CO₂ emissions. The investment cost at Lippendorf is equal to about \$1300 per kilowatt, as against \$500 for the natural gas combined-cycle plant.

Continued from previous page

garded both as the way to increased prosperity and as evidence of it.

□ Increasing its availability has often needed no more than a single decision, with clearly visible result. Improving efficiency may on the other hand call for millions of decisions and need the aid of psychologists and sociologists for its attainment.

As regards ways of bringing about a change, Lundberg proposes, besides doing away with all subsidies, making each form of energy pay its actual costs – including those to society for climate change and damage to health and the environment. Such

accounting would not only put coal at disadvantage compared with other forms of energy, but would also lead

*The coal industry
will be the first victim
of any such move*

to greater interest in bringing about a more efficient use of energy, since it would then become slightly more expensive.

A changeover from present policy

would in turn call for the creation of a more active public opinion to counterbalance the enormous sums the coal industry is paying out for lobbying to preserve the status quo – such as by opposing meaningful decisions under the UN climate convention. As Lundberg points out, the coal industry has every reason to oppose any limitation of greenhouse-gas emissions, since it would be the first victim of any such move.

Many decisions with far-reaching effect will have to be made during the next few years in Europe, since many old coal-fired plants will either have to be modernized or replaced by something else. A renewal rate of 7 per cent a year is usually not considered exceptional in business circles – and that is all that would be needed to halve the use of coal in Europe over a ten-year period.

PER ELVINGSON

Carbon emissions from coal combustion. Tons per capita 2000.

	Em. per capita	Comment
Czech Republic	1.73	big coal producer
Poland	1.54	big coal producer
Bulgaria	1.09	big coal producer
Russia	1.01	big coal producer
Germany	1.00	big coal producer, subsidized, large share brown coal
Ukraine	0.98	big coal producer
Greece	0.93	big coal producer
Macedonia, FYR	0.90	big coal producer
Slovakia	0.87	big coal producer
Belgium	0.84	was a big producer, ceased 1992
Netherlands	0.84	no coal production for decades
Slovenia	0.76	small coal production
Denmark	0.75	no coal production
Yugoslavia	0.75	coal producer
Finland	0.70	no coal production (but peat)
United Kingdom	0.63	rapidly shrinking coal production
Malta	0.52	no coal production
Spain	0.47	big coal producer
Ireland	0.46	no coal, but peat*
Austria	0.43	small production
Portugal	0.40	no coal production
Iceland	0.39	no coal production
Hungary	0.38	coal production
Turkey	0.37	increasing coal production
Romania	0.36	coal production
Luxembourg	0.28	no coal production
Estonia	0.26	no coal production, but oil shale*
France	0.25	insignificant coal production, being phased out
Sweden	0.25	no coal, but some peat
Norway	0.24	insignificant coal production
Italy	0.23	no coal production
Croatia	0.14	no coal production
Bosnia and Herzeg.	0.09	insignificant coal production
Belarus	0.05	no coal production
Lithuania	0.03	no coal production
Latvia	0.03	no coal production
Switzerland	0.03	no coal production
Moldova	0.02	no coal production
Cyprus	0.02	no coal production
Albania	0.00	no coal production

*Peat and shale are sometimes accounted for as “coal”, but not included in the EIA statistics.

¹ **To phase out coal. The structure of the coal industry, its environmental effects, and the possibilities of phasing out the use of coal.** By Fredrik Lundberg. Published by the Swedish NGO Secretariat on Acid Rain, October 2003. Single copies can be ordered from the publisher, free of charge. Also available in pdf format at www.acidrain.org/publications.htm.



New power plants or new lighting?

Building a new 1000 MWe coal-fired plant would cost at least 1 billion euros – or sufficient to buy at least 500 million 11-watt CFL lamps as replacement for 60-watt incandescent ones. In other words there would be no need to build it. But the former, at 2 euros apiece, would be a good investment for the consumer, so the government or utility would not have to invest a cent. All that would be needed is an information campaign, plus some inducement to design holders more suited to CFL lamps.



PEAT BURNING

Could spread unless checked

THE USE OF PEAT is very destructive to the landscape, and when burnt it emits great amounts of carbon dioxide, which are often also accompanied by large releases of sulphur dioxide and heavy metals as well as volatile organic compounds.

Although there are huge deposits everywhere, little is used outside Europe. Unless checked however, this use could spread from the present main consuming countries – Finland, Ireland and Sweden – to other parts of the world.

Peat is exempt from CO₂ tax in Sweden, which is the main reason for its continued use. It is also being increasingly imported from the Baltic states. While it is no longer subsidized in Finland, it is still not subject to the full CO₂ tax there.

It has been claimed with some success by the peat lobby in the EU that peat is an almost renewable fuel, with more being formed every year in the world than is being consumed (in some places).

Although it is of small consequence in regard to total EU emissions of CO₂, peat is having an effect on national emission targets in Finland, Ireland and Sweden. In Finland peat-based emissions amounted to 13.5 million tons of CO₂ equivalents, or almost a fifth of all the country's greenhouse-gas emissions in 1999. In 1995, 11 per cent of its energy had derived from peat.

In their national communications to the Climate Convention, both Estonia and Latvia announced increases in peat production and use. In this they may have been influenced by the example of Sweden and Finland. Their attitude may also help the peat lobby when those countries have become members of the EU.

¹ **To phase out coal. The structure of the coal industry, its environmental effects, and the possibilities of phasing out the use of coal.** By Fredrik Lundberg. Published by the Swedish NGO Secretariat on Acid Rain, October 2003.

Less coal being mined and burnt

In 2002 the production of coal went down from 79.3 to 73.1 million tons in the EU, mainly because of declines in the UK and Germany, where output fell by 9.2 and 6.5 per cent respectively. The gross internal consumption of coal in the EU was around 233 million tons in 2002, a drop of nearly 8 per cent compared with 2001.

Source: *Europe Environment*, October 9, 2003.

Will need new power sources

An extensive restructuring looms for the German power sector in the next twenty years, since many coal-fired plants will soon have become obsolete, and a phase-out of nuclear power has already been decided.

This opens the way for a more environmentally friendly energy system, such as outlined in a study published by the Umweltbundesamt, the German environment agency, in August. There it says priority should be given to measures to cut down the demand for energy. But even if that should be successful, there would still remain a shortfall in generating capacity of 40,000 megawatts in 2020 as a result of the shutting down of coal and nuclear plants. At least 10,000 MW of energy will need to be replaced by 2010. It will be impossible to make up for the deficiency solely through wind-power, according to the UBA, which proposes geothermal energy as a leading alternative. The agency also favours natural gas-fired, ultra-efficient combined heat-and-power (CHP) plants, to be sited close to centres of demand for heat.

The new study follows a longer-term sustainable energy scenario released by the agency last year in which it modelled the requirements for cutting German carbon-dioxide emissions by 80 per cent compared with 1990 levels by 2050.

Source: *Environment Daily*, August 18, 2003.

Same for both

Under the German renewable energy law government subsidies guarantee a fixed "feed-in" price of roughly 0.09 euro per kilowatt hour for wind power. Overall wind-power subsidies in Germany are now of the same order as those for coal.

Source: *Environment Daily*, September 3, 2003.

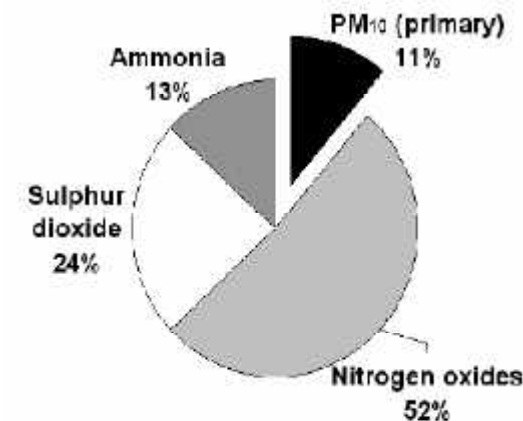
First particles and ozone

An integrated long-term policy for air quality is to be presented to the EU in 2005

WORK ON THE EU's Clean Air For Europe Program (CAFE) is starting to gain momentum. At the last meeting of the Steering Group in September, the Commission not only presented an updated work schedule but also a preliminary outline of a so-called thematic strategy (see box).

According to the schedule, that strategy is to be ready for the Commission to present to the Council and the European parliament at the latest by July 22, 2005 – in other words, three years to the day after the EU had officially adopted the Sixth Environmental Action Programme. That will be somewhat later than was intended when the Commission put forward the original proposal in May 2001, which would have seen the strategy ready in 2004.

It is still unclear how inclusive the text will be when presented in 2005 – whether it will simply be a sketch indicating the aims and direction of the Clean Air project, or whether it will set forth definite proposals for



Particle emissions: EU 1998

Only a smaller part of the particles (PM₁₀) in the air stems from direct emissions. Much of the formation of so-called secondary particles is due to sulphur and nitrogen oxides and ammonia after their emission.

The percentage of particle emissions in the chart is based on certain assumptions as to how much of the other pollutants becomes transformed into particles in the air.

Source: *Environmental signals 2001*. Environmental assessment report No. 8. European Environment Agency. Internet: www.eea.eu.int

new legislation and revision of the existing.

The CAFE program concentrates primarily on those air pollutants that are already covered by EU air-quality standards, of which the Commission has mentioned two as needing

especial attention: particles and ground-level ozone. Four kinds of pollutant – sulphur dioxide, nitrogen oxides, volatile organic compounds (VOCs) and ammonia – come under the directive on national emission ceilings (NECs). One intention of the

Clean Air for Europe – the CAFE program

Launched in May 2001, CAFE is a program for technical analysis and policy development leading to the adoption of a thematic strategy for air pollution under the EU's Sixth Environmental Action Programme. The aim is to develop a long-term, strategic, integrated policy to protect against negative effects of air pollution on health and the environment. The Commission is to present its proposal for a thematic strategy before July 22, 2005, in which it will outline the environmental objectives for air quality and the measures it deems necessary to achieve the above aims.

The activities of the program include:

1. Developing, collecting and validating scientific information relating to the effects of outdoor air pollution, making inventories and projections of emissions and air quality, assessing air quality, doing studies of cost effectiveness and carrying out integrated assessment modelling – all leading to new and/or revised objectives in respect of air quality and pollutant depositions, and identifying the measures required for reducing emissions.

