

Acid News



CLIMATE NEGOTIATIONS

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The quest for equity

WHEN NEGOTIATIONS on climate get going as to what is to follow after the commitments of the Kyoto protocol have been fulfilled, the term "equity" will undoubtedly surface – how the burden of bringing down the emissions of greenhouse gases is to be distributed fairly among the nations.

There is still no certainty that the protocol will have come into force when the parties to the climate convention start their next meeting (COP8) in New Delhi on October 23. But however that may be, it can safely be assumed that they will have to begin considering what is to happen after 2012, when each country is supposed to have fulfilled its commitments under the protocol.

One possibility is that starting out from the protocol they will continue

to squabble about objectives for emissions, entering on a political tug-of-war with no clear principles for the setting of national emission ceilings. But a much stronger demand is now likely to be raised for definite commitments on the part of the developing countries - for which the US, Australia, and other countries in the so-called umbrella group had been pressing during the Kyoto talks.

It is evident from a simple calculation that no matter which paths negotiations may take, a worldwide climate catastrophe cannot be avoided solely by clamping down on emissions from the industrialized countries, despite their being responsible for by far the greater part of the total. The trouble is that the developing countries are currently

increasing their emissions of greenhouse gases at a rate of 4.6 per cent a year, and if the trend continues they will have overtaken the industrialized nations within a relatively short time. It will only be a matter of decades; globally, the emissions of carbon dioxide will go on increasing even if the industrialized countries should manage to achieve far greater reductions than are required of them under the Kyoto protocol.

Nevertheless it is most unlikely that the developing countries in the G77 group will be ready to enter negotiations for the setting of definite ceilings unless there is some basic agreement as to the principles by which the distribution of reductions is to be arranged. They argue, for instance, that it is the historical

Continued on page 4

Acid News

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

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

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

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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

Get on with it!

THIS SUMMER THE EU Commission is to present a Community Strategy on Air Pollution from Seagoing Ships. And there is much to be said for such a strategy. Emissions from sources on land have gone down, and are likely to continue to do so, while those from shipping are showing a steady rise. Shipping will thus be contributing ever more to the damage to health and the environment from air pollution. In order to achieve agreed EU aims for environmental quality, measures leading to a marked decrease in the emissions from shipping will be a clear necessity. And, as has been shown in several studies, they would moreover be cost effective.

For many years shipping has been regarded as a sort of free zone, exempt from modern environmental restraints – the excuse usually being that shipping is an international business, needing global agreement if it is to be subject to rules in regard to the environment.

Discussion of the problem was however started towards the end of the eighties within the International Maritime Organization, a UN body, and agreement was finally reached in 1997 on an air pollution annex to its MARPOL Convention. As might have been expected, this turned out to be a very feeble document. Yet despite its timid requirements, it has still only been ratified by five countries, and only by Sweden in the EU. It is therefore highly uncertain when, if ever, it will come into force.

The Commission has recently held two consultation meetings with the member and candidate countries, as well as representatives of some of the affected business interests and environmentalist organizations, in order to try and find a basis for an EU strategy in regard to air pollution from shipping. (See article on p. 3.) It has been interesting to observe the reactions of the actors in the process to the fact that the Commission has at last decided to take the matter up.

Almost all the member countries

had said they were in favour of MARPOL Annex VI and considered that the EU should avoid asking for any stricter requirements than those already contained in it – despite the fact that many of them were agreed that its requirements for NOx could and should be tightened up. That is of course an evasive and hypocritical attitude, seeing that the members have in any case not ratified the annex even after four years. Representatives of the shipping and oil industries expressed scepticism in almost all respects to any new EU initiative in the matter, and often absolute rejection.

It is surprising, to say the least, that neither the member countries nor the shipping industry seem to have realized that up-to-date environmental standards will be essential for the industry's future competitiveness and development. Ships have many environmental advantages over other modes of transportation. Their fuel consumption is lower, they have no problems with such things as noise and congestion, and have much less need for investment in infrastructure than either road or rail transportation. But ships can make no claim to environmental respectability so long as they go on polluting the air with their great emissions of sulphur and nitrogen oxides.

