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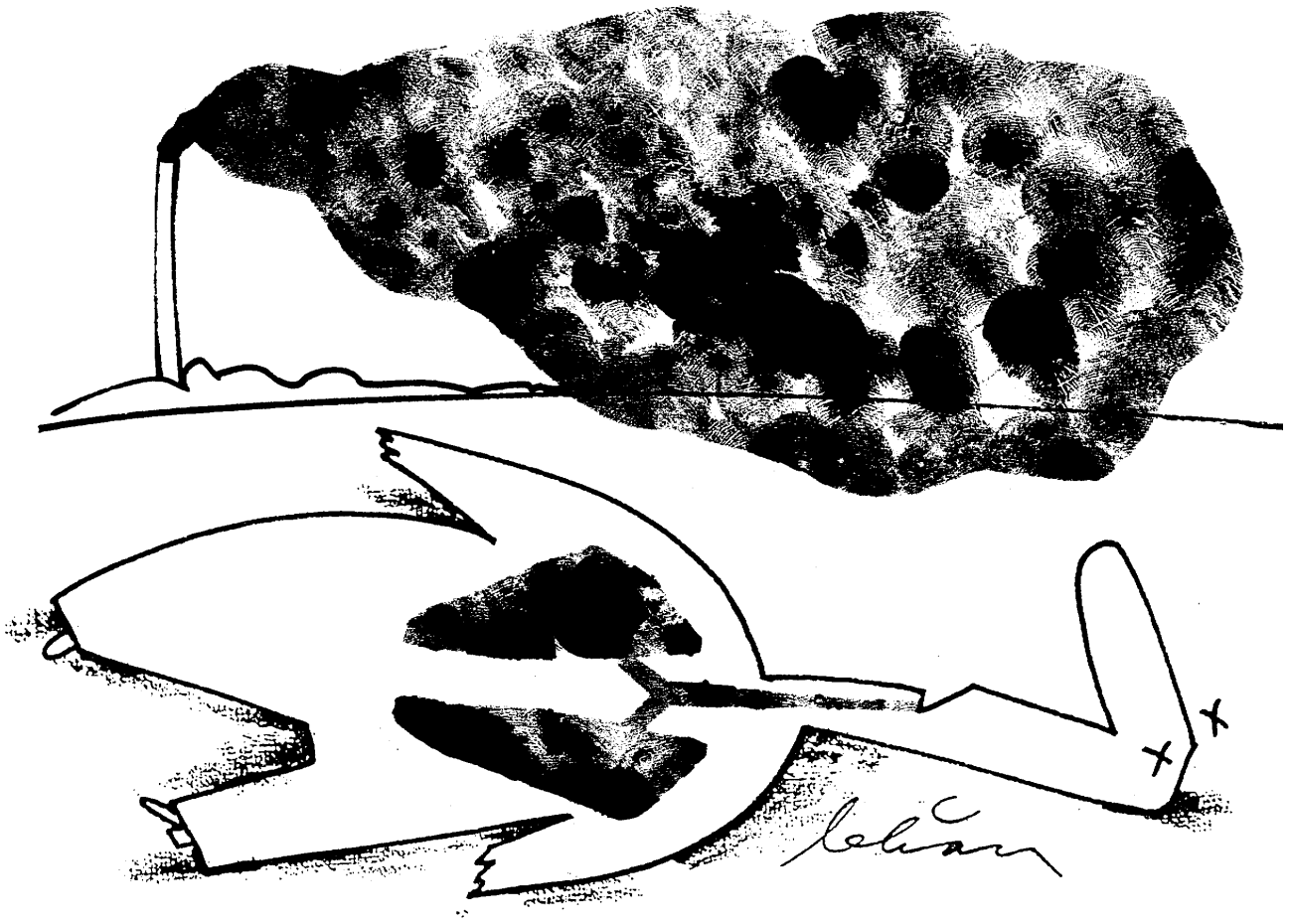
Acid News



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DIRTY POWER

Taking its toll in the US

Simply cleaning up power plants to modern emission standards could save over 18,000 lives per year.

Fine particles originating from emissions of air pollutants from power plants have been found to be the cause of more than 30,000 deaths a year in the United States. Moreover hundreds of thousands of Americans are suffering from asthma, cardiac and respiratory problems for the same reason. The report[1] revealing these figures also notes that about two-thirds of the deaths due to fine particles from power plants could be avoided if the sulphur dioxide and nitrogen oxides pollution from such plants were cut down by 75 per cent from their 1997 levels.

The suspicion that fine particles ($PM_{2.5}$) give rise to a variety of health problems is not new. Another American study had estimated in 1999 that as many as 60,000 people die prematurely in the United States as a result of exposure to them. But it is only now that the cause of so many deaths has been traced to emissions from power plants. The study[2] showing this, by Abt Associates, was that drawn upon by the Clean Air Task Force in making its report.

Apart from the deaths associated with fine particles, hundreds of thousands of Americans have to be admitted to hospital or make emergency visits on account of the same symptoms. Hundreds of thousands of workdays and school days are lost, too, many of which could, according to the Task Force, be avoided if only older power plants were cleaned up. It has been estimated, by using a method of economic valuation similar to that employed by the EPA, the US Environmental Protection Agency, that the total monetary benefits to society of making over old power plants to modern emissions standards would come to more than US$100 billion a year.

These estimates of effects on health and the likely economic benefits of averting them only refer however to airborne fine particles. They thus grossly undercalculate the to-

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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 fullfill the purpose of Acid News, we need information from everywhere – so if you have read or heard about something that might be of general interest, please write or send a copy to:

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THE SECRETARIAT

The 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.

EDITORIAL

Not only the environment

JUST NOW it is the risk to people's health that is most back of efforts to bring about a reduction of the emissions of air pollutants – in the US and some of the developing countries, as well as in Europe. The air pollutants that are most damaging to health in the industrialized countries are small particles and ozone at ground level.

In the EU three directives are presently being considered that would do much to reduce the effects of air pollutants. One is the NEC directive, setting national emission ceilings to four air pollutants. Another, the LCP, is that regulating emissions from large combustion plants, while the third, a new air-quality directive, will put limits to the number of days on which defined concentrations of ozone may be exceeded in any one year. All are nearing the final stage in the EU legislative procedure, with second readings in Parliament scheduled for this spring.

Two different proposals are up for consideration in the case of the NEC directive. One is the Commission's of 1999, the other the Council's much weaker compromise version, amounting to little more than confirmation of what had been agreed on at Gothenburg under the Convention on Long-Range Transboundary Air Pollution.

The Union of Industrial and Employers' Confederations of Europe, UNICE, was quick to assert, in a press release dated January 24 regarding the NEC, that the Council's compromise ceilings were "extremely challenging," adding that any improvements in air quality resulting from stricter ceilings than the Council proposed would be small and outweighed by the costs of their implementation.

But quite another picture emerges from analyses of the two proposals. For one thing the difference between them as regards environmental consequences are remarkable. Some 4000 cases of premature mortality could be avoided each year, for instance, if the Commission's proposal was adopted, and also 175,000 extra life-years saved annually. The environmental damage from ozone, acidification, and eutrophication would moreover be markedly reduced.

It is now generally agreed that even the Commission has greatly overestimated the cost of reductions. Since most of the environmental gains, too, cannot be assessed in terms of money, it has not been possible to include them among the savings. It has nevertheless been estimated that whereas the annual net benefits for the EU of emission reductions resulting from the Council's compromise ceilings could be put at 6.2 billion euros, under the Commission's proposal they would be a whole 24.5 billion. The calculations all refer to the target year 2010. As no thorough analysis of the health effects was made for the Council's version, figures from the Gothenburg protocol (see AN 1/00) are here used for the purpose of comparison.

But it is not only general emission ceilings that are in the news. It has just been shown in an American study (see p.1) that air pollutants from power plants alone are causing 30,000 deaths a year in the US. More than half of them could be avoided by curbing those emissions. Although no corresponding study has been made for Europe, there is no reason to suppose that the emissions from old, unregulated plants are less unhealthy here.

There can be no doubt whatsoever that the protection of health as well as the environment will require still greater reductions in the emissions of air pollutants. Reducing the emissions would moreover bring impressive economic benefits and it is just those countries that are supposed to be making the greatest reductions that will have the most to gain. But not even the Commission's proposal for ceilings can be regarded as more than a first step in the required direction.

CHRISTER ÅGREN

Thresholds are being clearly overstepped

The highest hourly average in 2000, recorded in Athens, was 334 µg/m^3.

OZONE CONCENTRATIONS are still high in Europe. Last summer they were more than 180 $\mu g/m^3$ (1-hour average) in all the EU countries except Ireland and Finland. That figure was also exceeded in a lot of countries outside the Union, such as the Czech Republic, Slovak Republic, Slovenia, and Switzerland. Of all the EU countries Italy was the most struck by frequent occurrences of ozone in high concentrations.

According to the EU directive of 1992 all the member countries have to report when certain threshold values for concentrations are exceeded, 180 $\mu g/m^3$ (micrograms per cubic metre of air) as a one-hour value being the threshold when the public must be told of it. The higher threshold of 360 $\mu g/m^3$ one-hour average, at which a warning has to be issued, was not exceeded in any of the countries sending in reports to the Commission, either in 1999 or 2000. The highest hourly average in 2000, recorded in Greece, was 334 $\mu g/m^3$.

There is data for 1999 on the times the threshold value of 110 $\mu g/m^3$ as an 8-hour average for the protection of human health was exceeded – as it was substantially in all the reporting countries, and particularly in southern Europe. Overcrossings of this value were recorded on an average during twenty-five days at all the monitoring stations. As regards the level set in the directive for the protection of vegetation – 65 $\mu g/m^3$ as a 24-hour average – the overcrossings were still more frequent, having taken place everywhere, and usually with a long stay – of 100 days or more – and at levels three times the limit.

An attempt has also been made to discover trends for the period for which reports have been received. For 1994-98 the 50 percentile – a way of calculating the average exposure – had increased a little, while the 98 percentile, marking maximum values, showed a slight decline. While warning that the measuring series only covers a short period of time, and that trends may be affected by yearly meteorological fluctuations, the researchers suggest that the drop in the European emissions of ozone precursors (NOx and VOCs) may explain the decline in maximum concentrations of ozone. The rising average level is more difficult to explain, although it may be due to a worldwide increase in the emissions of precursors, thereby creating higher background levels.

Air Pollution by Ozone in Europe in 1999 and Summer 2000. European Topic Centre on Air Quality. Draft report. Reports from previous years are available on the web at www.eea.eu.int.

On the following pages

Continued from front page

tal adverse effect on public health and the environment of emissions from power plants. They take no account, for instance, of the effects of elevated concentrations of ground-level ozone, nor of those of power plants' emissions of heavy metals such as mercury, nor of the contributions of their emissions to acidification, eutrophication, reduced visibility (an acute problem in US national parks), to mention only a few.

Most of this pollution does not come directly in the form of particles, but through conversion in the atmosphere of sulphur dioxide (SO_2) and nitrogen oxides (NOx) into small sulphate and nitrate aerosols. In 1998, power plants were responsible for over 13 million tons of SO_2, or two-thirds of the annual total of SO_2 emissions in the United States, and more than 6 million tons of NOx, over a quarter of the NOx total. Power plants also emit fine particles of carbon soot directly from their smokestacks – in 1999 nearly 300,000 tons altogether. Coal-fired plants are the worst offenders, being responsible for 88 per cent of all the SO_2 coming from US power plants.

According to an EPA report on national emission trends published last year, emissions of SO_2 from power plants had been increasing every year since 1995, rising more than 10 per cent by 1998. Thus, in 1998 power plants emitted 1.26 million more tons of SO_2 than they had done in 1995. Direct emissions of small particles, as well as emissions of NOx, have also increased over the past few years.

The vast majority of coal and oil-fired power plants have, according to the report, circumvented the most protective air-emissions standards required of modern power plants. When the US Clean Air Act was amended in the 1970s it was assumed that many of the nation's older power plants would be retired and replaced by new, cleaner ones and should therefore be exempt from modern, state-of-the-art requirements for pollution control. But for a variety of reasons, many of these plants have not been retired. The vast majority of them therefore fail to meet modern emission standards for SO_2 and NOx, and are consequently polluting at rates up to ten times those of modern coal plants.