2. Supporting the implementation of existing legislation and reviewing its effectiveness, in view especially of the daughter directives on air quality and the directive on national emission ceilings, and to develop new proposals

for measures to abate emissions.

3. Ensuring that the measures are taken that will be needed to achieve the objectives for air quality and depositions cost effectively.

4. Determining at regular intervals an integrated strategy to define appropriate air-quality objectives for the future and cost-effective measures for meeting those objectives.

5. Disseminating the technical and policy information emerging from implementation of the program.

The program aims, through its organizational structure, at ensuring its policy will be science-based and involve stakeholders at all levels of policy making. It is being developed under the leadership of a permanent secretariat housed within the Environment Directorate of the Commission. In order to ensure full coordination of the Commission's policy, the secretariat has the assistance of an inter-service group composed of representatives of all the relevant Commission departments.

A steering group comprising representatives of the member states, the European parliament, stakeholders and relevant international organizations meets two or three times a year to advise the Commission on the strategic direction of the program.

CAFE program is to assemble data for a revision of this directive, and add particles to the list of the pollutants it covers.

Just now much of the work is concentrated on assembling the necessary data for the program, and on developing computer models for its analysis. A main item is integrated assessment modelling, which is done with the aid of the RAINS model – in other words, essentially the same as that used a few years ago in putting together the NEC directive.

That model will also be used in forming scenarios for likely trends in emissions – for the target years 2010, 2015 and 2020 from the base year 2000.

There is still a great deal of uncertainty as to the extent to which the EU members will fulfill commitments under the Kyoto protocol to reduce emissions of greenhouse gases. Their actions will greatly affect the extent to which fossil fuels will be used, and thus the emissions of air pollutants covered by the CAFE program. To be on the safe side, various so-called baseline scenarios will therefore be used.

The first results of the computer modelling are expected to come early in 2004, when the emission figures and environmental effects revealed in the baseline scenarios are scheduled for presentation. Following that, a number of policy options for the abatement of emissions will be studied, for example in respect of cost effectiveness. Some will also be subjected to more detailed analyses for costs and benefits.

Projections of economic activity in the member countries up to 2020 will be needed if the emission scenarios are to be credible. These will have to include the expected levels of energy use (broken down into types of energy), transportation volume (also by type), industrial and farm production, etc. Although the need for such information has long been known to the member countries, many have still to report the necessary data. This may not only delay the analyzing, but also result in the outcome being less credible among the member countries than it would otherwise have been.

CHRISTER ÅGREN

More information On the CAFE program can be found on the environment directorate's website: <http://europa.eu.int/comm/environment/air/cale/index.htm>

Nations show laxity in fulfilling commitments

Only a minority has prepared programs for reducing emissions and reported them according to the directive.

FOUR EU COUNTRIES – Greece, Ireland, Luxembourg and Spain – have still not told the Commission how they propose to reduce their emissions of air pollutants so as to fulfill their commitments under the directive on national emission ceilings (2001/81, the NEC directive). It seems, too, that many of those that have reported have failed to do as the directive requires.

Article 6 says that the member states shall, at the latest by October 1, 2002, have drawn up programs for the progressive reduction of the four pollutants covered by the directive: SO₂, NO_x, VOCs and ammonia. These programs should be so formed as to make it possible to get down to their allotted ceilings at the latest by 2010. It should be said what policies and measures have been adopted or envisaged, and give quantified estimates of the effect they will have had on emissions in 2010. Article 8 says that the member states shall have informed the Commission of their programs at the latest by December 31, 2002.

Article 6 also says that the member countries must make their programs available to appropriate organizations such as those dealing with environmental matters, as well as to the public. The information shall be “clear, comprehensible and easily accessible.”

Since it had soon become evident that only a minority had prepared programs for reducing emissions and reported them in accordance with the directive, the Commission sent out letters to all those that had not. Subsequently more and more members started sending in reports, but in October 2003 – one year after the deadline – the four above-mentioned had still not done so.

These national programs are highly important not only for the im-

plementation of the directive, but also for its eventual revision. They provide the material for the report that the Commission has to produce, in accordance with Article 9 of the directive, in 2004, and deliver to the European parliament and the Council of Ministers. In it the Commission must tell what progress has been made towards nearing the national ceilings, and report on the extent to which the interim environmental objectives of the directive are likely to have been met by 2010.

The Commission has also to produce a review of the directive by 2004, which may for instance lead to proposals for modifying the ceilings and for measures to ensure that they will be adhered to.

EEA, the European Environment Agency, has recently started to make an assessment of the national programs. A report is expected in December. It is however already evident that most of them fail in essentials – and especially in giving assessments in figures of the effects of measures to curb emissions.

It appears from the reports that have come in that several of the member countries foresee difficulties in meeting their ceilings. The main problem appears to be nitrogen oxides. It is naturally difficult however to determine how great these difficulties are, since most of the national programs lack the information needed for an analysis – namely, quantitative estimates of the effect of the measures proposed or undertaken.

CHRISTER ÅGREN

The reports on national programs received by the Commission can be found on the environment directorate's website http://europa.eu.int/comm/environment/air/nationalprog_dir200181.htm

Better air with road pricing

The British Institute for public policy research (ippr) says congestion charging should be introduced to help reduce traffic and air pollution on the roads. According to a study, charging would cut the volume of traffic in England by 7 per cent, and the emissions of carbon dioxide by 8 per cent, provided that fuel taxes were not reduced. Bus travel would at the same time increase by 11 per cent.

The government is said to be thinking of starting road pricing on a national scale, possibly in combination with a reduction of other motoring taxes.

The study can be downloaded from www.ippr.org.uk

Works well

The system of congestion charging that was started in London last February has come up to expectations, according to an appraisal made by Transport for London for its first six months. Traffic delays are reported to have lessened by 30 per cent within the charging zone, traffic flow is better and buses have taken charge of the extra passengers.

Some 60,000 fewer cars are now entering the 22-square-kilometre charging zone. TfL estimates that 25-30 per cent of them are now taking their way around the periphery, 30-60 per cent of the former riders are using public transportation, and the remaining 15-25 per cent are car sharing, cycling, or making the trip in charge-free hours.

Concerns over the possible detrimental effect of charging on economic activity within the zone appear to be misplaced, says TfL. There seem to be other reasons for fewer people travelling into central London, as may be gathered from the drop in passengers on the underground.

Further information: www.tfl.gov.uk/tfl/press-releases/2003/october/press-818.shtml

Again postponed

Trouble with computer software has meant that the distance-based charging system for heavy trucks on German motorways has once more had to be shelved, this time indefinitely. First it was going to be introduced in August, and then in November. Toll Collect, the consortium behind the system, may be forced to compensate the government for lost revenue caused by the delay, estimated at around 160 million euros per month.

Source: *Environment Daily*, October 6, 2003.

Very high levels in summer of 2003

Unless the emissions of precursors are greatly reduced, the situation will be repeated in coming warm summers, warns the EEA.

IN LARGE PARTS OF Europe this summer the concentrations of ground-level ozone were the worst for almost a decade. This was particularly so during the long August heatwave. A preliminary assessment by the European Environment Agency¹ shows the situation to have been worst in southwestern Germany, Switzerland, northern and northeastern France, Belgium, northern and central Italy and Central Spain.

For its formation at ground level, ozone needs to have nitrogen oxides, volatile organic compounds and sunlight. High concentrations can build up during periods of high pressure in summer, when the air tends to move sluggishly. This was precisely what happened over large areas of Europe last August.

"The situation is likely to repeat itself in any future summers with above-average temperatures until measures taken under current leg-

islation result in a much larger cut in emissions of the precursor pollutants," says the EEA in a preliminary analysis intended for the environmental ministers of the EU countries.

According to the EEA's statistics, the emissions of the main ozone precursors – nitrogen oxides and non-methane VOCs – declined by about 30 per cent between 1990 and 2000 in the fifteen EU member countries. If the national ceilings for these and some other pollutants should have been met by 2010, as envisaged, emissions will come down by another 30 per cent.

Of thirty-one countries reporting monitoring results to the EEA this year, twenty-three had suffered pollution from ground-level ozone at concentrations well above the information threshold of 180 micrograms per cubic metre of air ($\mu\text{g}/\text{m}^3$), averaged over one hour on one or more days between April and August.

Ground-level ozone

Exposure to elevated concentrations of ozone can give rise to adverse effects on the breathing system and decreases in lung function. Symptoms observed during smog events have been coughing, chest pain, difficulty in breathing, headache and eye irritation. Recent research suggests that there may be no threshold for the adverse effects on health. It seems that even low concentrations can cause damage.

Exposure of ecosystems and agricultural crops to ozone results in visible injury to foliage and reductions in crop yield and seed production. Adverse effects on vegetation can be noted at relatively low ozone concentrations which occur frequently in Europe.

EU legislation on ozone pollution was established in 1992 by directive 92/72/EEC. This was replaced on September 9, 2003 by directive 2002/3/EC on ozone in ambient air. For information see: <http://europa.eu.int/comm/environment/air/ambient.htm#2>

Besides the fifteen EU member states, the countries reporting on ozone levels this year were Bulgaria, the Czech Republic, Estonia FYR Macedonia, Hungary, Iceland, Latvia, Liechtenstein, Lithuania, Malta, Norway, Poland, Romania, the Slovak Republic, Slovenia and Switzerland.

Altogether 1805 monitoring stations in 31 countries are assumed to have been operational this year during spring and summer.

Clamping down on coal-fired power plants

The State Environmental Protection Administration in China is now stepping up efforts to curb ever-growing emissions of air pollutants, according to a report in the official China Daily.

New standards for the emissions of sulphur dioxide from coal-fired power plants in the country's 22 largest cities were published in October. While it is not exactly clear what the requirements are, it is said that measures must have been taken at 137 "key plants" by 2005. That has been set as the date by which the country's emissions of sulphur dioxide shall have been brought down by 20 per cent from their 2000 levels. In 2002 emissions amounted 6.6 million tons.

If enforced, the regulations could substantially raise costs for producers in China's booming energy market. Most of China's coal is high in sulphur and emissions require substantial treatment to extract the most dangerous pollutants.