It must be quite evident, after ten years, that efforts to get to grips with the emissions from shipping on a global basis will yield little in the way of results. To get emissions down within a reasonable time, as well as to put pressure on the global negotiating machinery, moves will have to be made both at the national and EU level. The first step must be to get legally binding EU rules to set minimum emission standards. And to bring about sufficiently large reductions more quickly, economic instruments, such as environmentally differentiated charges, will be needed to supplement those rules.

CHRISTER ÅGREN

Sulphur restrictions underway

AT A CONSULTATION meeting in Brussels on April 15, the EU Commission made known its intention of proposing a limit to the sulphur content of marine fuel (bunker oils). The proposal, which would amount to a modification of the 1999/32 directive on the sulphur content of liquid fuels, is to be considered as part of its Community strategy on air pollution from seagoing ships that was announced in January¹, and is expected to be presented during the summer.

The aims of the measures that the Commission outlined in April are:

1. To reduce the overall emissions in the so-called SECAs (SOx Emission Control Areas - the North and Baltic Seas) as well as in all EU port areas.

2. To establish a regulatory regime with which all seagoing ships will be able to comply by using only two different fuels.

3. To ensure that fuels complying with EU standards will be available in all EU ports.

Among the means for achieving these aims are the following, all of which are to be written into directive 1999/32:

- Member states bordering on the SECAs of the North and Baltic Seas must ensure that only marine fuels with a sulphur content of less than 1.5 per cent are used in their territorial waters, and possibly also, if applicable, in their exclusive economic zones. This shall apply to all vessels of all flags, either from the date of the MARPOL Annex VI coming into force or from January 1, 2005, whichever is the earlier.

- Only fuels with less than 0.2 per cent sulphur may be used in inland waterways and EU port areas. (It is suggested that the latter should be defined as extending from the "outer limit of territorial sea to the quay-side.")

- By 2005 member states must ensure that all marine gas oil sold in their territories shall have less than 0.2 per cent sulphur. (A change in the definition of gas oils is suggested, so as to exclude the so-called DMB and DMC grades.)

At the time of making these preliminary proposals the Commission had no clear information as to what they might lead to in the way of reduced emissions. But more information will be forthcoming anytime now as a result of two fresh studies by outside consultants.

CHRISTER ÅGREN

¹ Article 12 of directive 2001/81, on national emission ceilings for certain air pollutants, obliges the Commission to specify a program of actions aimed at reducing the emissions from international maritime traffic before the end of 2002. A discussion paper issued by the Commission, together with responses from member countries and stakeholders, can be found on the Commission's website: http://www.europa.eu.int/comm/environment/air/future_transport.htm

On the following pages

Portugal 7

Has still not ratified any of the protocols on long-range transboundary air pollution, and emissions continue to increase.

Acidification 8

The effect that lowering of the emissions of air pollutants is having in Europe is confirmed in an extensive report on the situation in the UK.



Factsheet on EU laws 11

Environmental factsheet No 10, included in this issue, gives an overview of the EU legislation on acidification and air pollution, including a list of all relevant directives.

China 15

The world's second largest emitter of carbon dioxide, China, shows no signs of taking the matter of climate seriously.

USA 18

The president's plan for curbing emissions of greenhouse gases and other air pollutants has met with scathing criticism from environmentalists.

Motor vehicles 22

Meeting last summer in Bellagio, Italy, to define principles for a single policy for motor vehicles, some leading experts ended by issuing a series of recommendations for policy makers.

Increasing emissions

While emissions of air pollutants have declined over the last decade, those from shipping are still on the increase. In 1990 the annual amounts from ships in the seas surrounding Europe were estimated to have been nearly 3 million tons of sulphur dioxide (SO₂) and 4 million tons of nitrogen oxides (NO_x). After the fifteen member countries of the EU have fulfilled their commitments in accordance with the directive on national ceilings for emissions, and assuming that emissions from shipping remain at their 1990 level, by 2010 the latter will be equivalent to three-quarters of the EU total for sulphur and nearly two-thirds of that for nitrogen oxides. See <http://www.acidrain.org/policy.htm/shipping> for further information.