Because a number of power companies have made life-extending investments in old, dirty coal-fired plants without upgrading their pollution control, the EPA and the State of New York have launched enforcement actions against them for violations of the federal law governing their emissions (see AN 4/99, p.9).

The emissions of SO_2 and NOx are nevertheless expected to drop as a result of permit trading. The first large-scale experiment with tradable emission permits was started in the United States in 1995, following the Clean Air Act Amendments of 1990. The aim of this program is to bring down the emissions of SO_2 from the country's electric utility plants to half of their 1980 levels by 2010 (see AN 3/98, p.15). Another program, which aims at reducing elevated concentrations of ground-level ozone, would oblige twenty-two eastern states of the US to take measures that could include permit trading to reduce their emissions of NOx from power plants fired with fossil fuel by May 2003.

Coal-fired power plants must be made to comply with modern standards

The main outcome of the Task Force's report is that coal-fired power plants must be made to comply with modern standards for emissions control. This is readily achievable and would reduce emissions of SO_2 and NOx from power plants by 75 per cent from their 1997 levels. Such a measure would dramatically reduce the pollution from fine particles, which is necessary for the protection of public health. It says moreover that the nation's power plants should be held to nationwide caps on all four key pollutants from power plants – SO_2, NOx, mercury, and the main greenhouse-gas carbon dioxide.

The report concludes by saying that requirements such as these can ensure that US energy policy will better account for the public health and environmental costs associated with electricity production and propel the country towards a more sustainable energy future, relying increasingly on renewable energy resources and conservation.

CHRISTER ÅGREN

[1] **Death, Disease & Dirty Power – Mortality and health damage due to air pollution from power plants** (2000). By C.G. Schneider, Clean Air Task Force, 77 Summer Street, Boston, MA 02110, USA.

[2] **The particle-related health benefits of reducing power plant emissions** (2000). By Abt Associates Inc., 4800 Montgomery Lane, Bethesda, MD 20814-5341, USA.

Both reports can be downloaded from www.cleartheair.org.

Clear the Air is a project of three leading US clean air groups: the Clean Air Task Force, National Environmental Trust, and U.S. PIRG Education Fund.

Health effects of fine particles originating from emissions of air pollutants from power plants in the USA.

	Incidence (cases/year)	
Health effect	**Total**	**Avoided by 75% cut in power plant emissions**
Mortality	30,100	18,700
All respiratory and cardiovascular hospitalizations	20,100	12,200
Asthma-related emergency-room visits	7,160	4,320
Chronic bronchitis	18,600	11,400
Asthma attacks	603,000	366,000
Lost workdays	5,130,000	3,190,000
Days of minor restricted activity	26,300,000	16,400,000

Two weeks' talks in vain

Disagreement between the EU and the US could not be resolved at The Hague meeting

TWO WEEKS OF INTENSIVE negotiation at the UN climate meeting at The Hague – COP6, the sixth conference of the parties to the climate convention of 1992 – ended in stalemate. It had been hoped that agreement could be reached on the manner in which the so-called flexible mechanisms of the Kyoto protocol of 1997 were to be interpreted, in order to make way for its ratification and coming into force.

The differences were however so great as to prevent any agreement. The divide lay between the EU countries, which had pursued a firm line throughout the negotiations, and the so-called umbrella group consisting of the United States, Canada, Japan, and Australia, which wanted to make the greatest possible use of some loopholes in the protocol.

Disagreement mainly concerned the American proposal to allow countries an extensive use of "sinks" to increase the fixation of carbon in vegetation and soils as an equivalent to cutting emissions. The objection to this proposal was that it would let industrialized countries increase their emissions of CO_2 beyond the 1990 level and still claim to be meeting Kyoto targets for pollution reduction.

Another matter of contention was how much countries should actually have to reduce their emissions and how much they could claim by the use of flexible mechanisms such as emissions trading, joint implementation, etc. The EU countries wanted a 50-per-cent limit to such practices, while the umbrella group was proposing complete freedom.

Proposal would let industrialized countries increase their emissions

Despite efforts to reach a compromise, disagreement persisted throughout the meeting. Observers from environmentalist organizations were all highly critical of the umbrella group's attitude, and also of the general lack of results from the meeting.

Negotiations will now be continuing in an attempt to reach agreement. The arrival of a new administration in the US will mean that the follow-up meeting scheduled for May now will have to wait until June or July.

The Kyoto protocol calls for a 5-per-cent reduction, between 1990 and 2010, of the industrialized countries emissions of greenhouse gases. This is however intended to be no more than a first step towards attainment of the whole aim of the climate convention, namely, the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system."

PER ELVINGSON

More fully on: Climate Action Network, www.climatenetwork.org, UN Framework Convention on Climate Change, www. unfccc.de.

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As a part of a campaign organized by Friends of the Earth 5000 persons built a dike of sandbags 2 metres high and 360 metres long in front of the conference centre as a symbolic line of defence against the rising sea levels that will be threatening cities such as New York, regions along US east coast, low-lying islands in the Pacific, and countries such as Bangladesh and Egypt.

11 million against global warming

A THREE-MONTH CAMPAIGN via the internet, *www.climatevoice.org*, resulted in more than 11 million messages being sent by members of the public to political leaders around the world, demanding that they use the Hague Climate Summit to reduce the pollution that is causing global warming. In a symbolic gesture, Ruud Lubbers, WWF's international president, presented the messages to Dutch Prime Minister, Wim Kok, as representing all world leaders, at a ceremony during the summit meeting.

"The leaders of the world need to recognize that their citizens are extremely concerned about global warming. The public want to see their leaders make real progress at this conference. That means industrialized countries doing more to reduce their own emissions and for the climate summit to conclude a fair and effective Kyoto climate treaty," said Professor Lubbers.

Predictions revised upwards

Panel warns that temperature could rise by as much as 6 degrees in next hundred years

IT NOW comes from the UN Intergovernmental Panel on Climate Change that the world's average surface temperature is going to increase faster than has hitherto been thought. If nothing is done to hinder the emissions of greenhouse gases, the climate will become anything between 1.4 and 5.8 degrees C warmer during the next hundred years, it says.

At a meeting in Shanghai in January the representatives of some hundred nations agreed to accept the account of our present knowledge of the world's climate system that is the result of the research of several hundred scientists working for the panel. The document is one of three that are to form the IPCC's Third Assessment Report, which should be agreed *in toto* early in April.

The last time the IPCC presented a report of this kind was in 1995. A much-quoted sentence from that was that "The balance of our evidence suggests a discernible human influence on global climate."

Knowledge has subsequently accumulated in a variety of respects, concerning both natural and man-induced effects. Although some uncertainty still remains, there is now a much greater consonance between measured effects and those obtained by modelling. The concentrations of greenhouse gases in the atmosphere are reported to have gone on increasing as a result of human activities and the researchers of the intergovernmental panel draw the following conclusion:

"In the light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last fifty years is likely to have been due to the increase in greenhouse-gas concentrations."

In this last report they say the global average surface temperature has risen by 0.6 +/- 0.2 °C. They also say it is very likely that the 1990s were the warmest decade, globally regarded, and 1998 the warmest year ever recorded since 1861, when instrumental records started. In the course of the last century the sea level had risen by 1-2 decimetres. No clear trend had been found as regards the frequency of tornadoes, days with thunder, or hail storms, but here the data is said to be limited.

In northernmost latitudes the rise in temperature may be 40 per cent more in winter than the global average.

As for future trends, an increase of 1.4-5.8 °C in the average temperature of the air at surface level is predicted for the period from 1990 to 2100. That figure takes account of all the thirty-five emission scenarios used by the IPCC, as well as various assumptions as to the climate's responsiveness to changes in the amount of greenhouse gases in the atmosphere.

Projected rate is much larger than anything during the 20th century

The fact that a higher temperature rise is said to be on the way – according to the second assessment report a rise of 1.0-3.5 °C would be likely – does not mean that the emissions of greenhouse gases are now expected to be higher. The main explanation is that the emissions of sulphur dioxide are expected to be lower worldwide. The concentrations of sulphate particles will consequently be lower, and their cooling-off effect reduced (the particles reflect back incoming solar radiation).

The projected rate of warming is much larger than anything that happened during the 20th century. It is likely, too, says the IPCC, to be without precedent in the last 10,000 years.

It should be noted that there will not be an even warming-up everywhere. The temperature will be more likely to increase over land than over the sea, with the greatest increases in winter temperatures in the far north – especially in the northern parts of North America and north-eastern and central Asia, where the global mean warming is likely to be exceeded by more than 40 per cent.

Fears are often expressed as to what will happen to the big ocean currents that carry heat from lower latitudes out towards the poles when the climate becomes warmer. According to the IPCC, most of its mod-

elling points towards a falling away of heat transports northwards – and yet to a net warming-up in Europe, due to the increased concentrations of greenhouse gases in the atmosphere generally. No complete cut-off of the thermohaline circulation is envisaged before 2100. The IPCC nevertheless warns that beyond 2100 this heat transport could completely, and possibly irreversibly, shut down in either hemisphere, if the increase in greenhouse-gas concentrations is large enough and continues long enough.

The rise of 9-88 centimetres that is projected to take place in sea level between 1990 and 2100 is somewhat less than previously anticipated. But here, too, the IPCC issues a warning. The sea level will continue to rise long after the climate had become stabilized. If the temperature rise over Greenland should be 5 °C, and remain so for a thousand years, it could lead to a general rise in sea level of another three metres. The same might happen in the case of the West Antarctic ice sheet, although the data for that is more uncertain.

PER ELVINGSON

The document that was accepted at Shanghai was the contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), entitled **Climate Change 2001:The Scientific Basis**. There is a so-called summary for policy makers available on www.ipcc.ch. The full assessment report is to be published by the Cambridge University Press.

The emission scenarios are described in a separate report: **Emissions Scenarios**. A Special Report of IPCC Working Group III. Published by the Intergovernmental Panel on Climate Change. A summary in English, French, Spanish, and Russian is available on the IPCC website, www.ipcc.ch.

May be aggravated by carbon-cycle feedbacks

CHANGES IN the natural circulation of carbon caused by higher global temperatures and an altered pattern of precipitation are not fully taken into account in the IPCC's climate modelling. When the temperature rises, the decomposition of organic matter can for instance increase, and drought can cause a decrease in the biomass of some ecosystems. The result will in either case be higher amounts of carbon dioxide in the atmosphere, with a consequent increase in the greenhouse effect.

Modelling at Hadley Centre research station in England has shown that in 50 to 100 years the biosphere as a whole could well change over from being a smallish sink for carbon to becoming a significant emission source – mainly because decomposition increases in the soil when it gets warmer.

Just how much this will add to the increase in temperature predicted by the IPCC (1.4 to 5.8 °C) has still to be investigated. At Hadley Centre, Peter Cox suggests however that if the carbon cycle feedbacks are also taken into account in the modelling, the IPPC figures probably have to be raised by a factor of 1.4.

The Centre has also tried to calculate the effect of planting trees on arable land – which could theoretically lead to a slowing down of the warming process, because trees bind more carbon than farm crops, and the result would be a net capture of carbon dioxide. But ploughland reflects back more of the solar energy than forested land – especially at northern latitudes in winter, when there is a covering of snow. Whereas an open field will reflect most of the incoming sunlight, a forest will remain dark and absorb heat. Planting trees may thus have both a positive and negative effect on the climate. If done over large areas it could actually increase global warming, according to the Hadley Centre's calculations.

The full report, **Climate change. An update of recent research from the Hadley Centre**, November 2000, can be obtained from the Hadley Centre, Met Office, London Road, Bracknell, Berks, RG12 2SY, UK. It is also available on internet: www.met-office.gov.uk/research/hadleycentre/pubs/brochures/B2000. The Hadley Centre for Climate Prediction and Research is part of the government Met Office.

NEWS IN BRIEF

Difference between north and south

A week or so before the climate summit at The Hague a study was published of the effects of climate change in Europe. It main conclusion was that southern countries will suffer more than northern ones, and rural areas more than towns. Natural ecosystems, soil quality, water availability, the insurance industry, agriculture in southern Europe, human health and transport are most likely to be affected.