Source: AP, October 9, 2003.



Include aviation in emissions trading

The emissions of greenhouse gases from aircraft should be regulated by a global cap in combination with emissions trading. Until then all flights within the EU should be subject to an "en route" environmental charge based on carbon emissions at a rate of £70 (100 euros) per ton of carbon dioxide. A UK Commission for integrated transport is also proposing auctions for peak-time take-off and landing slots, plus an additional congestion charge. Tradeable noise permits could be introduced, while separate instruments should be devised to cover condensation trails and nitrogen oxides (NO_x), once their impact on climate has been properly quantified.

An existing aviation charge in the UK produces £800m a year in revenue, barely half of the £1.4bn in external costs that the commission says the industry causes. A government white paper on aviation is expected later this year.

Further information: UK Commission for Integrated Transport: www.cfit.gov.uk

Beyond this threshold, exposure for a short period can have limited, temporary effects on the health of children as well as of adults who are particularly sensitive to ozone. Governments are required by EU law to inform the public whenever the 180 µg/m³ threshold is overstepped.

That happened on 137 of the 153 days monitored between April and August in at least one of the twenty-three countries. Concentrations stayed above the threshold on an average for 3.5 hours, the longest period since 1995. During the episodes they averaged 202 µg/m³ in the twenty-three affected countries. In Romania it was as much as 246 µg/m³. Only in Scandinavia, Finland, the Baltic States and Ireland did they stay below the threshold.

The number of hours during spring and summer when concentrations stayed above the threshold averaged 31 this year for the EU. That was the highest ever. In France it was one-third higher than in the previous record, set nine years ago.

The threshold was overstepped

most often in southwestern Germany, Switzerland, northern and south-eastern France, Belgium, northern and central Italy and central Spain.

Revised EU legislation that took effect in September sets the level at which even brief exposure to ozone is considered to pose a health risk at 240 µg/m³ averaged over one hour, instead of 360 µg/m³. Governments are now required to warn the public when this threshold is overcrossed.

The previous 360 µg/m³ threshold, when it still applied, was overstepped four times this summer. The highest recorded concentration was then 417 µg/m³ reached at Sausset les Pins, France, in August.

The new 240 µg/m³ threshold would have been crossed over in fifteen countries.

PER ELVINGSON

¹ Air pollution by ozone in Europe in summer 2003: Overview of exceedances of EC ozone threshold values during the summer season April-August 2003 and comparisons with previous years. Available at http://reports.eea.eu.int/topic_report_2003_3/en.

EUROPEAN HEAT WAVE

The toll last August

THE AUGUST HEAT WAVE is estimated to have caused at least 35,000 deaths in Europe. In France alone, where the temperature rose to 40°C and remained there for two weeks, 14,802 people are said to have died from heat. That is almost twenty times more than those that had died in the whole world as a result of the SARS epidemic.

Deaths in Germany are numbered at 7000. Both in Spain and Italy some 4200 were associated with the heat wave, which took at least 1300 lives in Portugal and 1400 in the Netherlands.

In London, where temperatures rose above 100°F (37°C) for the first time ever, the death toll was put at 900, and for the whole of the UK at 2045. In Belgium temperatures higher than any recorded in the Royal Meteorological Society's register dating back to 1833 brought 150 deaths.

August 2003 was the warmest on record in the northern hemisphere,

but according to the projections of the Intergovernmental Panel on Climate Change, even more extreme weather events lie ahead. By the end of the century the average world temperature is projected to increase by 1.4-5.8°C. As the mercury climbs, more frequent and more severe heat waves await us. The World Meteorological Organization estimates that the number of heat-related fatalities could double in less than twenty years.

"Though heat waves are rarely given adequate attention, they claim more lives each year than floods, tornadoes, and hurricanes combined. Heat waves are a silent killer, mostly affecting the elderly, the very young, or the chronically ill," writes Janet Larsen at the Earth Policy Institute, who has compiled the above figures.

For more information see www.earthpolicy.org/Updates/Update29.htm

A source in need of attention

Air quality in Copenhagen found to be greatly affected by ships lying at berth.



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Much of the nitrogen dioxide in the air around Helsingør comes from ferries plying continuously between Denmark and Sweden. In Copenhagen on the other hand it comes mostly from ships in the port.

RELATIVELY LITTLE is known about the extent to which shipping adds to the concentrations of harmful air pollutants in ports and their surroundings. Modelling carried out in Denmark has however indicated a strong connection, especially as regards nitrogen oxides.

Using emission factors for various types of vessel, together with harbour statistics and a dispersion model for air pollutants, the Danish Environment Assessment Institute (IMV) has worked out the local concentrations of various pollutants deriving from shipping.¹ Since they are based largely on assumptions, the figures should however be regarded more as an estimate of the risks than a definite conclusion.

Nevertheless they suggest that it would be worthwhile to make a deeper study, especially of the emissions of nitrogen oxides in the port of Copenhagen – where shipping emissions account for at least 25 per cent of what will be the allowable one-hour average EU limit value for nitrogen dioxide in the air. In some more closely defined areas, ships'

emissions alone will be enough to breach the EU limit.

Although shipping appears to contribute relatively little to the local concentrations of sulphur dioxide, its share may have been underestimated – since the estimates are based on the assumption that Annex VI of the MARPOL convention will be coming into force and thereby limit the sulphur content of marine oils used in the Baltic and North Seas to 1.5 per cent. That content is now twice as high.

Lives shortened by global warming

About 160,000 people die every year from side-effects of global warming ranging from malaria to malnutrition and the numbers could almost double by 2020, even taking account of factors such as improvements in health care, according to estimates presented by a group of researchers at the World Health Organization and the London School of Hygiene and Tropical Medi-

As for the background concentrations of particles (PM₁₀) in urban air, the local effects of shipping are accounted small when considering the situation as a whole. But they still equal one third of the local emissions from road traffic.

In Copenhagen, a very great part of the emissions of nitrogen oxides from ships (about three quarters) stems from the time when they are berthed. The possibilities of taking power from land should therefore, says IMV, be studied. The great emitters in this case are ferries, tankers and cruise ships, which account for 25, 23 and 18 per cent of the emissions of nitrogen oxides in the port area.

The IMV has also examined the situation further up the coast in Helsingør, where shipping also accounts for a lot of the nitrogen dioxide in the air. Here emissions come mainly from vessels moving in and out, since a large part of the traffic consists of ferries plying between Denmark and Sweden (Helsingborg). This means taking power from land will be no solution. Instead, measures will need to be taken aboard ship.

PER ELVINGSON

¹ *Luftforurening fra skibe i danske havne.* (In Danish only.) By Henrik Saxe and Thommy Larsen, Danish Environmental Assessment Institute. Article published in Stads- og havneingeniøren, No.9, 2003.

cine at a climate conference in Moscow at the end of September. Children in developing countries are likely to be most vulnerable. It would be worst in Africa, Latin America and south-east Asia, due to the spread of malnutrition, diarrhoea and malaria in the wake of warmer temperatures, floods and drought.

Source: Planet Ark (Reuters), October 1, 2003.

Acid News

Index of articles 1999-2003

An index covering the whole period since 1982 is available at www.acidrain.org/acidnews.htm

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1/99:7 Standards for benzene and CO proposed (EU). Ozone concentrations (EU). **2/99:**11 Ozone – lung cancer. **3/99:**7 Limit values for ozone (EU). 14 WHO London '99 Conference. 15 Effects of PM₁₀. **4/99:**14-15 Children worst affected. 15 Diesel particles. **1/00:**7 Benzene limit values (EU). 12-13 Particles. **2/00:**8 Diesel particles and cancer. 17 Particles. **3/00:**9 Benzene limit values (EU). 28 Italy. Greece. **4/00:**12 Air-quality limits for ozone, benzene and CO (EU). 23 Europe. London. Delhi. **1/01:**1,4 LCPs and particles (US). 20 Benefits from climate strategy. Particles. **2/01:**11-14 *Factsheet:* Air pollution and health. 15 Particles (Sweden, UK). **3/01:**13 Diesel particles (US). **4/01:**3 Ozone concentrations 2001 (EU). 6 Clean Air for Europe Programme (EU). 7 PAH emissions. 11 Air-quality directive on ozone agreed (EU). **1/02:**7 Ditto. 9 Anti-smog plan (Italy). 13 Air pollution – birth defects (Calif.). **2/02:**20 Small particles – lung cancer. 21 Premature deaths from power plant emissions (US). **3/02:**21 Effects (US). **4/02:**10 Particles – death rates (APHEIS program). Coal ban – better health (Dublin). **2/03:**15 The Great London Smog 1952. 19 Long-term ozone exposure. 22 Particles (Netherlands). **3/03:**15 Effects of ozone underestimated (Sweden). 19 No binding limits proposed for PAH and heavy metals (EU). 24 NO_x and asthma attacks. **4/03:**8-9 Ground-level ozone in Europe 2003. 9 Heatwave and health. 10 Local pollution from shipping (Denmark).

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3/99:14 Lake recovery (North America). **1/00:**22 Norway. **1/01:**22 Recovery (Sweden).

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1/99:9 Old vs new plants. 10-11 British power sector. **2/99:**14-15 Oil shale (Estonia). **4/99:**4 LCP directive (EU). 5 NO_x standards (US). 8-9 British power sector. 9 Power-plant owners prosecuted (US). 10 Poland. **1/00:**13 EU directive. 18-19 British power sector. **2/00:**2 EU directive (Editorial). 10 EU directive. **3/00:**1, 4-5 Worst European plants. **4/00:**1, 3-4 Best and worst European plants. 2 EU directive

(Editorial). 8-10 replacing coal. **1/01**:1,4 Particles and health effects (USA). 12 LCP directive (EU). 14-16 Best available techniques (IPPC directive, EU). 1, 3-5 EU directive. 8-9 Ditto. **3/01**:1,4-5 Ditto. 13 US NOx standards. 14 Black Triangle. 15 German emissions 1990-2000. **1/02**:5 EU directive adopted. **2/02**:20 US polluters listed. **3/02**:11 Benefits from compliance with EU directive (UK). **1/03**:22-23 Kola Peninsula. **2/03**:16-17 Maritsa-East (Bulgaria). **3/03**:10 CO₂ emissions from European power sector (WWF study). 24 "Carbon dinosaurs." **4/03**:1, 3-4 Coal in Europe. 17 New source review program (US).