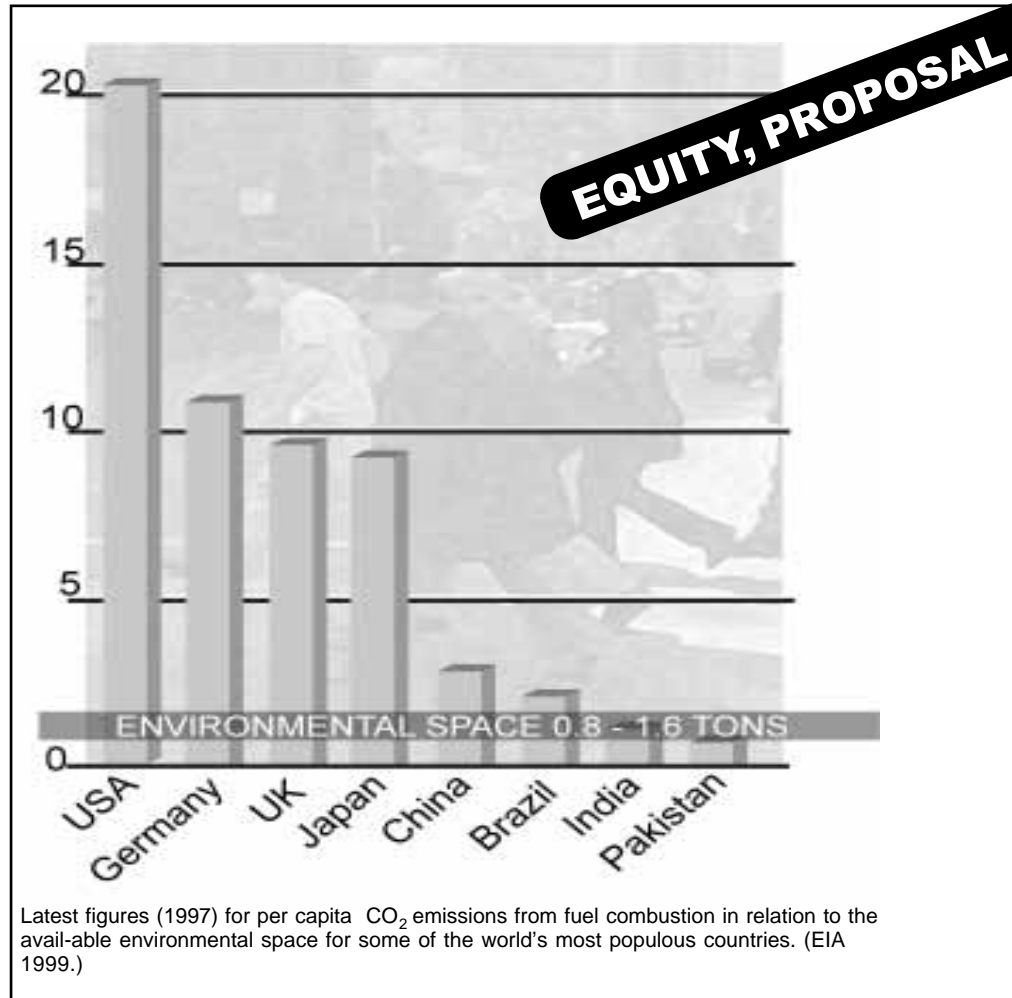
The quest for equity

Continued from front page

emissions of the industrialized countries that make them so largely responsible for the present situation, and that the present per-capita emissions of those countries are usually far, far greater than in most of the developing countries. Ceilings that would prevent or delay attainment of living standards comparable to those of the industrialized countries would, they maintain, be inequitable.

As Anil Agarwal and Sunita Narain ask in *Global warming in an unequal world*, "Can we really equate the carbon dioxide contributions of gas-guzzling automobiles in Europe and North America or, for that matter, anywhere in the Third World, with the methane emissions of draught cattle and rice fields of subsistence farmers in West Bengal or Thailand? Do these people not have a right to live?"

References to equity will be inevitable during the negotiations. The idea is in any case not new. It had already turned up in the climate convention itself, where Article 3.1 reads: "The Parties should protect the climate system for the benefit of present and future generations of



Latest figures (1997) for per capita CO₂ emissions from fuel combustion in relation to the available environmental space for some of the world's most populous countries. (EIA 1999.)

humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities." It appears, too, in the Kyoto protocol.