According to the lead author, Martin Parry, forecasts suggest that by 2050 Greece's summer tourist industry could be all but destroyed by high temperatures. Areas of Spain that are currently among the EU's largest suppliers of fruit and vegetables could become virtual desert. In northern Europe, the main negative impacts are predicted to be increased flooding and wetter winters. Northern countries might on the other hand reap economic benefits from warmer temperatures through increased agricultural and forest productivity and lower energy demand.

ENDS Daily November 2, 2000. The study was made at University of East Anglia, UK, and financed by the EU Commission. A summary of the report is available at http://uea.ac.uk.

Roads will get it, but not public transport

Environmentalist organisations in eight of the candidate countries for admission to the EU are critical of the present distribution of financial support within the Union. They are particularly critical of the intransparancy in the decision-making and the difficulty of influencing it. Also that a lot of money goes to projects that do not promote sustainable development – with large amounts being spent for instance on motorways and nothing at all on public transport in the cities.

T&E Bulletin No. 94, December 2000.

Rise expected from expanding fleets

But by forming ozone, emissions of nitrogen oxides rather than carbon dioxide may have a greater effect on the climate.

ALTHOUGH the emissions of carbon dioxide from ships could be considerably reduced both by lowering speeds of travel and making technical adjustments to the engines, it is difficult to find incentives to make shipowners take such steps. In any case the ever increasing traffic at sea is going to lead to increases in emissions that will be far greater than any savings that could be made.

This is one of the main conclusions of an extensive study made for the Marine Environment Protection Committee of IMO, the International Maritime Organization, to identify the possibilities of curbing the emissions of greenhouse gases.

The emissions of carbon dioxide from ships the world over are estimated to have been running to 420 million tons a year in 1996. The study assumes that sea transport will increase in step with economic growth and increased world trade. If fleets were to expand at an annual rate of 1.5 per cent, ships' fuel consumption would be 19 per cent higher in 2010 than it was in 2000, if no steps were taken to reduce it. By 2020 the increase would be twice that, 38 per cent. It would be almost doubled again if fleets were to grow at a rate of 3 per cent instead of 1.5 a year.

Since the technical means of reducing fuel consumption are primarily applicable when building new ships, it will probably take time before they can have any effect. Their theoretical potential for bringing down the emissions of carbon dioxide from ships worldwide is put at 18 per cent for 2010 and 28 per cent for 2020 – in other words, much less than the estimated figures for a relatively slow growth in sea traffic (which has actually been around 3 per cent a year in recent decades).

Fuel consumption can best be brought down by lowering sailing speeds. A lowering of 10 per cent would mean a fuel saving of 23 per cent. But not even a great increase in the price of fuel oil would induce owners of new ships to lower speeds, since their high fixed costs make fast travel profitable. It could on the other hand be worth lowering them in the case of older vessels.

A worldwide charge on carbon dioxide emissions would in theory be fine, but in practice it would be extremely difficult to administer, since it would require the cooperation of all countries, and ships could moreover take in oil in international waters.

It is proposed instead that the IMO should explore the possibilities of arriving at voluntary agreements with shipowners, in the first place regarding energy or emission-efficiency standards, especially for new vessels. It should also consider letting them sell emissions credits, obtained as a result of abatement measures taken when building new ships, and possibly when retrofitting on existing ones. This last is considered a very promising option, which could in the long run give very strong incentives to shipowners to reduce emissions by technical means.

The report also points out that the emissions of nitrogen oxides from ships can contribute disproportionately to the greenhouse effect. Whereas such oxides only occur in small amounts over the world's oceans, there are natural emissions from them of hydrocarbons. Any nitrogen oxides that are emitted can consequently lead to an extensive formation of ozone, which is also a greenhouse gas. The net effect of this can be equal to or even greater than that of the emissions of carbon dioxide from ships.

PER ELVINGSON

Study of Greenhouse Gas Emissions from Ships. Final Report to the International Maritime Organization. By MARINEK in partnership with Det Norske Veritas, Econ Centre for Economic Analysis, and Carnegie Mellon University. MT Report: MT00 A23-038, Trondheim, Norway, 2000.

Ecoship in the offing

An environmentally adapted short-haul seagoing type of oil tanker is being developed by a group of Swedish companies in association with Swedish university departments. The country's National Energy Administration is contributing SEK 8.7 million (just over 1 million euros) to the project, which is aimed at developing a tanker consuming approximately 10 per cent less energy than is normal for such vessels. According to computer modelling, the emissions of nitrogen oxides will be 97 per cent lower than from traditional short-haul tankers, and those of hydrocarbons and carbon monoxide at least 75 per cent lower. The proposed vessel will be equipped with several small diesel-electric driving units, increasing loading capacity by 10 per cent as well as making it possible to use less engine power in ports.

Further information: Björn Carlsson, Ecoship Engineering. E-mail: bjorn.carlsson@kockumseng.se. Tel. +46-40-348140.

Commitments within reach

If all countries act as planned, the promise made at Kyoto can, in Commission's view, be met.

WHEN THE EU Commission presented its proposal for a European Climate Change Programme in the spring of last year, it forecast a rise of 6-8 per cent, between 1990 and 2010, in the Union's emissions of greenhouse gases. According to a recent report,[1] the situation should however be much better, although much still needs to be done if the commitments made under the Kyoto protocol are to be met.

The Commission now reports that between 1990 and 1998 emissions had dropped by 2.5 per cent. This was mostly due however to one-time measures in Germany and the UK (restructuring in East Germany and a switch from coal to gas in the British power sector). The Commission's view is that given existing policies and measures the reduction by 2010 will at best be 1.4 per cent, while in the worst case emissions will stay put at their 1990 level.

The Commission emphasizes, too, that a majority of the member countries are still far from where they ought to be as regards emissions if the EU is to meet the obligations made at Kyoto. There the EU countries agreed collectively to cut back their emissions of six greenhouse gases by 8 per cent, averaged over the five years from 2008 to 2012, from 1990 levels. Their individual commitments are shown in Table 1.

The report also shows what has happened in the way of emissions from various sectors (Table 2). In seven of the EU member countries – France, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain – emissions had increased in all sectors. The emissions of greenhouse gases from transportation had not only risen in fourteen countries between 1990 and 1998, but in the case of seven of them – Belgium, Greece, Ireland, the Netherlands, Portugal, Spain, and Austria – the rise had been more than 20 per cent.

Important to supplement and reinforce national climate strategies

If the additional measures notified by the member states are carried out, emissions by 2010 will, in the Commission's estimate, lie 7 per cent under their 1990 levels – in other words, close to the promised Kyoto figure. As much as one-third of these further savings will however be coming from projected reductions in Germany and the UK. "This development," says the Commission, "should not be taken for granted by the other thirteen member states, as each of them is responsible for meeting its own target."

In view of the member countries' difficulties in meeting the Kyoto aims, it will become increasingly important, continues the Commission, to supplement and reinforce national climate strategies. It believes its own proposal for a revision of EU energy taxation would bring about an overall reduction of 1.5 per cent in greenhouse-gas emissions as from 1990, while its directive for increasing the proportion of energy from renewable sources would result in a whole 10-per-cent drop. The proposed action programs for using energy more efficiently, and increasing the use of combined heat-and-power, would, if carried out, bring further reductions of 5 and 1.5 per cent.

PER ELVINGSON

Table 1. EU Kyoto commitments and internal burden sharing (1st column), emission trend 1990 to 1998 (2nd), and projections to 2010 relative to 1990 (3rd). All figures in per cent.

	Share of commitm.	Trend 1990-1998	Projection to 2010
Austria	-13	+4.1	+7.7
Belgium	-7.5	+6.3	+13.5
Denmark	-21	+8.7	-16.5
Finland	0	+4.7	+25.9
France	0	+1.0	+11.2
Germany	-21	-15.8	-19.1
Greece	+25	+15.0	+29.0
Ireland	+13	+19.1	+29.0
Italy	-6.5	+4.6	-0.3
Luxemb.	-28	-58.4	-23.4
Netherl.	-6	+8.2	+16.6
Portugal	+27	+17.8	+56.6
Spain	+15	+19.4	+18.8
Sweden	+4	+1.2	+17.1
UK	-12.5	-9.5	-12.6
EU total	-8	-2.5	-1.4

Table 2. Trends in EU greenhouse gas emissions for four economic sectors, from 1990 to 1998. All figures in per cent.

	energy industries	manufacturing	transportation	small combustion
Austria	-5.9	+9.6	+23.5	+11.6
Belgium	-14.4	+19.4	+20.1	+22.3
Denmark	-20.2	+4.2	+15.6	-6.7
Finland	+16.3	+8.4	+3.4	-8.8
France	+3.6	+0.7	+13.8	+9.6
Germany	-17.9	-25.0	+11.4	-6.0
Greece	+15.9	+7.0	+29.4	+30.0
Ireland	+36.1	+2.2	+76.8	+2.5
Italy	+9.2	+2.0	+15.2	+2.4
Luxemb.	-96.5	-78.4	-56.2	+49.3
Netherl.	+11.3	+5.7	+21.6	+2.1
Portugal	+17.8	+15.1	+41.9	+34.0
Spain	+5.9	+23.0	+35.1	+16.7
Sweden	+9.9	-6.5	+13.3	-9.9
UK	-17.1	-6.3	+5.3	+5.6
EU total	-6.2	-5.7	+15.3	+3.0

[1] **Report under Council Decision 1999/296/EC for a monitoring mechanism of Community greenhouse gas emissions**. COM(2000) 749. Available in pdf format in all EU languages at this address: http://europa.eu.int/comm/environment/docum/00749_en.htm

A report (November 2000) on progress within the European Climate Change Programme can be found at http://europa.eu.int/comm/environment/climat/eccp.htm.

Directive for curbing emissions

Potential for damage is relatively greater than would appear from their less than 1-per-cent proportion of EU emissions.

LAST OCTOBER the EU Commission put forward a proposal[1] for a directive to reduce the emissions of air pollutants as well as noise from pleasure craft. It did so partly because the Swedish government had given notice in 1996 of its intention of introducing national legislation with this aim. The proposed EU directive will amount to an amendment of the former 94/25/EC on the design and construction of recreational water craft.

The three countries bordering on Lake Constance – Germany, Austria, and Switzerland – had already agreed early in 1990 on standards for exhaust emissions and noise from the engines of pleasure boats used on the lake. These standards were brought into effect in two stages, in 1993 and 1996. During the nineties similar legislation was also introduced in the United States.

It has been estimated that there are about 4 million engine-driven pleasure craft in the EU plus Norway and Switzerland, and that each year more than 400,000 marine engines are sold in the area. The consequent emissions of air pollutants are put roughly at 65,000 tons of hydrocarbons (HC), 10,000 tons of nitrogen oxides (NOx), and 150,000 tons of carbon monoxide (CO). To these must be added fine particles and carbon dioxide, the main greenhouse gas.

This means that the emissions from pleasure craft amount in each case to less than 1 per cent of the EU totals for such pollutants. Since however most of the emissions take place during a short period in summer, their potential for damage to health and the environment is relatively greater. The conditions for the formation of ground-level ozone are moreover at their greatest during sunny days in summer.

Hydrocarbons from two-stroke engines are regarded as an especially difficult problem. Typically between 25 and 40 per cent of the petrol consumed in such engines is emitted as unburned hydrocarbons. It may also be mentioned, by way of comparison, that the combined emissions of ozone-forming pollutants (HC and NOx) from running a 20-kilowatt two-stroke engine (the most usual type for boats) for five hours are calculated to exceed the total from driving an average car for a year (15,000 km), assuming that the car is one meeting the EU emissions standards for 1996.

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Hydrocarbons from two-stroke engines an especially difficult problem

The Commission's proposal would comprise all engine-propelled craft from 2.5 to 24 metres in length, as well as inflatables and "personal watercraft" such as jet skis. The most usual engines are of the outboard type, which are mostly two-stroke. The directive will however also apply to four-stroke engines, as well as diesel driven.

The proposal is that emission limits, varied according to rated engine power, shall apply from December 2004 for four-stroke and diesel types, but not until December 2005 for two-stroke engines – the reason being that the Commission considers the technical problems for the former to have already been solved, whereas time will be needed to develop the more advanced technology required for the two-stroke types – including the substitution of direct injection for the present carburettor systems. A market might on the other hand gradually appear for four-stroke engines at the expense of two-stroke.

The cost of eliminating one ton of combined HC and NOx is put at 500 to 1000 euros for outboard engines and 2000 to 8000 for diesels.