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2/99:11 Ammonia (Switzerland). **3/99**:16 Algal blooms. **2/01**:20 Ammonia (Netherlands). **3/01**:5 Ammonia emissions. **4/01**:16-17 Long-term effects. **1/02**:10-11 Ammonia emissions from non-agricultural sources.

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3/99:17-18 Nuclear phase-out and reduced CO₂ emissions (WWF).

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1/99:7 EU concentrations. 16 Worldwide. **2/99**:11 Ozone – lung cancer. **3/99**:7 Air-quality standards (EU). **4/99**:11 EU concentrations 1998-99. **1/00**:15 Southern Europe. **4/00**:12 European trends. Air-quality standards (EU). 13 Damage to crops. 14 North America. **1/01**:3 EU concentrations 1999-2000. 12 Air-quality standards (EU). **3/01**:9 EU air-quality directive. **4/01**:3 EU concentrations 2001. 11 Air-quality directive agreed (EU). **1/02**:7 Ditto. **3/02**:22-23 Damage to crops (Europe). **4/02**:22 EU concentrations 2002. **2/03**:18-19 Background levels increasing. 19 Health effects. **3/03**:15 Health effects underestimated (Sweden). **4/03**:8-9 European concentrations 2003.

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2/99:4 EU strategy. **4/99**:13 Photovoltaic cells. Windpower potential. **1/00**:11 Installed windpower capacity (EU). **2/00**:7 EU directive. **4/00**:24 Windpower potential. **2/01**:22 Windpower (General, UK). 24 Potential worldwide (UNEP report). **3/01**:15 Windpower (Germany). **1/02**:6-7 Status and targets (EU). 8 Funding stopped (Denmark). Windpower (Germany). 11 Windpower (worldwide, Ireland). **2/02**:21 Solar energy. **1/03**:7 Biofuels (EU). **2/03**:6 Windpower (EU, global).

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1/99:8 HDV emission limits (EU). Eurovignette. Swiss transit traffic. 11 Road charging (UK). 13 EU fuel taxes. **2/99**:4 Italy. 6 Tractors (EU). 16 Cycling. 20 New standards proposed for cars and fuels (US). **3/99**:13 Speed limits (Germany). 14 WHO transport and health conference. 15 Particle trap for diesel cars. Fuel-efficient Honda. Best and worst (UK). 19 Cleaner heavy vehicles. 20 Infrastructure report (SACTRA, UK). **4/99**:6 Emission standards for trucks and motorcycles (EU). Railways (EU). 7 European car-free day. 11 Taxation (Germany, France, UK). 15 Diesel parti-

cles and health. 19 HDV standards (US). Cars' fuel consumption (US). Sulphur in fuels (US). **1/00**:7 US car standards. 12-13 CO₂ from cars (EU). Sulphur in fuels. 14 Emission standards for HDVs. 19 Road charging (Germany). 22 Car-free cities. **2/00**:8 Diesel particulates and cancer. IT and transportation. 9 Sulphur in fuels (EU). 14-15 Non-road vehicles – emissions and abatement. 20 Emission standards (US). **3/00**:20-21 Transportation trends (EEA report). 22 Desulphurization of diesel. **3/00**:9 Motorbikes (EU). **4/00**:6 Auto-Oil II (EU). 7 Sulphur in motor fuels (EU). 9 Limits for pleasure boats (EU). 10 CO₂ from cars (EU). 24 Fuel taxes (EU). **1/01**:11 Small petrol engines (EU directive). 11-12 Motorcycles (EU directive). 16 Kilometre tax for heavy vehicles (EU). 17 Ditto (Switzerland). 19 Cleaning equipment for existing heavy vehicles. **2/01**:10 Sulphur in motor fuels (EU). 17 Particle emissions: petrol vs diesel. Motorcycle standards (EU). 22-23 Ecodriving. **3/01**:10 Small petrol engines (EU directive). 11 CO₂ from cars (EU). 13 Diesel particles and health (US). 16-17 Environmentally sustainable transportation (OECD). 18 Road pricing (Netherlands). 19 Ditto (Germany). Congestion charging (London). Urban sprawl. **4/01**:7 Small petrol engines (EU). Pleasure boats (EU). 8-9 Common transport policy proposed (EU). 9 Transportation trends (EU). **1/02**:3 Sulphur in road fuels (EU). 6 Motorcycles (EU). 9 Anti-smog plan (Italy). 12-13 Biofuel directives proposed (EU). 16-17 Trucks and ships compared. 19 Catalyzer for diesel cars (Toyota). **2/02**:8 Motorcycles (EU). 22-23 Global motor vehicle policy (Bellagio memorandum). **3/02**:4 CO₂ from new cars (EU). Sulphur-free fuels (EU). Biofuels (EU). 15 Standards for CO₂ from cars (Calif.). **4/02**:5 Non-road machinery standards decided (EU). **1/03**:6 CO₂ from new cars (EU). 7 Biofuels (EU). Sulphur-free fuels decided (EU). 8 Non-road mobile machinery (EU). 9 Mopeds (Denmark). 16-17 Development in transportation sector (EU, accession countries; TERM 2002). 18-19 Taxation of transportation (EU). 19 Kilometre tax for heavy vehicles (Austria, Germany). **2/03**:6 Non-road petrol engines (EU). 7 Biofuels (EU). Sulphur-free fuels (EU). 8-9 Stricter diesel standards in the offing (EU). 9 NOx from trucks (Germany). 10 Congestion charging (London). 15 Air conditioners in cars. 19 Stricter non-road diesel standards proposed (US). **3/03**:16-18 Fuel-cell cars. 18 Non-road vehicle emissions. 19 Biofuel directive into force (EU). 21 EU kilometre tax for heavy vehicles (Eurovignette). 21 German road-user charge postponed. 22 CO₂ from transportation can be reduced (US). **4/03**:8 Congestion charging (London). Road pricing (UK, Germany). 16 Non-road diesel standards (EU). 18-19 New EU standards for diesel-driven road vehicles (UBA proposal).

AIRCRAFT

2/99:16 Climate effects. Subsidies. **3/99**:6 Subsidies. **1/00**:11 EU strategy. **4/02**:5 External costs calculated. **3/03**:23 Increasing emis-

sions (UK). Subsidies calculated (Germany). **4/03**:9 Aviation charges (UK).

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1/99:12-13 Ditto. 12 Emissions, Norway. **4/99**:1, 3-4 Economic instruments. **1/00**:24 Mediterranean emissions. **2/00**:4 North Sea sulphur sensitive area. 5 Green shipping conference. **3/00**:3 Acidifying emissions. **4/00**:5 Measures at EU levels. **1/01**:8 Global CO₂ emissions. 10 Pleasure craft emissions (EU directive). 17 Differentiated harbour dues (Åland, Finland). **3/01**:10 Pleasure-craft emissions (EU directive). 12 Emissions in Danish waters. NOx from Norwegian ships. Harbour dues in Hamburg. Cruise ships, Alaska. **4/01**:2 Editorial. 14-15 Emissions and abatement. 15-16 Air quality in ports. **1/02**:5 EU strategy underway. 13 Pleasure-craft emissions. 16-17 Worse than trucks. **2/02**:2 Editorial. 3 EU strategy. **3/02**:8-10 Emission trends analyzed (EU). 10 Air pollution in ports (Calif.). 10 Contribution to formation of small particles. **4/02**:1,4 Emission charging effective (Sweden). 2 Editorial. 3 Ratification status of IMO MARPOL Annex VI. 6 EU sea strategy proposed. 8-9 Emissions trading proposed. **1/03**:1, 3-4 EU shipping strategy proposed. 2 Cost-effective to do it at sea (Editorial). 4-5 Sulphur in marine fuels (EU directive proposed). 24 Environmental labelling of ships (Germany). **2/03**:1,3 Ecoship. 4-5 Sulphur in marine oils (EU). 5 "Toothless" requirements (US). NOx abatement costs (Norway). 7 Pleasure craft (EU). *Factsheet*: Air pollution from ships. **3/03**:2 Sulphur in marine fuels (Editorial). 6-7 EU parliament wants stricter limits. 7 PAH emissions from ships. 7 MARPOL Annex VI. 8 Seawater scrubbing. **4/03**:10 Contribution to local air pollution (Denmark).

Volatile organic compounds (VOCs)

1/99:8 Ditto. **1/01**:18-19 Oilfield emissions (Norway). **3/01**:22 Protocol evaluated. **1/02**:1, 4-5 Ditto. 2 Editorial. 5 VOCs in products (EU directive). **2/02**:16 VOCs in paints. **4/02**:6 Emissions from refineries underestimated (Belgium, Sweden). **1/03**:7 Paints and varnishes (EU directive proposed). **3/03**:7 PAH emissions from ships. 19 Air-quality directive (EU). 20 Paints and varnishes (EU directive). **4/03**:16 Ditto.

Damage hardly changed but still high fallout

While the percentage of defoliated trees in Europe remains fairly constant, depositions of nitrogen, acidity and heavy metals still exceed critical loads in many places.

THE LATEST MONITORING of forest condition in Europe shows little change from 2001. In 2002 the proportion of damaged trees – those that had lost more than 25 per cent of their needles or leaves – was 21.3 per cent as against 22.4 per cent the year before.

Showing the results of studies of some 7000 observation plots in altogether 36 European countries, this last survey was the seventeenth in a continuous series. Many countries also conducted their own surveys, the outcome of which can be seen from the table.

Besides noting leaf and needle loss, which is considered to be a good measure of the trees general state of health, the project includes some more detailed studies, which have made it possible to draw the following conclusions:

- The main causes of crown thinning are extreme weather conditions, attacks from insects and fungi and air pollution. A statistical connection has been established between sulphur depositions and defoliation of the main species.

- Greatly reduced emissions of sulphur dioxide have led to a strong lowering of the concentrations of sulphate in the soil solution.

- Depositions of nitrogen, acidity and heavy metals still exceed critical loads on a large proportion of the intensive monitoring plots, indicating enhanced risks for forest ecosystems.