What it can actually mean has already been much discussed. Is it to be interpreted as equity in the course of time – meaning equitable burden sharing between generations

Defining a global carbon budget

To arrive at a global budget for emissions of carbon, one has to start with an estimate of climate sensitivity – how much it will be affected by a specific rise in the concentrations of greenhouse gases in the atmosphere. According to the

Climate sensitivity	CO ₂ concentration for:	
	1° rise	2° rise
2.5 °C	348	436
3.5 °C	327	384
4.5 °C	315	357

Table 1. Permissible concentrations of CO₂ in the atmosphere (ppmv) at various estimates of climate sensitivity (Hare 1997). The present concentration is around 350 ppmv, while the pre-industrial levels were around 280 ppmv.

Intergovernmental Panel on Climate Change (IPCC), a doubling of CO₂ concentrations would bring a rise in temperature of 1.5-4.5°C. From this basis it is possible to calculate the concentrations of CO₂ in the atmosphere corresponding to various assumed rises in world temperature and degrees of climate sensitivity. See Table 1.

A global emission budget – the permissible future volume of greenhouse-gas emissions – can be calculated, as the IPCC has done in Table 2, for each given concentration of those gases in the atmosphere.

That is as far as one can get with science and mathematics. The next step will be to decide how the "space" demarcated by a CO₂ bud-

get is to be distributed either over a period of time or among the nations – which is where politics come in.

CO ₂ conc. (ppmv)	Accumulated CO ₂ emissions (GTC)
350	300-430
450	630-650
550	870-890

Table 2. Concentration targets and corresponding emission budgets (GCI 1998). The accumulated CO₂ emissions represent the total remaining space for anthropogenic emissions (gigatons of carbon). The annual figure is now around 7 gigatons.

Fair shares

FIRST COINED BY Friends of the Earth, the term "environmental space" implies the amount of natural resources that each individual can consume without causing permanent damage to the environment. In the case of climate it means the amount of greenhouse gases that can be let out without giving rise to more damage than they have caused already.

On the basis of the IPCC's call for a reduction of 60-80 per cent in global emissions, and present world population, it could roughly be put at 0.8-1.6 tons of CO₂ per capita per annum. As world population continues to grow, that figure will of course gradually have to be lowered, and if effects such as those arising from deforestation are also taken into account, shrunk still further. The environmental space for carbon dioxide concentrations in the atmosphere, given certain

aims, has been calculated at the Centre for Science and Environment in India (CSE), see table 3.

Allowing everybody the same per-capita emissions is a clear and simple way of applying the principle of equity – especially as the climate is a global resource that belongs to all and all are dependent on it. It sweeps automatically away the divide between countries that have limits set to their emissions and those that do not. It can moreover easily be combined with a system for trading in emission permits.

The CSE has adumbrated various schemes for bringing the concept of environmental space into the cli-

mate negotiations. One would be to ignore calculations concerning any possible environmental space and set instead a global per-capita quota which could gradually be reduced until it had reached an acceptable level in regard to sustainability. The Indian institute calls this "moving entitlements" – the idea being that it is more important to move ahead in the right direction than to specify the final figure. But no matter which way is chosen, and what the objective, it will obviously take considerable time before the same per-capita figure has been attained in every country.

Conc. target (CO ₂ ppm v)	Emission budget 1991 -2100 (MTC)	Average annual budget (MTC)	Per capita entitlement (TC)
350	300-430	2,73-2,91	0,46-0,65
450	630-650	5,73-5,91	0,96-0,99
550	870-890	7,91-8,09	1,32-1,35
650	1030-1190	10,27-10,82	1,71-1,80
750	1200-1300	10,91-11,82	1,82-1,97

Table 3. Emission budgets and per capita entitlements for different atmospheric targets. Data from IPCC. The per capita entitlements assume a fixed world population of six billion. MTC = million tons of carbon. (From Agarwal, Narain & Shama 1999).

– or equity among individuals, with every person on earth assuming his share? Not even the most obvious interpretation – equity between nations (which would also be the most practical for negotiations) – can easily be translated into operational terms.

Most of the proposed models for equity assume a global emission budget, setting a total allowance for man-made emissions of greenhouse gases to the atmosphere, with inputs according to the principles on which that total is to be divided both over time and between nations. Two of the three models presented here follow that line, while a third, the Brazilian, proceeds from simpler assumptions.