The Commission has estimated that after the directive has been fully carried out – in other words, after all the present engines have been replaced by others meeting the proposed standards – the emissions of HC and CO from petrol engines will have been cut by 89 and 42 per cent. In the case of diesel engines, the reduction is calculated to be 23 per cent for HC, 31 for NOx, and 30 per cent for particulate matter.

CHRISTER ÅGREN

[1] The Commission's proposal, COM(2000) 639, is available in pdf format at following address: http://europa.eu.int/eur-lex/en/com/pdf/2000/com2000_0639en01.pdf

SMALL PETROL ENGINES

Main problem is hydrocarbons

Emissions, which have so far been unregulated, can be controlled at small cost to consumers.

A PROPOSAL FOR standards for small spark-ignition engines used in non-road mobile machinery – in other words the petrol engines used for example in lawn mowers and other gardening equipment – was put forward by the EU Commission at the end of last year. It takes the form of an amendment to the directive for controlling emissions from diesel engines in non-road use (97/68/EC) which was agreed in 1997.

Like that already proposed for motorcycles and pleasure boats, this new directive is aimed primarily at volatile hydrocarbons, although it also covers nitrogen oxides and carbon monoxide. The emissions of volatile hydrocarbons for engines covered by the directive are estimated to amount to 850,000 tons a year (the total for EU being about 13 million tons). Attending to small engines would, according to American figures, be a cost-effective way of reducing these emissions within the EU.

The limit values for small engines are to apply in two stages – the first 18 months after the coming into force of the directive, and the second from 2004 to 2010, depending on engine category. After the second stage has taken effect, the emissions from engines in the smallest types of equipment, the handheld, should be 80-85 per lower than they are today. Improvements in design should also bring about a saving of about 30 per cent in fuel, offsetting some or even more than all of the increase cost to the consumer arising from the effect of the new standards.

The proposed directive has come as a result of close cooperation with the US Environment Protection Agency, largely copying the regulations that have been in force in the US since 1997. A novelty is that it would allow the EU to follow US practice in setting up a system for banking and trading in emission permits. Under such a system, manufacturers could for instance market an engine with emissions that exceed the limits, provided other engines they make emit correspondingly less. They could also "bank" credits so achieved, for later use, or even sell them to other engine makers who are having difficulty in meeting the emission limits.

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More details in a press release of December 20, 2000 from the Commission (IP/00/1497). The whole draft of the directive, COM(2000) 840, can be found on internet at http:/europa.eu.int and the US regulations on www. epa.gov/oms/regs/nonroad/f99001.htm.

MOTORCYCLES

Expected emission increase calls for curbs

THE EMISSIONS of air pollutants from motorcycles and mopeds were made subject to control in an EU directive that is now only three years old. Since the requirements of that directive (97/24/EC) are rather weak, however, the proportion of emissions from these vehicles is expected to rise instead of falling. If no further steps are taken, the emissions of hydrocarbons (HC), for instance, are likely to increase from 4 per cent in 1995 to 20 per cent of the total emissions from the transport sector in 2020 – despite estimates that in 2020 motorcycles will only account for 2-3 per cent of the whole traffic volume.

The emissions of hydrocarbons and nitrogen oxides (NOx) from motorcycles in the EU are estimated to have amounted to 170,000 and 11,000 tons in 1995. There is no estimate of emissions of particles in the Commission's proposal. The present standards, which have applied since 1999, limit the emissions of hydrocarbons from types with two-stroke engines to 4 grams per kilometre, and those of nitrogen oxides to 0.1 gram. For motorcycles with four-stroke engines the limits are 3 and 0.3 grams respectively. Although differences in the test cycles make it difficult to

Emission limit values for motorcycles accordning to directive 97/24/EC and the Commissions's new proposal COM(2000)314. (grams per kilometre)

	Dir. 97/24/EC 1999	Dir. 97/24/EC 1999	Pro-posal 2003/4	Proposal Permissive values for the purpose of fiscal incentives	
Engine	Two-stroke	Four-stroke	All	<150cc	>150cc
CO	8.0	13.0	5.5	2.0	2.0
HC	4.0	3.0	1.2	0.8	0.3
NOx	0.1	0.3	0.3	0.2	0.1

Motorcycles

Continued from previous page

draw a proper comparison, it can be said that by and large new motorcycles today emit up to twenty times the amount of hydrocarbons per kilometre that a new car will do.

Consequently the Commission put forward a proposal[1] last June for stricter requirements for motorcycles. The aim in the first place will be to reduce the emissions of hydrocarbons. It is proposed that the new exhaust standards shall apply from 2003-2004 with a further reduction in 2006. The first-step requirements are expected to reduce the emissions of hydrocarbons from new motorcycles by 60-70 per cent.

The requirements for the second stage would imply a new test cycle, which is said to be more representative of "real world emission behaviour." The Commission intends to revert to the matter of the test cycle, as well as that of second-stage emission limits, before the end of 2002.

The Commission also wants to favour fiscal incentives as a means of encouraging the development of motorcycle engines with better emission characteristics than the present types. It is therefore proposing "permissive emission values" (see table) to enable member countries to grant fiscal incentives.

The European Environmental Bureau (environmentalist organization) considers the Commission's proposals altogether too feeble, amounting to no more than a repetition of the standards that have applied to cars in the EU since 1993. The EEB thinks the requirements for motorcycles in 2003 should be based an the same test cycle as that for cars, and moreover be made comparable to those that have been in force for cars since 2001. The EEB further notes a weakness in the proposed directive in that it only aims at motorcycles, omitting mopeds, which also need attention.

CHRISTER ÅGREN

[1] COM(2000)314: Proposal for a directive of the European Parliament and of the Council amending directive 97/24/EC on certain components and characteristics of two or three-wheel motor vehicles. Available at http://europa.eu.int/eur-lex/en/com/dat/2000/en_500PC0314.html

EU DIRECTIVES

Second readings

THREE NEW clean-air directives are now reaching the final stage of the EU legislative process. All have gone through a first reading in Parliament and been subsequently considered by the Council, which has agreed on a common position for each of them. They will now be given a second reading in Parliament in accordance with the EU co-decision procedure.

Emission ceilings

The directive, called the NEC, is entirely new and will set ceilings for each country's emissions of sulphur dioxide, nitrogen oxides, ammonia, and VOCs. While the target year will be 2010, it is intended that there shall be a review in 2004, prior to which the Commission will be making a thorough analysis in order to determine, among other things, whether there should be a call for still lower ceilings than those now proposed.

Actually two proposals for national emission ceilings are being put forward. One is the original version framed by the Commission in 1999, which received full support of Parliament at its first reading in March last year. The other is the much weaker compromise version emanating from the Council later in June, which amounts to little more than a repetition of the ceilings agreed upon for the Gothenburg protocol.

Surprisingly, the Parliament rapporteur, the Finnish Social Democrat Riitta Myller, has recommended that the environmental committee should support the Council's version. This has however met with opposition – from her own party representatives as well as from others who would favour the tougher Commission version. But Ms Myller would not propose departing from two other demands made at the first reading, namely that the requirement for review should be made clearer, and that the long-term aim of the directive, that by 2020 there should no longer be any exceeding of critical loads, should be written into it.

Large combustion plants

A new directive for limiting the emissions of air pollutants from large combustion plants, LCPs, is to replace the existing one dating from 1988. The great question is whether the requirements are also to apply to existing installations, and if so, how strict they are to be. The rapporteur in this case is the Dutch Christian Democrat Ria Oomen-Ruijten. She wants to see stricter requirements *both* for existing plants *and* for new ones (yet to be built), just as the Parliament did at the first reading. In other words, *not* what the Council decided. She would also like to have the directive made more equitable and effective by removing some loopholes, which would allow higher emissions for instance from power plants fired with local coal or lignite.

Ground-level ozone

The third proposal that is up for debate is an entirely new air-quality directive setting target values for maximum concentrations of ozone.

In this case Parliament supported the Commission's proposal at the first reading. That would allow the target value set for the protection of human health to be exceeded on no more than 20 days in any year. The Council would have let it be exceeded on 25 days. But Parliament also differed from the Council in wanting the target values for 2010 to be made binding, instead of being merely guide values. Moreover it wanted the long-term aim, with no exceeding at all of the threshold value, to have been reached by 2020.

The first two directives were to be considered in the Parliament's environmental committee late in February, with voting in the plenary session in mid-March. If Parliament and the Council should still be in disagreement, there will have to be recourse to the conciliation procedure, with the aim of reaching a conclusion during the summer. Delays have meant that no date could be set for a second reading of the ozone directive.

CHRISTER ÅGREN

Note. There have previously been several articles on these directives in Acid News: On NEC in 4/98, pp.1-5, 2/99, pp.8-9, 1/00, pp.1-7, 2/00, p.10, and 3/00 pp.6-7. On LCPs in 3/98, pp.11-12, 4/98, pp.8-9, 2/99, pp.6-7, 2/00, p.10, 3/00, p.8, and 4/00, pp.1-4. On ozone in 3/99, p.7 and 4/00, p.12.

Aims for the current decade

The Commission's proposal for a new environmental action program meets with criticism.

Whereas it was clearly stated, in the EU's fifth environmental action program, that there should be no exceeding ever of critical loads and levels, there is nothing about this in the new program.

"Much in the way of generalities and few specific targets," was the opinion in many quarters concerning the Commission's proposal for a new environment action program, *Environment 2010. Our Future, Our Choice*, published on January 24 this year.

The Commission itself calls this, the sixth of its action programs, "an ambitious new environmental strategy," embodying priorities to be worked on during the next ten years. It puts emphasis on the need to implement already agreed directives, and to observe the environmental aspect in all moves, whether by individuals or business firms.

In contrast to previous programs, the new one sets only a few quantifiable aims, which has brought considerable criticism. But the commissioner in charge, Margot Wallström, has a ready answer: "For me it is important that we discuss concrete actions that will start things moving rather than spend much time in debating what the specific target figures should be." Quantifiable targets, she maintains, can be set in due course.

The program dwells mainly on four fields for action, namely, climate change, health and the environment, nature and biodiversity, and the management of natural resources. While insisting that the short-term aim in the case of climate change should be fulfillment of the EU's commitment under the Kyoto protocol (see p.9), the Commission also calls for more far-reaching global cuts in emissions – as much as 20-40 per cent by 2020, with reduction of the emissions of greenhouse gases in the EU by 70 per cent from their 1990 levels as a long-term aim.

Other air pollutants are dealt with under health and the environment, where the aim is said to be "to achieve levels of air quality that do not give rise to unacceptable impacts on, and risks to, human health and the environment." Policy shall be to ensure the implementation of existing directives and the development of a comprehensive strategy for all new legislation under the heading of CAFE, Clean Air for Europe.

The last environment action program had included clear-cut objectives as regards air quality and acidification. For the first it had stated that "all people should be effectively protected against recognized health risks from air pollution," and for the latter the aim was to be "no exceeding ever of critical loads and levels" (thus covering SO_2, NOx, and NH_3).

These objectives were further underlined in 1998, when the European Parliament decided jointly with the Council of Ministers on a review of the fifth program. It was then laid down that in relation to acidification and air quality, particular attention should be given to:

a) developing and implementing a strategy with the goal of ensuring that critical loads, in relation to exposure to acidifying, eutrophying and photochemical air pollutants, are not exceeded; and

b) establishing or amending air quality objectives with respect to specific pollutants, with the goal of ensuring that critical loads or levels for ecosystems are not exceeded.

These clearly stated objectives, which have formed a cornerstone of several important directives, such as that on national emission ceilings, are lacking in the proposed sixth action program.

Besides criticizing the program for its absence of clear targets and timetables, the European Environment Bureau (EEB) said it relied too heavily on the voluntary cooperation of business.

During the spring the Commission's proposal will be debated under co-decision procedure, involving both the Council and Parliament.

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For further details, turn to http://europa.eu.int/comm/environment/newprg/index.htm

More freight by rail

National barriers are hampering competition in freight carrying by rail in Europe. An improvement is however now in sight as a result of an agreement made between the EU Council and Parliament concerning the liberalization of traffic. In essence this will mean that railway companies will be able to carry freight without hindrance in other EU countries – at first only on certain lines, but later on the whole network. The move is welcomed by T&E, the European Federation for Transport and Environment as a step on the way towards a sustainable transport system.