- One of the main pollutants affecting forests directly via leaves and needles is tropospheric ozone. The measurements that have now been carried out for the first time in the monitoring program support the existing knowledge of high ozone concentrations in southern Europe especially. The assessment of visible

ozone injury will now be further developed, as the only monitoring on a European scale of the effects of ozone on forests.

- The net increase in the forest carbon pool in Europe is around 0.1 Gigatons per year. The uptake of carbon is 5-7 times greater in trees than in the soil. The monitoring program has now shown it to be no more than a tenth in soil of what appeared from previous surveys.

- By stimulating forest growth over the whole of Europe during the last forty years, the deposition of atmospheric nitrogen was calculated to account for 5 per cent of the increase in carbon uptake.

Information collected at the intensive monitoring plots has also made it possible to construct so-called dynamic models to predict the rate at which the soil chemistry will change as the emissions of air pollutants decline.

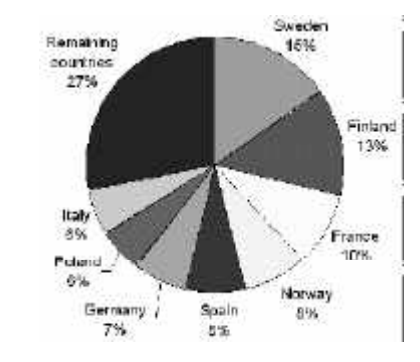
This modelling shows that if the countries reduce their emissions as agreed under the so-called Gothenburg protocol, there can be expected to be marked improvements in the average acidity of the soil water and its content of aluminium ions. The nitrate content will also come down if the emissions of nitrogen are reduced as agreed.

It should be noted however that this only applies to the chemical reactions of the soil water. Reactions of the soil solid phase are always much slower, taking decades or even centuries.

The monitoring of forest condition in Europe is carried out jointly by the United Nations Economic Commission for Europe (UNECE) and the European Union.

PER ELVINGSON

Where Europe's forests are
(Belarus, Ukraine, Russia and Turkey excluded).



Results from national forest-damage surveys, 1998-2002. Percentage of trees with defoliation >25 per cent.

	1998	1999	2000	2001	2002
Albania	10	10	10	10	13
Austria	7	7	9	10	10
Belarus	30	26	24	21	10
Belgium	17	18	19	18	18
Bulgaria	60	44	46	34	37
Croatia	26	23	23	25	21
Cyprus	—	—	—	9	3
Czech Rep.	49	50	52	52	53
Denmark	22	13	11	7	9
Estonia	9	9	7	8	8
Finland	12	11	12	11	12
France	23	20	18	20	22
Germany	21	22	23	22	21
Greece ¹	22	17	18	22	21
Hungary	19	18	21	21	21
Ireland	16	13	15	17	21
Italy	36	35	34	38	37
Latvia	17	19	21	16	14
Lithuania	16	12	14	12	13
Luxembourg	25	—	23	—	—
Moldova	—	—	29	37	42
Netherlands	31	—	22	20	22
Norway	31	29	24	27	26
Poland	35	31	32	31	33
Portugal	10	11	10	10	10
Romania	12	13	14	13	14
Russian Fed. ²	—	—	—	10	11
Serbia & Mont.	8	11	8	14	4 ³
Slovak Rep.	32	28	24	32	25
Slovenia	28	29	25	29	28
Spain	14	13	14	13	16
Sweden	14	13	14	18	16
Switzerland	19	19	29	18	19
Ukraine	52	56	61	40	28
United Kingd.	21	21	22	21	27

¹ Excluding maquis. ² Only regional surveys in northwestern and Central European parts of the Russian Federation. ³ Montenegro only.

Source: **The Condition of Forests in Europe, 2003 Executive Report**. Available from Federal Research Centre for Forestry and Forest Products, PCC of ICP Forests, M. Lorenz, Leuschnerstr. 91, 210 31 Hamburg, Germany. Can also be downloaded from www.icp-forests.org

Evidence of a decline in Europe

WHILE THERE ARE great variations in the atmospheric fallout of heavy metals over Europe, a general trend seems to be that depositions at least of arsenic and cadmium are declining.

Several human activities lie back of the spread of heavy metals to the atmosphere. A simple and reliable method of measuring the extent of depositions is to collect and analyse their content in common moss species. This is now being done on a European scale as part of the environmental surveillance for the Convention on Long-range Transboundary Air Pollution.

The results of sampling in 2000-01 indicate increases for most kinds of heavy metals as one moves from west to east in Europe. Coal burning is pinpointed as the reason for the fallout being higher in central and eastern Europe than in the western part of the continent. It is also a large source of the spreading to the atmosphere of arsenic as well as other heavy metals such as chromium, copper, mercury, nickel and zinc.

It also appears from analyses that long-distance transports are taking place in the air. In Scandinavia, for instance, where local emissions are small, concentrations in mosses decline as the distance from emission sources on the continent increases. The analyses also give evidence of where sizable local emissions from smelters and similar plants are located.

It is only possible, from today's data, to make a preliminary comparison of the situation in 2000-01 with that five years earlier. Such comparison, using identical sites and moss species, indicates however a general decline in the concentrations of some heavy metals, such as arsenic and cadmium, throughout Europe.

Further reading: Heavy Metals in European Mosses: 2000/2001 Survey. UNECE ICP Vegetation, 2003. For information and copies contact Gina Mills, CEH Bangor, University of Wales, Deiniol Road, Bangor, Gwynedd LL57 2UP, UK. E-mail: gmi@ceh.ac.uk.

Nearer to two directives

AT THE MEETING of the EU environment ministers on October 27, a "political agreement" was reached concerning two proposals for directives to reduce emissions of air pollutants.

VOCs IN PAINTS. Last year the Commission had put forward a proposal for a new directive to reduce releases of volatile organic compounds (VOCs) from the solvents in paints, varnishes and vehicle refinishing products (see AN 3/03, p.20). The aim was in part to make for better air quality – VOCs are one of the main contributors to the formation of ground-level ozone – and in part to ensure better working conditions for those using these products.

At a first reading in parliament in September, various demands for more stringent requirements than those in the Commission's proposal were voted down.

The exact wording of that proposal (COM(2002)750) can be found on the internet: [http://europa.eu.int/eur-](http://europa.eu.int/eur-lex/en/com/pdf/2002/com2002_0750en01.pdf)

[lex/en/com/pdf/2002/com2002_0750en01.pdf](http://europa.eu.int/eur-lex/en/com/pdf/2002/com2002_0750en01.pdf)

NON-ROAD DIESEL ENGINES. Here the proposal is aimed at reducing the emissions of air pollutants – especially NO_x and particles – from diesel engines used in various types of machinery (such as excavators and other construction equipment), locomotives, railcars and inland waterway vessels. See AN 1/03 p.8.

The meeting of the Council of Ministers to discuss the matter had been preceded by negotiations with the parliament, finally leading to a compromise which will mean that a new directive probably can come into force this year, with a first stage in 2006. A second stage, setting standards that will, on an average, be ten times more stringent than the present ones, will start to take effect from 2010 and finish by 2014, in line with similar requirements in the United States.

CHRISTER ÅGREN

Under fire for double dealing

At the same time as it is arranging a top-level ministerial meeting on environmental sustainability, the European Investment Bank is continuing to give financial support to fossil fuel projects – a double dealing that has been criticized by a group of non-governmental organisations including Friends of the Earth International and CEE Bankwatch Network.

While the NGOs welcome initiatives to improve financing of the renewable-energy sector, they insist that a clear deadline must be set to the EIB's support of fossil fuel, if its aims for sustainable energy are to be taken seriously. Support for renewables needs to be expressed in clear measurable goals. A 25 per cent share of financing in renewables in the next three years would be a welcome first step, says the NGOs.

While other international financial institutions like the World Bank have made progress in their commitment to

good governance and environmental and social safeguards, the EIB remains "stuck in the dark ages," according to the organizations.

Further information: www.foei.org/ifi/eib

Trading and flexible mechanisms

In July the Commission put forward a proposal for a directive to permit the inclusion of trading in emissions from non-EU country in a system that is to come into force in the EU in 2005 (see AN 3/03). That proposal should have come up at the meeting of the environment ministers on October 28, but the idea had to be put off because it had proved impossible, despite a lengthy debate, to agree on a common position for the ninth conference of the parties to the climate convention (COP9) in Italy on December 1-12. The Italian presidency hopes nevertheless that the Council will be able to reach a common position in December.

Letting off owners of old power plants

UNDER THE New Source Review program that was added to the US Clean Air Act in 1977, when making modifications to plant built before that act took effect in 1970, which would increase emissions, the owners had to install the best available pollution-control equipment.

That requirement has now been eased up by the Bush administration through a final ruling issued by the Environmental Protection Agency on August 28. Modifications that cost less than a certain percentage of the value of the whole plant are now exempt. The idea is that it should be possible to make old plants more efficient without having to take into account environmental considerations.

Critics, which include state pollution-control officials, state attorneys general, public health groups, Democrats and even some Republicans, say the administration's revision of the program will undermine future progress in reducing harmful air pollution from some of the oldest and dirtiest sources. On October 27, when the new rule was published in the Federal Register, a dozen states filed suit in federal court seeking to block the changes.

At the same time as the administration was preparing this rule, the Department of Justice, state attorneys general, the Natural Resources Defense Council and other organizations had successfully prosecuted or settled out of court some new-source-review lawsuits that the Clinton administration had brought against the twelve owners of the oldest and dirtiest coal-fired power plants.

The new rule will now make such prosecutions impossible. According to a study made by Abt Associates, the failure to install modern pollution controls at the 51 power plants that have been at issue will lead to 5000-9000 premature deaths and 80,000-120,000 more asthma attacks every year in the United States.

Source: **Environment News Service** (www.ens-newswire.com) August 28, 2003.



ENVIRONMENTAL EDUCATION

Fresh initiative puts new slant on the matter

STUDY MATERIAL called Green Pack, produced by the Regional Environmental Centre for Central and Eastern Europe, has been reaching some 200,000 pupils aged 13-16 at Polish schools over the last two years. The response is said to have been highly positive, and by the end of 2004 the pack will have been sent to altogether 6000 schools.