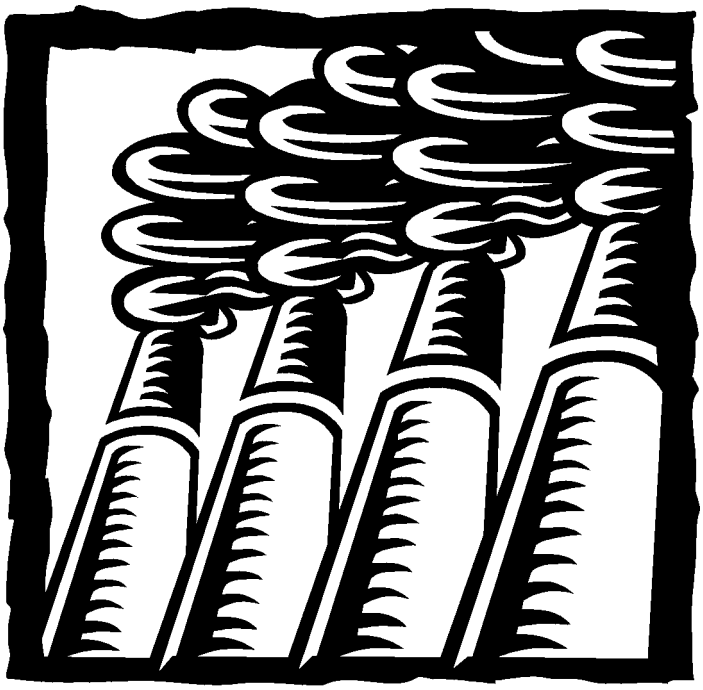
Best available techniques

Proposals for BATs submitted by EEB as member of EU working group on IPPC directive

WORK IS CURRENTLY in progress within the EU to determine which techniques are to form the benchmark standards for preventing and controlling pollution from LCPs (large combustion plants) under the new Integrated Pollution Prevention and Control Directive (IPPC).[1]

It is being undertaken by a technical working group made up of representatives of each member state, industry, and one member from EEB, the European Environment Bureau. It began work in February 2000, and expects to finally report in the spring of 2002.

This working group is one of several that have been set up as part of the information exchange required by the IPPC directive. Each group focuses on a particular industrial sector, and there is an Information Exchange Forum to address cross-sector issues and oversee the whole process. Work is centred on the Institute for Prospective Technological Studies in Seville, Spain, where the European IPPC Bureau is also based.



What is BAT?

The final product of each working group will be a BAT Reference Document (BREF) describing the best available techniques (BAT) that have been agreed upon for preventing and controlling pollution from LCPs.

The concept of BAT is defined under Article 2(11) of the Directive, which uses the term *techniques* to include not only the technology to be applied, but also the way in which the installation shall be designed, built, maintained, operated, and decommissioned. The techniques have to be *available* on a scale that allows implementation in the relevant industrial sector under economically and technically viable conditions, with account taken of the costs and advantages. The techniques also have to be *best* in terms of being the most effective for achievement of a high general level of protection for the environment as a whole.

In addition to considering a number of techniques and determining which are the most appropriate, the BREF provides general information on the industrial sector concerned and on the industrial processes used within that sector. Data is also given in respect of current emission and consumption levels, reflecting the situation in existing installations at the time of writing.

The first stage in producing a BREF is for members of the working group to submit details of techniques for consideration as BAT. The EEB would like to see a relatively small number of techniques adopted, thereby providing a very clear definition of BAT for the LCP sector. It has therefore usually submitted only one BAT candidate for each of its traditional areas of concern, while also identifying important emerging techniques where appropriate.

The EEB submissions for end-of-pipe pollution control feature state-of-the-art developments by Alstom Power, a world leader in this field.

Sulphur abatement techniques

Alstom Power's Flowpac system for flue-gas desulphurization builds upon the well-established chemistry of the wet limestone process, in which sulphur dioxide is absorbed into limestone to form gypsum. It differs however from conventional wet-limestone processes in that instead of using pumps to circulate the gypsum/limestone slurry, this is achieved "naturally," using pressure differences within the absorption vessel. This allows for intimate contact between the flue gas and the limestone slurry, resulting in removal efficiencies of 98-99 per cent for sulphur dioxide, even when the fuel has a high sulphur content.

Given the particular focus of the IPPC directive on pollution prevention, an important feature in favour of Flowpac as BAT is the very high quality of the gypsum, which maximizes its potential for re-use. As regards the economic aspect, Flowpac is about 10 per cent more expensive than conventional systems, but this has to be considered in the context of a halving of the cost of wet-limestone FGD since its widespread introduction 5-10 years ago. Flowpac can consequently be judged economically "available" for all EU countries.

The Flowpac system can be applied in existing as well as new plants using a range of fuels. It has already been commercially proven in a 3x340 MW power plant fired with heavy oil at Karlshamn, Sweden.

NOx from gas-fired plants

As a proposal for the control of nitrogen oxides (NOx) from gas-fired LCPs, the EEB has submitted details of SCONOx. Developed in the US, this system uses a single catalyst to control the emissions both of NOx and carbon monoxide (CO), and it does this without the use of ammonia and its resulting ammonia slip. Emission levels of 2 ppm NOx in the flue gases are guaranteed, with 1 ppm being achieved in some applications. This has led the US Environmental Protection Agency to base its lowest achievable emissions rate (LAER) for NOx abatement in the case of large gas turbines on SCONOx. The technique also reduces emissions of CO, formaldehyde, acetaldehyde, and non-methane, non-ethane VOCs by 90 per cent.

The SCONOx system has been in operation since 1996 at SunLaw Energy's Federal 30 MW co-generation plant in Vernon, California, and since 1999 on a 5 MW co-generation plant at the Genetics Institute in Andover, Massachusetts. Since the end of 1999, a scaled-up SCONOx system has also been commercially available for combined-cycle gas turbines (CCGTs) of 100 MW and more.

SCR for other fuels

Technical complexities mean however that SCONOx is not yet available for LCPs using other fuels, nor have such applications yet been sufficiently developed for inclusion in the BREF as "emerging techniques." For end-of-pipe NOx abatement for LCPs using these fuels, the EEB has therefore submitted details of the state-of-the-art DENIT system for selective catalytic reduction.

As with other SCR systems, DENIT reduces NOx in flue gases to pure nitrogen and water, using a catalyst and ammonia. The case for DENIT as BAT is helped by its ability to keep the ammonia slip below 5 ppm, thus ensuring that the ash is suitable for re-use. A further advantage is that it reduces the use and disposal of catalysts by 30 per cent – achieved by allowing space for an additional catalyst layer, which enables gradual rather than immediate replacing of catalysts when de-activation would otherwise result in an insufficient rate of reduction for NOx.

The DENIT system achieves a typical maximum outlet NOx concentration of 200 mg/Nm^3 (at 6 per cent O_2 by volume), corresponding to removal efficiencies of 70-90 per cent. The EEB has presented evidence showing that this is being achieved in Sweden, Germany, and Denmark at about half the cost of some of the estimates that have been put forward as typical for SCR. It has also presented GDP/capita data showing that SCR it not just a technique for wealthier countries, while Germany and Denmark have above EU average GDP/capita, Sweden, which also widely uses SCR, is at or below the average.

The system is already in widespread use. Examples include the 550 MW coal-fired combined-heat-and-power plant at Västerås, Sweden, the 3x340 MW heavy-oil plant at Karlshamn, Sweden, and waste-to-energy plants AW1 Twente in the Netherlands and the TRV Thermische Rückstandsverwertung, Wesseling, Germany, firing non-hazardous and hazardous waste respectively.

Fabric filters for particulates

For end-of-pipe particulate control, the EEB is keen to emphasize the superior performance of fabric filters as compared with electrostatic precipitators for removing fine and ultrafine particles. It has therefore submitted details of the Optipulse range of fabric filters, focusing mainly on the basic LKP model, but also describing others in the range that allow for compact modular applications or those with a very high removal efficiency. As its name suggests, Optipulse uses compressed air pulses to clean the filter bags, and minimizes energy requirements by using a lower pulse frequency.

The collection efficiency is very high, with emission levels typically below 10 mg/Nm^3, corresponding to an efficiency of 99.9 per cent or higher, depending upon inlet concentration. It is already being widely used, with applications in the USA, Sweden, Australia, Germany, Austria, Finland, Venezuela and the UK.

Non-polluting techniques

Nevertheless, end-of-pipe abatement is much less desirable than not producing pollution in the first place, and this is to receive particular recognition under IPPC, which should ensure that combined-cycle gas turbines (CCGTs) are prime candidates for BAT, given the high efficiencies resulting from their re-use of the gas-turbine exhaust to power a steam turbine.

Recent years have seen steady incremental increases in the efficiencies of combined-cycle gas turbines, with several companies now offering efficiencies of about 58 per cent. One of these has been detailed as part of the EEB's submission. Since the main object of their submission on CCGTs is not expected to be fully commercial before 2002, it has been submitted only as an emerging technique.

The General Electric's H System CCGT is the first to have reached 60 per cent efficiency – achieved by increasing the firing temperature by more than 100°C above the most efficient currently operating CCGT system. This higher firing temperature has been achieved by a series of technological advances, including crystal airfoils and improved component and coating materials. A closed-loop cooling system resolves the conflict between the higher firing temperatures needed for higher performance and the lower combustion temperatures necessary for lower NOx emissions.

High efficiency

General Electric has calculated that an increase of a single percentage point of additional efficiency can reduce operating costs by 17.5-23 million euros over the life of a typical CCGT plant in the 400-500 MW range. This further strengthens the case for GE's H System as BAT under IPPC. It will be tried out this year at Baglan Energy Park, outside Cardiff, in Wales, with an output of nearly 500 MW. District heating to local commercial and industrial businesses will increase the overall cycle efficiency to more than 70 per cent, and following a series of characterization and reliability tests, the system is expected to be fully commercial by 2002.

Other fuels cannot compete with such combustion efficiencies. Since however the IPPC directive cannot specify the use of a particular fuel, BAT candidates are also being sought across the full range of fuels, which make things all the more difficult. Just a few years ago, advanced coal

Large combustion plants

Continued from previous page

technology, gasification, and pressurized fluidized-bed combustion (PFBC) were being seen as equal contenders for the way forward for coal combustion.

Continual updating vital

Now, however, Alstom Power, the pioneers of bubbling-bed PFBC, has ceased developing it, because of the efficiency gains of advanced coal technology and the lack of established re-uses for the ash, which is mixed with calcium sulphate and excess lime as calcium carbonate. It is understood that a Japanese company is continuing the development of bubbling-bed PFBC, and other companies are producing circulating-bed PFBC. But despite the advantage of this technique in fuel flexibility, particularly with poor-quality fuels, the problem of ash re-use must inevitably call into question any widespread acceptance of pressurized fluidized-bed combustion as BAT under IPPC.

The EEB has therefore submitted details of PFBC explicitly as a contribution to the debate rather than necessarily as BAT. Existing and advanced forms of bubbling-bed PFBC have been detailed, together with the later development of the circulating-bed form of this technique, and potential efficiencies of around 50 per cent have been noted. The EEB nevertheless sees this as an area where continual updating of the BREF is vital if the BAT techniques are to properly represent developments in this sector.

The IPPC Bureau has been checking and evaluating the prospective BAT candidates submitted by members of the working group, and the first draft of the BREF is due early this year. Members' comments on this will then be incorporated into a second draft, in the hope of arriving at an agreement on the final document early in 2002.

LESLEY JAMES

EEB representative on the IPPC Technical Working Group for Large Combustion Plants.

[1] The IPCC directive was reported at length in Acid News 2/98, which can also be looked up on www.acidrain.org/acidnews.htm

Kilometre tax for heavy vehicles

A simple means of making great gains

FREIGHT CARRYING by road had, in terms of ton-kilometres, tripled in the EU between 1970 and 1998, and is still likely to go on increasing. That will mean more noise, more congestion, and increased emissions of pollutants, with effects on climate, vegetation, and health.

The high and growing demand for road transportation is due at least in part to its low cost. At present heavy vehicles are not being fully charged for their socioeconomic cost, and one of the proposals in a white book issued by the EU Commission in 1998, under the title *Fair payment for infrastructure use*, was just for a kilometre tax on heavy road vehicles.

The idea is strongly supported by T&E, the European Federation for Transport and Environment, which claims that kilometre taxes would provide an opportunity to reduce fuel prices while making for a much fairer taxation system for transportation in general.

One of the advantages of such a system that the T&E points to is that it could be made to reflect the true cost of road traffic – deriving in part from when and where the vehicle is used, its weight, and environmental classification. Other advantages are that the income would stay in the country where the effects had occurred, and that the rules would be the same for all carriers, no matter what their nationality. It would however be necessary to continue with a carbon tax on fuel, the advantage of which is not only its direct connection with the carbon content of the fuel but also its independence of where the emissions take place.

The adoption of an EU-wide system of kilometre taxing would entail some changes in existing legislation, the so-called Eurovignette directive.

The member countries would also have to agree on a common technical standard. Then each country could start kilometre charging as and when it pleases – provided only that the charges are kept competitively neutral, that is, do not favour or disfavour the carriers of any nation.

There should be no technical difficulty in going over to kilometre charging. Switzerland has had a properly functioning system in place since January (see following page). Germany has declared its intention of leaving the Eurovignette system and replacing it unilaterally with a kilometre charge on heavy vehicles by 2003. Austria has similar plans, and among other EU countries that have declared an interest in a distance-related system for road-taxing of heavy traffic are the Netherlands, Sweden, and the UK.

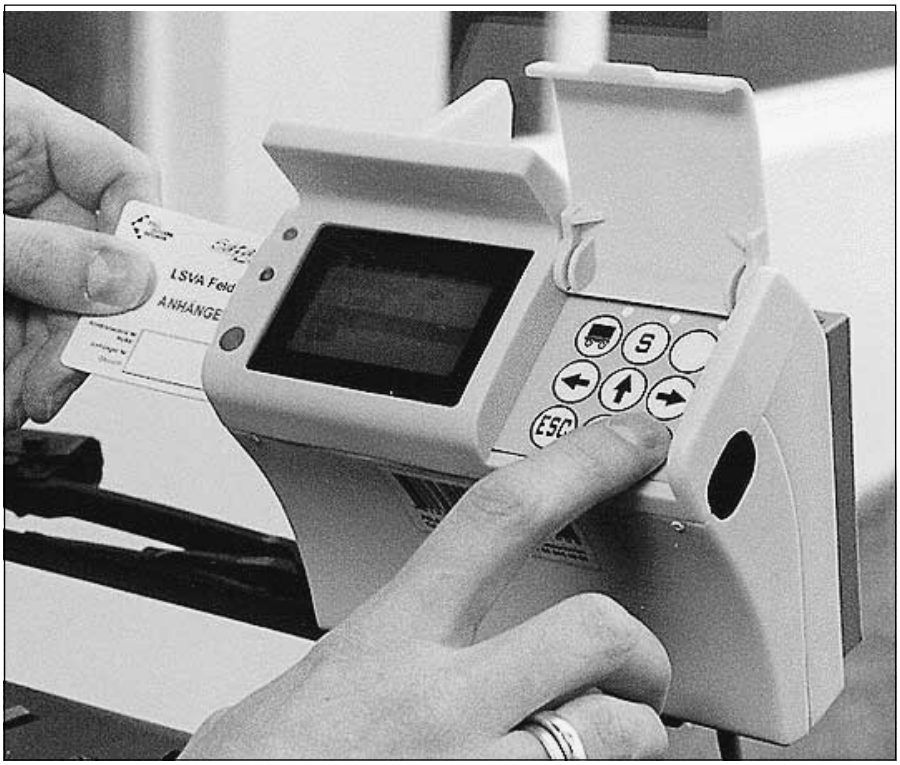
PER ELVINGSON

Among T&E's numerous publications on the subject of road charging is *Electronic Kilometre Charging for Heavy Goods Vehicles in Europe* by Per Kågeson and Jos Dings. As well as with a factsheet and a proposal for revision of the Eurovignette system, it can be had on T&E's website www.t-e.nu or from T&E, Bd de Waterloo 34, l000 Brussels, Belgium.

New express rail line

France and Italy intend to build a new express line between Lyon and Turin. This new rail line, which will cut travel time from the present 4 to 1.5 hours, is to be completed by 2015. From Paris to Milan will then take less than four hours. The project is mainly intended however to provide a new route for heavy freight through the Alps – with the aim of also increasing the railway's proportion of the traffic between the two countries from present 25 to 50 per cent. The most expensive and technically complicated part of the project will be a 52-kilometre tunnel. The total cost is put at 11 billion euros, although finance has still to be arranged.

Source: Ny Teknik, January 31, 2001.



The Swiss system

SINCE JANUARY 1, 2001, all vehicles weighing more than 3.5 tons have had to pay 1.6 cents (0.010 euro) per ton-kilometre to travel on Swiss roads, and starting in 2005 the charge will be raised to 2.5 cents (0.016 euro). For a 40-ton truck the charge now amounts to 0.41 euro per kilometre. It will be 0.64 euro in 2005, when it is estimated that the charges will cover the social costs of heavy traffic arising from noise, effects on health, etc. The charges are not only differentiated according to the vehicles' weights, but also to how polluting they are (what Euro-standard class they fall into).

The charge can be paid in two ways – either through a fully automated system that is mandatory for all Swiss vehicles, based on their tachographs, the microwave beacons, and the global positioning system (GPS). Non-Swiss vehicles can choose between this and a semi-automated version based on pre-paid chip cards.

The charges are estimated to bring in 750 million Swiss francs in 2001, and 1500 million in 2005 (500 and 1000 million euros). Two-thirds of this income is earmarked for investment in the federal railway system (including the construction of new tunnels through the Alps).

Although no reduction of the volume of freight going by road is expected as a result of this combination of vehicle charging with improvements in the railway system, it should slow down its rate of increase. If there was no charging, the number of vehicle kilometres would, it is estimated, run up to 4 billion in 2015, as against 2.5 billion today. Charging should keep the figure to 3 billion in 2015.

"The Swiss model is in line with the recommendations of the EU's green and white papers concerning the pricing of traffic. It has met with no objection, either, from the Commission. The only complaints have come from some individual member countries," notes Ueli Balmer of the Swiss ministry of transport.

For a fuller description of the Swiss system, turn to www.customs.admin.ch.

The Swiss have developed a special computer for vehicles subject to kilometre taxing (picture), more about which can be read from www.fela.ch/management/e_html/e_tripon.html.

NEWS IN BRIEF

Spreading eastwards

Since the beginning of the year differentiated harbour dues are being charged at Mariehamn, the chief port of call on the Åland Islands, which form part of Finland but are self-governing. Rebates are being given to ships that use low-sulphur oil and/or have low emissions of nitrogen oxides. The rebate is 4 per cent if the sulphur content of the oil is less than 0.5 per cent by weight, and 8 per cent if it is below 0.1 per cent. The rebate for low emissions of nitrogen oxides is at most 8 per cent (if the emissions are kept below 1 gram NOx/kWh). Ships that use oil with a sulphur content of less than 0.5 per cent as well as emitting less than 1 gram NOx/kWh get an extra rebate of 8 per cent on the due.

Mariehamn has thus joined the system with dues differentiated for environmental effect that has been practised in Sweden with good results since 1998. Other Finnish ports and the government are still taking a wait-and-see attitude.

Cleaner air when fuel supply dwindled

The local authorities of the northern English city of Leeds have found that road traffic dropped off by 24 per cent during the blockade of the oil depots last September in protest against high prices of motor fuel. Traffic accidents fell off by about the same amount, 25 per cent, and there was a marked improvement in air quality – with concentrations of nitrogen dioxide and small particles (PM_{10}) dropping by 30-40 and 25-35 per cent respectively during the week of the blockade.

Air Quality Management, December 2000.

Bike into the bargain

The general agent for Kia cars in the UK has started a campaign under the slogan *Think before you drive*. All buyers of new cars are being given a bicycle, with the exhortation to leave the car at home instead of using it for short trips. Better driving behaviour is also urged.

Air Quality Management, December 2000.

Handling oilfield emissions

Measures applied during storage and transfer of oil to tankers can be highly cost effective.

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Foredeck of the Anna Knutsen shuttle tanker serving the Statfjord field. On the right is the plant for capturing VOCs for use as fuel.

LAST YEAR the Norwegian Pollution Control Authority set rules for a marked reduction of the emissions of volatile organic compounds (VOCs) from the storage and handling of crude oil in the North Sea – with the declared aim of bringing them down by 70 per cent by 2006.

In 1999, 55 per cent of the country's total of 343,000 tons of emissions of non-methane VOCs was due to evaporation during the storage of crude oil and its transfer to tankers in the North Sea. The greater part of these emissions came from the Statfjord and Gullfaks oilfields, where the state-owned Statoil and the half state-owned Norsk Hydro were both loading crude oil, and accounting between them for three-quarters of the emissions of VOCs from Norwegian offshore operations.

In the VOC protocol of 1991 under the Convention on Long-Range Transboundary Air Pollution, Norway had committed itself to reducing its emissions by 30 per cent between 1988 and 1999, but it has not done so. Emissions have on the contrary increased by about 25 per cent

Bonus in cleaner exhausts

Shuttle tankers are widely used to serve offshore oilfields from which pipeline connections are not feasible. The tankers load their cargo of crude oil either from storage facilities at the oilfield or directly from the oil platforms and loading buoys. During the handling of the oil, in particular when loading and unloading, large quantities of the light components of the oil evaporate. Evaporation also occurs during the voyage when the oil splashes around in the tanks. This loss of volatile organic compounds (VOCs) represents a great loss of energy, as well as posing an environmental problem.

The Norwegian state-owned company Statoil, which is a leading operator of shuttle tankers in the North Sea, has together with MAN B&W Diesel developed systems for capturing and storing the oil vapour released from the crude-oil cargo, and subsequently utilizing it as the main fuel in the ships' engines.

Depending on the composition and amount of the VOCs, as well as the ship's sailing schedule, up to 90 per cent or even more of the shuttle tanker's consumption of fuel oil may be replaced by the captured VOCs, leading to substantial reductions in fuel outlay as well as cleaner exhaust gas through

- ❏ 50-90 per cent reduction of the emissions of SO_2 (since the VOC fuel is sulphur-free, the reduction will be directly proportional to the percentage of fuel oil that has been substituted);
- ❏ 50-90 per cent reduction of the emissions of particulates, due to the lighter and more volatile fuel;
- ❏ 20-30 per cent reduction of NOx emissions, as a result of a more uniform mixing of fuel and air in the cylinders; and
- ❏ some reduction of the emissions of CO_2, on account of the higher hydrogen/carbon ratio in VOC fuel as compared to fuel oil.

The installation of this type of system for recovery and utilization of VOCs may also be employed with benefit on other crude oil tankers, such as VLCCs (very large crude oil carriers), which are used to serve oilfields on land, and may be transporting the oil over long distances.

as a result of the increased production of crude oil and natural gas. Now, according to the Gothenburg protocol of 1999, also under the Convention, Norway is committed to a ceiling of 195,000 tons of emissions of VOCs, which means it must have reduced them by at least 35 per cent by 2010, from 1990 levels.

The Pollution Control Authority maintains that it is already technically possible to reduce the evaporation of VOCs in the handling of crude oil by up to 90 per cent. Since it would entail an increased consumption of energy, such a large reduction would be rather costly. The Authority has therefore decided that by 2006 emissions must have been cut by at least 78 per cent in at least 95 per cent of the offshore operations. That would amount to a total reduction of about 147,000 tons – all depending on how great the extraction of oil and gas will be. The cuts are to have taken place in three stages, by 2001, 2003, and 2005.

The evaporation of VOCs can be largely prevented through technical measures applied during storage and loading onto tankers. The VOCs so recovered can either be sold as fuel (gas) or used as fuel in the tankers that are used to carry the oil to shore, thus offsetting a good part of the cost of capture. There will be a further environmental gain in the case of the tankers, with gas replacing the bunker oil that would otherwise have to be burnt, and thus cutting back the emissions of sulphur and carbon dioxides. According to the Authority's estimates, the net cost of these measures would be no more than 1-2 Norwegian kroner (0.12-0.25 euro) per kilo of VOC eliminated, which would be very much less than the cost of similar measures for reducing emissions from land-based sources such as road vehicles and industries.