"Poland has been our pilot country, and in 2002 similar packs were made for Hungary and Bulgaria, and for the Czech Republic and Slovakia in 2003," relates Kliment Mindjov, project leader at REC.

The centre intends to start projects also for Albania, Russia, Macedonia and Turkey in the course of 2004-05, and to investigate the possibilities for Slovenia, Serbia and Montenegro, Romania and Estonia. There are expected to be 1000 packs for each country. An English version was presented in connection with the Fifth Ministerial Conference "Environment for Europe" last May.

The Green Pack is a multi-media environmental education kit intended in the first place for primary-school teachers and their pupils, although it can also be used at other levels of education.

It focuses on particular aspects of environmental protection and sustainable development and includes a variety of educational materials

such as a teacher's handbook with lesson plans and fact sheets for students, a video-cassette with animated clips and educational films, an interactive CD-ROM with extensive information on various environmental topics and a dilemma game.

The emphasis is on the creation of new values for pupils, and setting a new model for behaviour not only at school but also at home and in society, rather than a mere accumulation of knowledge in particular environmental areas.

Recently the REC also started working on a "Citizen Pack," with the family as the main target group. As Kliment Mindjov puts it:

"Almost all of the messages in the Green Pack, as well as some new ones, will be addressed to various members of the family. The material will however be so arranged as to cover the various aspects of daily life – at home, while shopping, in school, at work, when travelling."

Much of the money for the work on Green Pack has so far come from the Toyota Environmental Activities Grant Program.

PER ELVINGSON

For more information turn either to the website <http://greenpack.rec.org> or directly to Kliment Mindjov, REC Capacity Building Programme. Tel. (36-26) 504-069. E-mail: kliment@rec.org

Stricter standards proposed

The federal German environment agency wants to see the limit for the emissions of particles from diesel vehicles lowered to one tenth of the coming EU level, and those of nitrogen oxides to a fourth.

IT IS WELL ESTABLISHED that particles are extremely damaging to health, the smallest having the worst effect. Diesel vehicles are among the worst offenders in this respect, letting out vast amounts in places where people mostly are.

Another disadvantage of diesel vehicles is that they emit relatively large amounts of nitrogen oxides, the emissions of which most EU countries will have to struggle to reduce if they are to fulfill commitments under the directive on national emission ceilings (NEC).

In view of all this, and the increasing proportion of diesels in new car sales, the federal German environment agency, Umweltbundesamt, is proposing a gradual tightening of emission standards for diesel-driven vehicles in the EU up to 2010.¹ It would have the passenger-car limit for particles reduced by 90 per cent from the figure of the already adopted Euro 4 standards (coming into force in 2005). See Table 1.

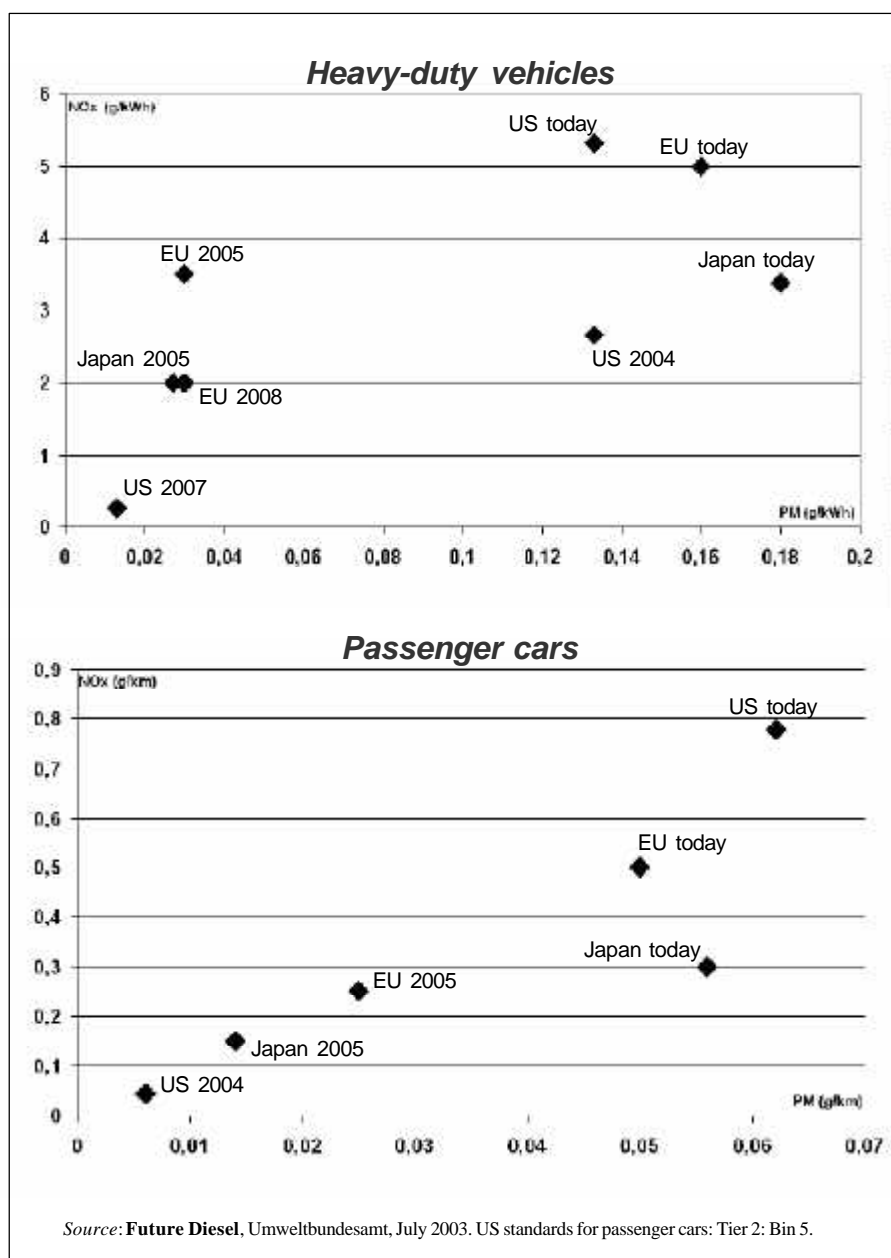
As justification for such a sharp drop, the agency argues that the proposed limit will be easily attainable by the use of particle filters which are now generally available. Wanting to have the emission standards made technically neutral, too, the Umweltbundesamt is proposing a reduction of nitrogen-oxide emissions from diesels by a factor of three, to bring them down to the levels now applicable for petrol-driven cars. It would abolish the present limit for overall emissions of NO_x and hydrocarbons from diesels, and replace it with a single limit 0.05 g/km for hydrocarbons, applying to all types of engines.

A lowering of the emission limit for particles by 90 per cent is also proposed for heavy-duty vehicles (Table 2). Such a big step is justified by pointing out that the limit value in Euro IV (2005) can be attained without any need to use a particle filter, and by using one, emissions can easily be reduced by 90 per cent or more. The new limit would apply from 2008.

In the indicative standards for heavy-duty vehicles, due to come into force in 2008, which were adopted by the EU in 1999,² the limit for nitrogen oxides was to be lowered from 3.5 g/kWh in 2005 to 2.0 g/kWh in 2008. But that would not be enough, in the UBA's view. It would like to see the limit set at 1.0 g/kWh for 2008, and further reduced to 0.5 g/kWh in 2010. Tightening the requirement for NO_x

emissions from heavy-duty vehicles would, according to the Umweltbundesamt, be a cost-effective means of reducing at least Germany's emissions of nitrogen oxides.

In its report, the Umweltbundesamt discuss whether emissions of particles should also be counted by the number, or whether it would suffice merely to give the weight. It concludes that confining the limit to





weight could lead to the engine makers concentrating primarily on eliminating the largest and heaviest particles, which have relatively little effect on health. It would therefore like to supplement the current weight-based standards with limits to the maximum number of particles within the size range that is inimical to health. Towards the end of the year an international group of experts will be proposing the way in which such measurements are to be made.

The extra cost of the UBA Euro 5 proposals for a diesel-driven car, compared with Euro 4, is estimated to run to 200-400 euros. It would be practically nothing, on the other hand, for a heavy-duty vehicle, since it would suffice in that case to improve the cleaning equipment that would in any case be needed to fulfill already agreed requirements.

The agency does not think it necessary to further tighten the requirements for petrol-driven cars beyond

those of Euro 4 (2005). It would make an exception however for cars with direct injection, since their emissions of particles can, in certain circumstances, approach those from uncleaned diesel vehicles. It therefore proposes that there should be the same particle limits for petrol-driven cars as for diesels (at present there are no requirements in this respect for the former).

PER ELVINGSON

¹ **Future Diesel.** Umweltbundesamt, July 2003. Can be downloaded in pdf format from www.umweltdaten.de/uba-info-presse/hintergrund/FutureDiesel_e.pdf

² Directive 1999/96/EC.

Table 1. Already decided EU emission standards for diesel-driven passenger cars (2005) and UBA proposal (2008).

Passenger Cars (g/km)	PM	NOx
Current Euro 4 (2005)	0.025	0.25
Proposed Euro 5 (2008)	0.0025	0.08

Table 2. Indicative EU emission standards for heavy-duty vehicles (2008) and UBA proposals (2008 and 2010).

Heavy Duty (g/kWh)	Particles		NOx
	ESC Test	ETC Test	Both Tests
Current Euro V (2008)	0.02	0.03	2.0
Proposed Euro V (2008)	0.002	0.003	1.0
Proposed Euro VI (2010)	0.002	0.003	0.5

Increased average life expectancy

Premature deaths due to the exhausts from diesel vehicles appear to run to something between 1 and 2 per cent of all deaths in Germany. A general use of particle traps could reduce the background concentrations of PM_{2.5} by 3 µg/m³, which would add 1 to 3 months to everyone's life expectancy in Germany.

Source: **Future Diesel**, Umweltbundesamt, 2003.



Frequent policy failures

IN ITALY, as in most European countries, the emissions of sulphur and nitrogen oxides dropped markedly during the nineties. Also a subject of praise in the OECD environmental performance review is the low energy intensity relative to other OECD countries, largely explainable by the high taxes on energy. The government has moreover introduced important legislation, "mainly prompted by EU directives."