CHRISTER ÅGREN

Further information: www.sft.no

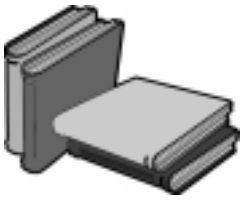
Making up for poor requirements

EMISSION STANDARDS for vehicles have never been retroactive. Old vehicles can therefore continue to be driven, even though they cause far more pollution that new ones would.

Some of the larger Swedish cities have tried to get around this problem by setting up zones for heavy vehicles, into which only those that meet quite high environmental requirements are allowed to come. In some cases, too, buyers of transport services in Sweden have insisted that only vehicles of similar standard should be used. Carrier firms and other vehicle owners have two choices if they want to go on driving into zoned areas. They can either buy new vehicles or improve the exhaust cleaning of those they have.

A new kind of equipment for catching nitrogen oxides, which can be fitted to existing vehicles, both on- and off-road, is presently being tested in Sweden. It involves injecting a reducing substance, urea, into the exhaust gases before they enter a catalyzer where oxides of nitrogen are converted back to nitrogen. It requires no engine adjustment. The great technical advance in this case is that the supply of urea is so precisely regulated that only the exact amount needed at any moment is injected, resulting in optimum functioning of the catalyzer. Tests have shown reductions of 70 and 30 per cent respectively in emissions of nitrogen oxides and particles.

Recent publications



Workshop on future needs for regional air pollution strategies (2000)
Report from a workshop held under the auspices of the Convention on Long-Range Transboundary Air Pollution in Saltsjöbaden, Sweden, April 10-12, 2000. TemaNord 2000:557. 100 pp. Published by the Nordic Council of Ministers, Store Strandstraede 18, 1255 Köbenhavn K, Denmark. Internet: www.norden.org.

Memorandum to the Swedish Presidency (2001)
Preparatory to each change in the presidency of the EU Council, the European Federation for Transport and Environment (T&E) publishes a statement of its attitude on relevant issues. This one gives a good overview of what is taking place in the EU as regards transport and environment.

25 pp. T&E 00/5. Available from T&E, Boulevard de Waterloo 34, 1000 Brussels, Belgium. Can also be downloaded in pdf format from www.t-e.nu.

Transport, Infrastructure and the Economy (2000)
By F. Goodwin. Investing in transport infrastructure is frequently assumed to provide large-scale economic and employment benefits. This publication shows there to be no scientific basis for that assumption. 30 pp. T&E 00/6. Available from T&E, address as above.

Is this your idea of paradise? (2000)
Describes environmental campaigns of non-governmental organizations in four central European countries and in the Netherlands. 40 pp. 15.00 gulden. In English. Also available in Polish, Slovak, Czech and Hungarian. Published by Milieukontakt Oost-Europa, PO Box 18185, 1001 ZB Amsterdam, the Netherlands. E-mail: info@milieukontakt.nl. Internet: www.milieukontakt.nl.

Your Way Through The Labyrinth 6th Edition (2000)
A Guide to EU Funding for non-governmental organizations. Available from ECAS, rue de la Concorde 53, B-1050 Brussels, Belgium. Fax +32 2 548 04 99. E-mail: admin@ecas.org

Further publications

Effects of Nitrogen Deposition on Forest Ecosystems (2000)
Popular scientific summary of the present state of knowledge concerning the effects of nitrogen depositions on soil and the ecosystems, especially forest. Includes data on depositions, both past and probable future.

160 pp. Order No. 5067. Published by the Swedish Environment Protection Agency, 106 48 Stockholm, Sweden. E-mail: kundtjanst@environ.se.

WHO Air Quality Guidelines for Europe, second edition (2000)
Published by WHO Regional Office for Europe. Can be ordered from WHO , Publication Department. E-mail: publications @who.ch. The publication will also be available in electronic format, free of charge, at www.who.nl.

IPCC Special Reports (2000)
The Intergovernmental Panel on Climate Change, IPCC, has published a number of subreports in preparation for its third assessment report which is expected to come later this year.

- Special Report on Methodological and Technological Issues in Technology Transfer
- Special Report on Emissions Scenarios
- Special Report on Land Use, Land Use Change and Forestry

Summaries in English, French, Spanish, and Russian can be downloaded from the IPCC website, www.ipcc.ch.

What can nature withstand: Science, politics and discourses in transboundary air pollution diplomacy (2001)
By Karin Bäckstrand. The book explores the role of scientific expertise in the diplomatic effort to counter transboundary air pollution in Europe, with focus on the 1999 Gothenburg Protocol to the Convention on Long Range Transboundary Air Pollution. Available from the author, Department of political science, Lund University, Box 52, 221 00 Lund, Sweden.

International Environmental Agreements: Institutional Innovation in European Transboundary Air Pollution Policies (1999)
By N. Castells. This study can now be obtained free of charge from the Joint Research Centre, Office for Publications TP 300 A, European Commission, Via Enrico Fermi, 1, 21020 Ispra (Va), Italy. Fax: +39 0332 78 96 23.

"Sinks don't reduce air pollution"

A LOT OF TIME was taken up during the last round of talks under the climate convention in debating the possibilities for some countries to meet their commitments under the Kyoto protocol by arranging for increased fixing of carbon in trees and soil – making more use of carbon sinks – and thereby to avoid part of what they should be doing to cut down on the burning of fossil fuels.

But it is only measures that reduce the use of fossil fuels that bring about quick and large improvements to health. As a representative of the World Health Organization put it at a press conference during the convention meeting:

"We are not just talking about taking measures to avoid the health risks that climate change will bring, such as diseases or death from extreme weather events, and vector, food or waterborne diseases that arise from altered climates. It is now clear that taking strong pre-emptive measures that directly reduce greenhouse gases will also result in other immediate and important health benefits for us all, for example, through cleaner air."

The same speaker also drew attention to a Swiss study pointing out that the most efficient programs for reducing greenhouse gases are also programs for clean air.

The author of that study, Dr Nino Künzli of the Institute for Social and Preventive Medicine, Basle, said at the meeting:

"The strategies on climate change that will benefit health are those in which countries directly target fossil-fuel emissions. The greatest health benefits will stem from integrated policies covering technology, urban planning, the speed and safety of traffic, quality of life and the promotion of walking, cycling and the use of public transport."

Another speaker for the World Health Organization was adamant in maintaining that the potential benefits of measures for protection of the climate would be lost if countries were allowed to use carbon sinks to achieve protocol targets instead of cutting emissions from the burning of fossil fuels. "Sinks don't reduce carbon dioxide [emissions] or air pollution, so you don't get the benefits we're talking about here," said Corrado Clini of WHO's European environmental and health committee.

Sources: WHO press release (www.who.dk/cpa/pr00/pr0016e.htm) and ENDS Daily, November 22, 2000.

Long-distance transports of particles

THE KIND OF PARTICLES that are mainly transported over long distances are those of less than 2.5 micrometres in diameter ($PM_{2.5}$). They are also those that are most injurious to health.

Work is now going on to enable the RAINS model to be used to trace the movements of particles too. This computer model, which was developed by the IIASA in Austria, has been of great use in the negotiations for reducing the emissions of acidifying and ozone-forming substances in Europe. With its aid, the effects and cost of various strategies can be estimated.

To make it useable for particles several lacunae in knowledge will have to be filled, and that will probably take two or three years. Around 2004 it should be possible to obtain reliable information on particle emissions and transports in the atmosphere, as well as on the cost of various measures for dealing with this problem.

It seems already evident however that in most localities only a small part of the particles come from direct emissions. A very large proportion – especially of the smallest fractions – consists of particles formed in the atmosphere from gaseous substances such as sulphur dioxide, nitrogen oxides and ammonia.

Fore more, turn to:
www.iiasa.ac.at/~rains/pm-intro.html

Effects from secondary gains

Measures for calculating them should be developed to avoid expensive mistakes

MEASURES TAKEN for some particular reason usually have an effect in other respects as well. Efforts to reduce the emissions of gases affecting the climate, especially of carbon dioxide, often bring evident secondary gains – since the emissions of substances that affect health will be reduced too.

There is no generally accepted method of calculating these secondary gains. The possible ways of doing so have however been extensively set forth in a 600-page report[1] from an international workshop that was busy in March last year.

Reduced burning of fossil fuels will not only mean less carbon dioxide in the air but much else besides.

It emerges from this report that there are many ways of assessing ancillary effects, but also that their extent may vary from country to country, depending on the state of their economies and the measures already taken for improving the environment, when emissions of carbon dioxide are reduced. The authors of a summary included in the report conclude however that "there appears to be compelling evidence that ancillary benefits may be a significant fraction of or even larger than the mitigation costs, especially where baseline conditions involve relatively high levels of pollution and there are likely to be minor ancillary costs."

Emphasizing that the combination of measures chosen will greatly influence the net cost of emission reduction, they continue:

"At a cross-sectoral level, it is commonly felt that measures such as reforestation or afforestation and land use change can be highly cost-effective greenhouse abatement options relative to measures taken in the energy sector. However, with evidence that 60 per cent or more of the cost of energy sector measures can be offset by ancillary benefits, the relative cost-benefit assessment can change dramatically. In cases where ancillary benefits outweigh abatement costs, as found in some studies, the relative cost assessment could be completely switched around."

Decisive for the estimation of ancillary gains will be the effects on health, which will usually account for 70-90 per cent of the benefits. Some other gains may however be underestimated; the effects on the ecosystem have for instance not been assigned any economic value in the calculations so far made.

Sixty per cent or more of the cost of energy sector measures can be offset by ancillary benefits

It is not unimportant, the report says, to consider *where* the measures are being taken to reduce emissions of carbon dioxide, when calculating the ancillary effects. Whereas reductions of greenhouse gases will have a global effect, the ancillary effects will be more local. If some measure results in lower emissions of health-affecting substances, for instance, in a highly populated area, the ancillary benefits will be much greater than they would be if the reduction had taken place where there were fewer people.

If that is to be taken into account when deciding on measures, it might be well to consider setting geographical boundaries for trading in emission permits as well as geographically differentiating the granting of such permits.

Some examples are given of clear ancillary costs resulting from measures to reduce emissions of carbon dioxide. This can happen for instance when switching from firing with fossil fuels to power generation in nuclear plants, or from petrol to diesel as fuel for cars. There would, in the latter case, admittedly be lower emissions of carbon dioxide, but the gain would be offset by increased emissions of small particles, which are a danger to health.

The authors of the summary argue that ancillary effects are not usually taken into consideration when policy is being made – although analyses of cost benefits, such as are common in the US as well as the EU, to some extent make the effects evident. Whatever uncertainty there may be, however, the ancillary effects can be judged considerable, and methods for calculating them should therefore be developed so as to avoid expensive mistakes when working out policy.

PER ELVINGSON

[1] **Ancillary Benefits and Costs of Greenhouse Gas Mitigation**. Proceedings of an IPCC Co-Sponsored Workshop, held on March 27-29, 2000, in Washington D.C. Published by OECD, 2, rue André-Pacal, 75775 Paris Cedex 16, France. All papers in the volume are available on the OECD's website: www.oecd.org/env/cc/ancillary_benefits.htm.

Some evidence of recovery

Despite improvements, it will take a long time before the damage is anywhere near repair

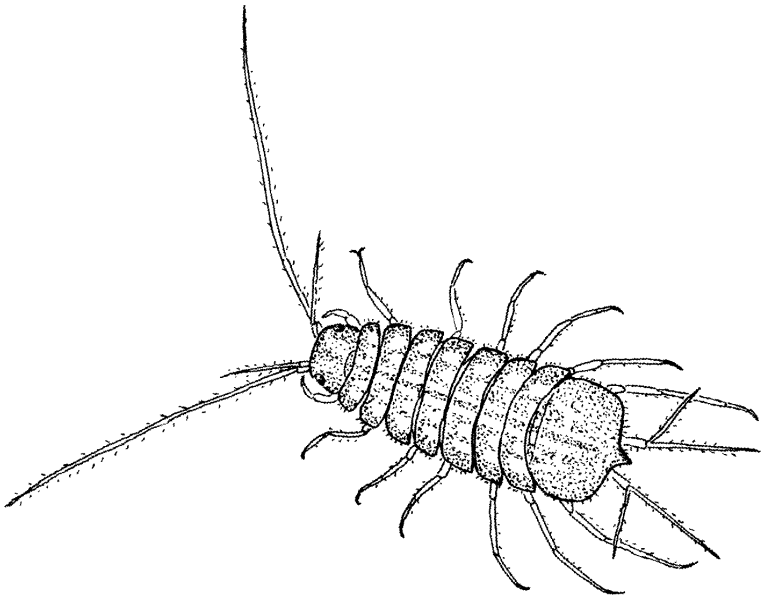
A FEW YEARS AGO some scientists netted a water hoglouse (*Asellus aquaticus*) when taking samples in Hästevatten lake in southwest Sweden. This is a species that is rather sensitive to acidification, and it had been several decades since it was seen in that lake.