In contrast to these positive developments there is however "a daunting list of failures," according to OECD. Common to many of them is the gap between aspirations and practice that arises again and again as a result of the country's fragmented and complex legal framework, the lack of coordination between different administrations, a poor controls in some of the regions.

Environmental taxes and charges are often too low to have any real effect. The OECD notes too the poor air quality in many cities, adding that the air-quality plans called for in a presidential decree of 1998 have still not been presented in most regions. Measures concerning road traffic will, for Italy as for many other countries, be a key question if it is to reach a number of environmental aims, such as reducing emissions of climate gases. Whereas Italy is supposed to reduce those emissions by 6.5 per cent under the Kyoto protocol, during the nineties there was almost a like increase.

OECD Environmental Performance Review: Italy. 248 pp.

Poland

Much still to be done

POLAND IS PRAISED for having made "remarkable environmental progress" during the last decade, in the OECD Environmental Review published in June. Here the accession process has brought a series of new laws concerning the environment, as well as an actual reduction of pollutant emissions.

But in the view of the OECD a lot will have to be done before Poland can come up to the EU level of environmental legislation. Annual investments of 22 to 50 billion euros (1.2-2.7 per cent of GDP) will be needed over ten years if the country is to comply with the terms of accession to the EU.

Although emissions of sulphur and nitrogen oxides have gone down markedly, there is still room for improvement, according to the OECD. Wide use of subsidized coal, together with a doubling of road traffic over the last decade, has meant that the

emission intensities of major air pollutants are among the highest in the OECD.

It is recommended that Poland should finalize and implement its national air-management strategy, continue efforts to reduce emissions of SO₂, NO_x and particulates, and inject environmental concerns into energy policies. The country is also encouraged to remove subsidies and to further implement the polluter-pays and user-pays principles and to strengthen its enforcement of environmental regulations. As regards climate, the introduction and implementation of a "coherent national climate-protection policy" is recommended, to be coordinated with the country's energy and transportation policies.

OECD Environmental Performance Review: Poland. 216 pp.

The Netherlands

No longer a leader

COMMENDATION on several counts is dealt out to the Netherlands in the OECD environmental performance review issued in April. The success of the country's unique mix of regulation and voluntary agreements is especially noted, besides the rapidity with which it has implemented international commitments regarding the environment. Also largely commended are the quality of the country's environmental information and the high degree of public participation in decision making.

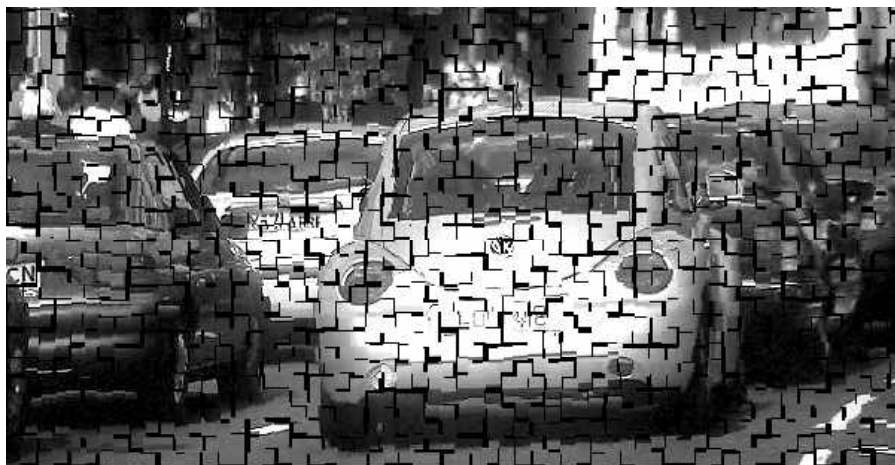
Despite all this, the Netherlands can no longer be said to lead in the environmental field. The integration of environmental concerns in key economic sectors is said, for instance, to be weak.

Moreover, greenhouse-gas emissions have not been decoupled from

economic growth. Progress in the transportation sector has been "too little," and nitrous-oxide emissions from agriculture have not been reduced.

In a commentary on the review, the Dutch environment minister Pieter van Geel promised measures to reduce air pollution generally, together with an "ambitious but realistic" target to bring down carbon-dioxide emissions by 30 per cent from their 1990 levels by 2020. The country's environmental priorities for its six-month EU presidency in the second half of 2004 are said to be climate change and sustainable energy, chemicals and major industrial hazards.

OECD Environmental Performance Review: The Netherlands. 248 pp.



United Kingdom

Transportation the catch

THE UK IS COMPLIMENTED in the OECD review for having decoupled economic growth from environmental considerations such as air pollution, carbon-dioxide emissions and water extraction – although with the warning added that “considerable effort and investment will be necessary if the UK is to consolidate and extend implementation of environmental policies.”

While the country's GDP rose by 26 per cent in the nineties, the emissions of air pollutants went markedly down. Sulphur dioxide declined by 68 per cent, nitrogen oxides by 42, and carbon dioxide by 33 per cent. The changes were mainly due to more efficient use of energy, a big switch from coal to gas, and better cleaning of the emissions from cars and power plants.

Reduced emissions have brought the UK close to the average for OECD countries. More could however be done, a special problem being the remaining “hot spots” in urban areas, where the concentrations of nitrogen dioxide and particulates frequently exceed national standards. This, notes the OECD, particularly affects the poor.

Decoupling the use of road transport from GDP growth is said to remain “the biggest challenge.” The government should do more to explain to the public that fuel and vehicle-related taxes are tools for achieving environmental goals and improving public transport.

OECD Environmental Performance Review: United Kingdom. 276 pp.

How they come and how to order

The OECD environmental performance reviews are issued at intervals in book form. The authors are independent experts commissioned by the OECD to report on the member countries' progress in measures to protect the environment. The aim is to help those countries improve their individual and collective performances in environmental management.

Besides the titles in the article, there are also reports on the Slovak Republic and Japan for 2002, and on

Mexico and Austria for 2003.

Several of the reviews can be downloaded free of charge from the OECD online bookshop: www.oecd.org. The volumes cost around 37 euros apiece, plus postage.

Most countries have national distributors for OECD publications, information about which can be had either from sales@oecd.org or from OECD, c/o Turpin Distribution Services Ltd., P.O. Box 22, Blackhorse Rd, Letchworth SG6 1YT, UK.



Recent publications

Executive Summary – 2000 Review of Strategies and Policies for Air Pollution Abatement (2003)

Published by the Secretariat for the Convention on Long-range Transboundary Air Pollution, UN ECE, Environment and human settlements division, Palais des Nations, 1211 Geneva 10, Switzerland. Internet: www.unece.org/env/lrtap

Health Risks of Persistent Organic Pollutants from Long-range Transboundary Air Pollution (2003)

An experts group review of 13 groups of POPs, their health effects and pathways of human exposure related to long-range transport. Available from WHO Regional Office for Europe, Scherfigsvej 8, 2100 Copenhagen Ö, Denmark. Internet: www.euro.who.int

Modelling and Mapping of Critical Thresholds in Europe: CCE Status Report 2003

The Coordination Centre for Effects under the Convention on Long-range Transboundary Air Pollution reports on the current situation as regards defining of the critical loads for sulphur and nitrogen and the development of dynamic models to make it possible to describe, on a European scale, the time it will take for the environment to recover if the fallout comes down under the critical limit.

132 pp. Published by RIVM, P.O. Box 1, 3720 BA Bilthoven, the Netherlands. Available at www.rivm.nl/cce

Ultrafine Particles in the Atmosphere (2003)

A state-of-the art overview of the scientific and medical research on ultrafine particles. Specialist reviews of methods, emission sources, damage mechanisms and epidemiological studies.

350 pp. £42.00. Published by Imperial College Press and distributed by World Scientific Publishing Ltd., 57 Shelton Street, Covent Garden, London WC2H 9HE, UK. Internet: www.worldscientific.com

The downward trend continues

But non-EU countries have been better at reducing NO_x emissions than EU members

IT IS EVIDENT, from the latest of the yearly reports¹ sent in by each country to the Convention on Long-range Transboundary Air Pollution, that the emissions of those pollutants that can damage both health and the environment are continuing on the way down in Europe.

The greatest change has been for sulphur dioxide, SO₂. Between 1980 and 2001 the emissions of this pollutant from land-based sources fell away by 72 per cent. See factfile and table. Those of nitrogen oxides (NO_x), volatile organic compounds (VOCs) and ammonia (NH₃) had also gone down, although to a less extent. While the two first had dropped by about a third, for ammonia it was only a quarter. But it should be added that there was no noticeable drop in the emissions of these last three pollutants until sometime in the nineties, whereas measures to curb SO₂ had started a decade earlier.

Of late emissions have also begun to go down in North America – although much more slowly in all four cases than in Europe. While those of

NO_x for instance fell away by almost a third totally in the fifteen EU countries, the figures for the US and Canada were 12 and 7 per cent respectively.

In the table the emissions from shipping in European waters derive from estimates made by Lloyd's Register during the nineties. Independ-

and nineties the calculations were based on 150x150 km grid squares, but now a model has been developed for 50x50 km squares. An overview of calculations for source-receptor relationships, covering acidifying, eutrophying and photo-oxidant pollution, based on the new model with a higher degree of resolution, has been presented in another recent report.²

The greatest change has been for sulphur dioxide

CHRISTER ÅGREN

ent estimates made in the last year or so indicate however that ships' emissions had increased considerably since 1990, and are likely to go on doing so (see AN 3/02, pp. 8-10).

The Convention's EMEP program is not confined to keeping track on emissions. Its main task is to model the ways in which emissions from one country are affecting the environment in others. In the eighties

¹ The data reported by individual countries to the Convention is assembled by the EMEP, the cooperative program for monitoring and evaluation of the long-range transmissions of air pollutants in Europe, and published both in printed form and on the EMEP's website. Figures for other pollutants, such as particles and POPs (persistent organic pollutants), are also given. The title of this year's report is **Review and revision: Emission data reported to CLRTAP**. MSC-W Report 2003. By V. Vestreng. Available at the EMEP website: www.emep.int

² **Transboundary acidification, eutrophication and ground-level ozone in Europe**. EMEP Status Report 1/2003 – Part III. By L. Tarrason et al. Also available at the EMEP website (see above).

Progress to date

SULPHUR DIOXIDE. Whereas European emissions totalled 53 million tons in 1980, by 1990 they had come down to 37 million, and to 14.6 million tons in 2001. In other words a percentual reduction of 60 per cent since 1990, and 72 per cent since 1980.

In general, it can be said that the EU member states have done somewhat better at reducing sulphur emissions than non-EU countries. Between 1980 and 2001, EU emissions dropped by 78 per cent, while those of other European countries outside the EU fell away by 67 per cent.

If the emissions from shipping in European sea areas were included (unfortunately they are assumed to have remained constant in the EMEP tables) the total figure would have to be 2.8 million

tons higher for each year, and the percentual drop somewhat lower.

NITROGEN OXIDES. By 1990 the emissions from land sources had only come down by 0.5 million tons or 3 per cent, from the 1980 figure of 23.3 million tons. Subsequently they fell away however to 15.7 million tons in 2001, a drop of 31 per cent.

In this case the non-EU countries have been more effective than the EU ones in cutting down emissions – having achieved a 40-per-cent reduction between 1980 and 2001, as against 27 per cent for the European Union.

With emissions from shipping included, some 4 million tons would have to be added each year, again making the final percentual reduction somewhat lower.

VOLATILE ORGANIC COMPOUNDS. European emissions show a similar trend to those for NO_x, remaining fairly stable at about 24.3 million tons throughout the eighties. But by 2001 they had fallen away to 15.5 million tons – a drop of 36 per cent. The reductions were again somewhat greater in the non-EU countries (41 per cent from 1980) than in the EU member states (32 per cent down).

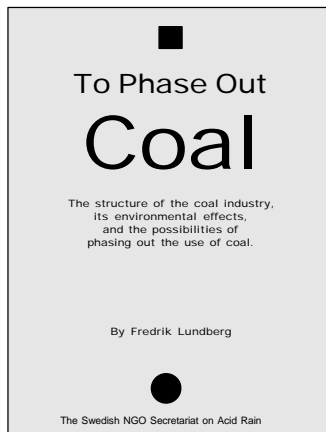
AMMONIA. Emissions remained fairly stable at 7.7 million tons (1980) throughout a greater part of the eighties, after which a slow decline set in – from 7.5 million tons in 1990 to 5.6 million tons in 2001, a reduction of 25 per cent. While emissions had only come down by 10 per cent from 1980 in the fifteen EU member countries, they had dropped by 43 per cent in the others.

European emissions of sulphur dioxide, nitrogen oxides (as NO₂), ammonia, and volatile organic compounds. 000 tons a year.

	Sulphur dioxide			Nitrogen oxides (NO ₂)			Vol. Org. Compounds			Ammonia		
	1980	1990	2001	1980	1990	2001	1980	1990	2001	1980	1990	2001
Austria	344	79	37	243	204	199	362	345	232	51	52	54
Belgium	828	362	162	442	334	317	274	274	252	89	99	81
Denmark	452	180	25	273	277	204	203	162	124	125	133	102
Finland	584	260	85	295	300	222	210	224	157	39	38	33
France	3261	1323	610	2023	1897	1411	2613	2473	1674	795	779	779
Germany	7514	5322	650	3334	2728	1592	3224	3220	1606	835	736	607
Greece	400	493	485	306	290	331	255	255	268	79	79	73
Ireland	222	186	131	73	118	125	111	111	90	112	112	122
Italy	3757	1651	758	1638	1938	1372	2179	2041	1464	479	466	437
Luxembourg	24	15	3	23	23	17	15	19	15	7	7	7
Netherlands	490	202	89	583	570	410	579	492	271	234	232	148
Portugal	253	273	286	158	272	377	189	371	468	106	106	102
Spain	2913	2102	1394	1068	1207	1305	1392	1555	1440	285	327	380
Sweden	491	106	57	404	334	248	600	498	303	54	54	54
United Kingdom	4854	3719	1125	2581	2759	1680	2160	2425	1336	341	341	290
Sum Eur. Union	26387	16273	5897	13444	13251	9810	14366	14465	9700	3631	3561	3269
Albania	72	72	58	24	24	29	31	31	34	32	32	32
Bosnia & Herzegovina	482	482	419	79	79	55	51	51	42	31	31	23
Belarus	740	637	151	234	285	135	549	533	215	142	142	137
Bulgaria	2050	2008	846	416	361	164	309	217	122	144	144	54
Croatia	150	180	58	60	88	77	105	105	80	37	37	23
Cyprus	28	46	48	13	18	18	14	14	14	4	4	4
Czech Republic	2257	1881	251	937	544	332	275	441	220	156	156	77
Estonia	287	252	92	70	68	38	81	88	33	24	24	9
Hungary	1633	1010	400	273	238	185	215	205	166	157	124	66
Iceland	18	24	27	21	26	28	8	13	10	3	3	3
Latvia	95	95	13	80	80	42	143	143	81	44	44	12
Lithuania	311	222	49	152	158	55	100	108	71	110	109	50
Norway	136	52	25	191	224	221	173	294	376	23	23	25
Poland	4100	3210	1564	1229	1280	805	1036	831	576	550	508	309
Macedonia	107	107	137	39	39	32	19	19	17	17	17	16
Moldova	308	265	12	115	100	17	219	157	22	53	49	25
Romania	1055	1311	912	523	546	319	829	772	638	340	300	221
Russia	7323	4671	1997	3634	3600	2357	3410	3668	2450	1189	1191	650
Serbia & Montenegro	406	508	394	192	211	158	142	142	129	90	90	79
Slovakia	780	542	129	197	215	106	262	262	90	63	63	28
Slovenia	234	196	96	51	63	58	39	44	40	24	24	19
Switzerland	116	42	21	170	154	92	323	279	147	77	72	68
Ukraine	3849	2783	1029	1145	1097	561	1626	1369	269	729	729	378
Sum Non-EU	26537	20596	8728	9845	9498	5884	9959	9786	5842	4039	3916	2308
Sum Europe	52924	36869	14625	23289	22749	15694	24325	24251	15542	7670	7477	5577
Int. ship: Baltic Sea	228	228	228	352	352	352	8	8	8	-	-	-
Int. ship: Black Sea	57	57	57	86	86	86	2	2	2	-	-	-
Int. ship: Mediterran.	1189	1189	1189	1639	1639	1639	34	34	34	-	-	-
Int. ship: North Sea	454	454	454	648	648	648	15	15	15	-	-	-
Int. ship: N.E. Atlantic	901	901	901	1266	1266	1266	25	25	25	-	-	-
Sum internat. shipping	2829	2829	2829	3991	3991	3991	84	84	84	-	-	-
Sum Europe + ships	55753	39698	17454	27280	26740	19685	24409	24335	15626			
Turkey	1030	1590	2112	364	644	951	359	463	726	321	321	321

Ending coal use

It would not only be quite possible to do away with the use of coal in Europe, but it would also be the least expensive and simplest way to drastically cutting down emissions of greenhouse gases as well as other harmful pollutants, according to this study made by Fredrik Lundberg on commission from the Swedish NGO Secretariat on Acid Rain. Published October, 2003.



Other publications from the Secretariat

The worst and the best. Atmospheric emissions from large point sources in Europe. Identifies and lists the 100 largest emitters of sulphur dioxide and the 200 "best" fossil-fuelled power stations. By Mark Barrett, SENCO, 2000.

Getting more for less. A study by EEB, T&E and the Secretariat showing that the estimated annual costs for achieving the interim environmental quality targets of the proposed national emission ceilings (NECs) directive can be reduced by nearly two thirds, from euro 7.5 to 2.7 billion. This result is obtained by using an alternative low-CO₂ energy scenario as the basis for the cost estimation. By Christer Ågren, 2000.

Ground-level ozone. A problem largely ignored in southern Europe. A comprehensive review of the situation as regards ground-level ozone in the Mediterranean region, showing that the

concentrations often exceed the levels at which harm can occur both to humans and vegetation. By Håkan Pleijel, 2000.

Ships' emissions. Shipping has clear environmental advantages. An important drawback, however, is the high emissions of sulphur dioxide and nitrogen oxides. Learn more:

> *Air pollution and shipping.* Briefing, February 2003.

> *Air pollution from ships.* Leaflet, revised January 2002.

> *Economic instruments for reducing emissions from sea transport.* Report by Per Kågeson, 1999.

How to order. Single copies of all the above mentioned material can be obtained from the Secretariat (free of charge within Europe). Please call for quotation if more copies are required. Can also be downloaded at no cost from www.acidrain.org (select "Publications").

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Coming events

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Executive Body for the LRTAP Convention. Geneva, Switzerland. December 15-18, 2003. *Information:* www.unece.org/env/lrtap/

EU Transport and Energy Council. December 15, 2003.

EU Environment Council. December 22, 2003.

World Sustainable Energy Days 2004. Wels, Austria. March 3-5, 2004. *Information:* O.Ö. Energiesparverband, tel. +43-732-7720-14380, www.esv.or.at/wsed04

European Pellets Conference 2004. Wels, Austria. March 3-4, 2004. *Information:* www.esv.or.at/pellets04 or O.Ö. Energiesparverband, see above.

EU Environment Council. March 2, 2003.

EU Transport and Energy Council. March 8, 2003.

ECOMM 2004: Transition strategies for sustainable mobility in an urban area – Review and prospects based on European experiences. Lyon, France. May 5-7, 2004. *Information:* www.epomm.org

Fourth Ministerial Conference on Environment and Health. Budapest, Hungary. June 23-25, 2004. Theme: The future for our children. *Information:* www.euro.who.int/budapest2004

13th World Clean Air & Environmental Protection Congress & Exhibition. London, UK. August 22-27, 2004. *Information:* www.kenes.com/cleanair/

Second International Ukrainian Conference on Biomass for Energy. Kiev, Ukraine. September 20-22, 2004. *Information:* www.biomass.kiev.ua

Acid Rain 2005. 7th International Conference. Prague, Czech Republic. June 12-17, 2005. *Information:* Acid Rain 2005, CHMI, Na Sabatce 17, 143 06 Prague, Czech Republic. www.acidrain2005.cz