Although it failed to give rise to any newspaper headlines, the discovery was a slight but clear sign that acidification was now slowly receding from European ecosystems. Emissions of sulphur, the chief acidifying substance, have lessened by more than 50 per cent in Europe generally since the beginning of the eighties. Between 1985 and 1997 the fallout over Sweden had become halved, and here and there in central Europe it is now upwards of 90 per cent less. And the changes are now becoming evident in the environment.

Recovery is most seen in chemical samples. During the last decade there has been a small but significant increase in the pH value of the water in Swedish lakes. Another noticeable improvement is the reduced leakage of sulphates and harmful aluminium compounds from soil to water.

But there is as yet no clear sign of a general return of sensitive plant and animal life to freshwaters, although that may be due to there being so few sampling series. Species' return will in any case not only depend on water chemistry. There must also be healthy populations in adjoining waters, with a possibility of migrating. There have nevertheless come reports from Norway and Germany, as well as Sweden, of the reappearance of some species of invertebrates.

In soil the process of recovery could be very long, even up to hundreds of years. More neutralizing substances than the acid fallout consumes will first have to be released by the weathering of the soil. Then the soil's store of exchangeable base cations, emptied by acidification, will have to be replenished. Only after that has taken place will the lakes receive any appreciable amount of buffering substances from the surrounding land.



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Water hoglouse (*Asellus aquaticus*) is one of the many species that can reappear when emissions decline.

In Sweden that first condition has still not been fulfilled in many parts of the southern provinces, on account of the acid fallout still exceeding the critical level. A comparison of two extensive surveys, in 1984-87 and 1993-96, showed the pH value of forest soil to have dropped by 0.1 pH units during that interval. The proportion of forested land with a pH value under 5.0 in the mineral soil had increased at the same time from 71 to 75 per cent.

Nature will not be able to fully recover on its own

Scientists have been trying with the aid of computer models to determine the changes that can now be expected in the chemistry of soils and waters. If emissions are reduced as proposed, it is calculated that the fallouts of sulphur and nitrate-nitrogen over Sweden by 2010 will be 65-75 and 50-60 per cent less, respectively, than in 1990, while those of ammonium-nitrogen will have fallen by 15 per cent.

The chemical symptoms of acidification in the soil are likely to decline fastest where the process of acidification has gone least far. The problems of soil acidification will probably be relatively limited in central and northern Sweden after twenty years. It will on the other hand take longer before the water chemistry has become restored to normal and sensitive plant and animal species have been able to re-establish themselves.

In southern Sweden the richer soils will eventually recover, but in poorer ones acidification seems to have gone so far that the damage would appear to be irreversible. Nature will not be able to fully recover on its own. Computer modelling indicates some degree of improvement in step with reduced acid fallout, but the curve will then level off and the soil remain acidified for the next 50-100 years if the fallout is not still further reduced.

PER ELVINGSON

For more see: **Recovery from Acidification in the Natural Environment**. Per Warfwinge & Ulla Bertills (Eds.). Report 5034. Published by the Swedish Environment Protection Agency, 106 48 Stockholm, Sweden. E-mail: kundtjanst@environ.se. Internet: www.miljobokhandeln.com.

Pollution intensity high despite improvements

Increased prosperity has led to a mounting use of energy

THE ENVIRONMENT is on the whole in good shape in Greece. There have even been improvements in places where it was not, such as Athens. The "pollution intensity" is nevertheless high. In the case of some air pollutants the emissions per GDP unit are amongst the highest in Europe.

The reason for the late increase in emissions is a mounting use of energy, mainly from fossil fuels. Between 1990 and 1996, use per unit of GDP increased by 11 per cent, so that it now lies close to the average level of that in the OECD's European countries. This development can be explained by the increase in the country's prosperity, which in turn has brought an increased demand for air conditioning, transportation, etc. More energy is being consumed, too, in the tourist industry.

Up to 1995 the emissions of sulphur dioxide had been on the rise, but they have since fallen away somewhat. In 1997 they were however twice the OECD Europe average per GDP, as well as being high in terms per capita. About 70 per cent of these emissions come from power plants, largely fired with local lignite of poor quality. Of late, however, the use of lignite has levelled off, to the accompaniment of an increased use of natural gas. Moreover some units of the country's largest power station, Megalopolis, have recently been equipped for flue-gas desulphurization, and two of the refineries have expanded their capacity for desulphurizing oil.

Emissions of nitrogen oxides have risen by 8 per cent since 1990, with transportation answering for about half of the total emissions. Per unit of GDP they were 42 per cent higher in 1997 than the OECD Europe average, but slightly lower when reckoned per capita. Although car travel had almost doubled in terms of passenger kilometres between 1980 and 1996, vehicle kilometres per inhabitant still remained lower than the average for European OECD countries.

Emissions of volatile organic compounds have also increased since 1990, in this case by 18 per cent, a notable share of which (59 per cent) was from transportation, with two-stroke engines making an exceptionally large contribution.

Air quality in cities has nevertheless improved. Although the pollution in Athens is high for a European city, it is within the present EU limit values. The reasons for this general improvement are various, ranging from cleaner vehicles and fuels to an expansion of mass transportation.

Internationally Greece has put its name to several of the protocols under the Convention on Long-Range Transboundary Air Pollution. But instead of the stabilizing of its NOx emissions to which it had committed itself by signing the 1988 protocol, it managed to do no better than confine them to an increase of 8 per cent between 1987 and 1994.

For combating air pollution the OECD recommends that Greece should carry out a program for conserving energy and improving energy efficiency, continue to promote the use of natural gas and cleaner vehicles, and improve the enforcement of regulations applying to air quality through a strengthening of field inspectorates and better monitoring.

It also recommends that Greece should itself take over the financing of environment management. Hitherto much of the money for this has come from EU funds. To that end it should employ the polluter-pays and user-pays principles as well as economic instruments to internalize the environmental costs. It proposes moreover a system of regular environmental reporting and greater cooperation with non-governmental organizations as a means of increasing public awareness of environmental matters.

PER ELVINGSON

Environmental Performance Reviews: Greece. OECD 2000. 204 pp. 200 francs. OECD Publications, 2, rue André-Pascal, 75775 Paris Cedex 16, France. Internet: www.oecd.org.

New on www.acidrain.org

During the winter we have expanded and updated our website. Here are some of the changes:

❏ The background articles on acidification and the greenhouse effect have been brought up to date and provided with more links to further information.

❏ The register of articles in Acid News will be updated with each issue.

❏ There is a new section called Baltic-Nordic Region, with information and background material on the cooperation that is taking place between environmentalist groups in the region on matters of energy and transportation.

❏ Acid News in pdf format is now available in two versions: one without photos and drawings which is intended for those with slow connection to the internet and who like a smaller file size (in this case the newsletter have the size 200-250 kB, with all illustrations approximately 900 kB).

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A sure win?

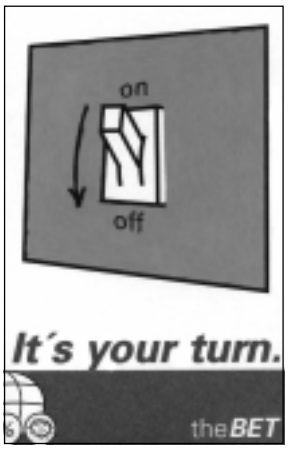
Young people in Europe are out to beat the politicians

EVER HEARD OF THE BET? Although it is we who say so, it is probably one of the most exciting environmentalist youth campaigns of recent years, in which youth activists, school kids, and students from all over Europe are betting against their governments that they will be able to cut the emissions of CO_2 at their schools by 8 per cent during the next eight months, although it appears that the EU will not even manage to attain its Kyoto target of 8 per cent in eight years.

Although the BET campaign had not even started a year ago, it has already got going in sixteen countries of Europe – north and south, east and west. This all-European campaign was fired by the success of Die Wette, the German version of 1999 in which kids from some 100 of the country's schools managed to save 10 per cent of their CO_2 emissions in seven months.

Why this success so far? Surely it is because we try to make clear to young people that their "small" savings of CO_2 can make a big difference to the total. We also show that it can easily be done – by insulation, using energy-saving bulbs, turning off lights in time, changing modes of transportation, and taking no more canned drinks. Although such measures should seem obvious, they have evidently not yet entered general awareness. We are encouraging school kids to organize teams to compete with each other, and be generally inventive, so as to make the whole thing fun.

After the campaign had got started in almost all sixteen BET countries in September and October last year, the great moment came on November 22 during the international climate talks (COP6) at The Hague, when EU Environment Commissioner Margot Wallström took us on. At a press conference, Mme Wallström and Mme Voynet (the French Environment Minister who was attending on behalf of the European Environment Council) signed "betting" contracts with us, under the eyes of about seventy journalists.



We are pretty sure we shall win our BET. But if we don't, we undertake to transport Mme Wallström by rickshaw to all her meetings in Brussels every day for a week. She on her part undertakes to cycle to work for a month if we win. She will also be visiting one of our meetings. The final decision as to who wins will be taken on July 22 by the European Environment Agency, in this case the referee.

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Note. The 16 participating countries are Bulgaria, Denmark, Estonia, France, Germany, Italy, Lithuania, Luxembourg, Macedonia, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the Netherlands.

Altered rules

The Californian rules for the least number of zero-emission vehicles in car makers' totals have once again been altered. In January the states Air Resources Board decided that the proportion of such vehicles produced by the largest car makers need no longer be 10 per cent by 2003 but only 2. Another 2 per cent can be hybrids (with both batteries and conventional engines). The remainder must be vehicles emitting only very small amounts of pollutants. Also new is that from 2007 the rules will cover sport utility vehicles as well.

Further information: www.arb.ca.gov

Coming events

NOX 2001. Paris, France. March 21-22, 2001. International conference on atmospheric pollution, NOx and N_2O emission control. *Information*: ADEME, Evelyne Perréon, Tel.+33(0) 2 41 20 42 30, e-mail: evelyne.perreon@ademe.fr. Internet: www.ademe.fr/anglais/events/vanoxconf.htm

EU Environment Council. June 7-8, 2001.

Second International Symposium on Air Quality Management at Urban, Regional and Global Scales. Istanbul, Turkey, September 25-28, 2001. *Information*: Prof. S. Incecik, Istanbul Technical University, Department of Meteorology, Faculty of Aeronautics and Astronautics, Maslak-Istanbul, 80626 Turkey. E-mail: aqm2001@itu.edu.tr Internet: http://atlas.cc.itu.edu.tr/~aqm2001

Nitrogen. 2nd Conference. Potomac, Maryland, USA, October 14-18, 2001. *Information*: Rhonda Kranz, The Ecological Society of America, 1707 H Street, NW, Suite 400, Washington, DC 20006, USA. E-mail: nitrogen@esa.org. Internet: http://esa.sdsc.edu/n2001.

COP7 – Seventh Conference of the Parties to the UN Framework Convention on Climate Change. Marrakesh, Morocco, October 29-November 9, 2001. *Information*: www.fccc.de.

Second International Conference on Plants and Environmental Pollution. Lucknow, India, November 15-19, 2001. Organized by International Society of Environmental Botanists and National Botanical Research Institute, Lucknow, India. *Information*: K.J. Ahmad, e-mail: nbri@lw1.dot.net.in. Internet: www.icpep.org

Clean urban transport

The EU Commission has launched a new initiative to promote cleaner transport in cities, called Civitas (CIty VITAlity Sustainability). It aims to encourage alternatives to the use of cars in urban centres in order to combat congestion and pollution. Cities seeking a share of the euro 50 million budget must submit a package of measures.

Further information: http://europa.eu.int/comm/energy_transport/en/cut_en/cut_civitas_en.html