ROGER OLSSON

For this article the writer has drawn largely on the report by Harri Lammi and Oras Tynkynen, entitled "The Whole Climate," published by Friends of the Earth Finland, 2001.

EQUITY, PROPOSAL #2:

The Brazilian model

THE BRAZILIAN MODEL for the attainment of equity in dealing with the climate problem was first presented just prior to the Kyoto meeting in 1997. It was followed by a more developed version in 1999, proposing that the industrialized countries should reduce their emissions of the chief greenhouse gases – carbon dioxide, methane, and nitrous oxide – by 30 per cent by 2020, from 1990, as a group. The burden was to be distributed according to the countries cumulative contributions to the rise in global temperature, starting as far back as 1840 but also taking into account any carbon sinks. Each country's climate debt would be its total emissions of carbon dioxide

minus the amounts fixed in man-made sinks.

The countries that had been the first to industrialize would thus have accumulated large climate debts and so brought upon themselves claims for a big reduction of their emissions. The UK would, for example, have to have brought down its emissions of carbon dioxide by 63 per cent by 2020, but Italy only by 10 per cent.

The Brazilian model makes use of the division of the world's countries into the Annex 1 and non-Annex 1 ones of the climate convention, where only the Annex 1 (industrialized) countries are subject to binding commitments to cut down emissions. Various criteria and methods have been discussed as to the way further countries might be brought into the Annex 1 group, possibly by setting a threshold in the form of per capita income. But calculations made by the Dutch National Institute of Public Health and Environment show that it would have to be put

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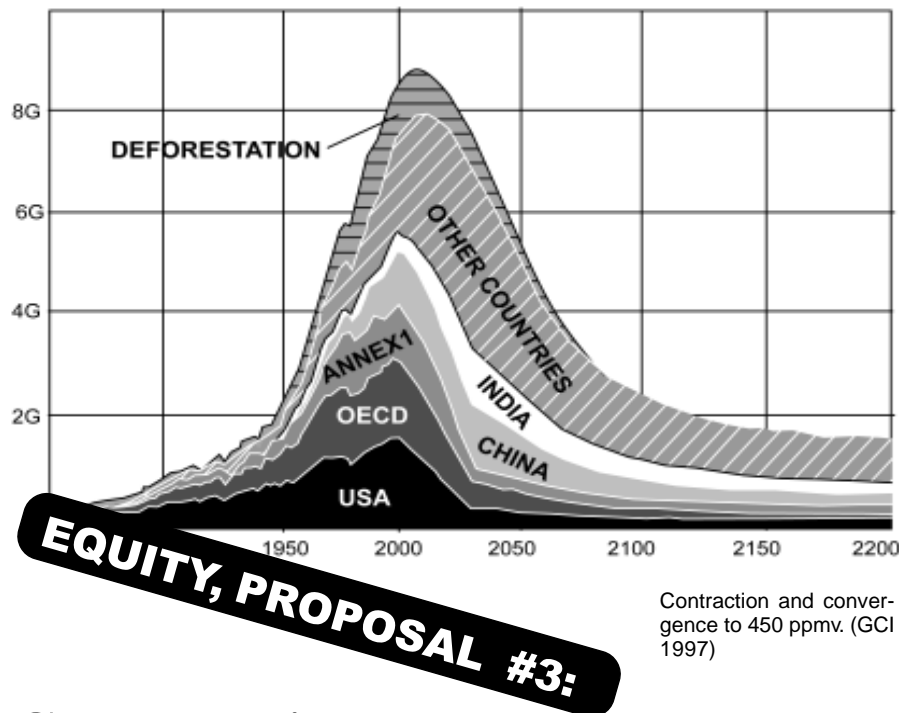
very low. Even if the developing countries were pulled in when their per-capita income was 10 per cent of that of the Annex 1 countries, the latter would still have to go on reducing their emissions at a rate of 10 per cent per annum.

The Brazilian proposal is appealing on account of its basic idea: the greater a country's guilt for the present situation, the greater its responsibility for clearing it up. But it has been criticized for taking too little consideration of the great differences in emissions. Is it reasonable, for instance that the UK, with a per capita figure of 10 tons of CO₂ per annum, should have to reduce by 60 per cent, while the US, with double that amount, should get away with little more than 20 per cent?

The data used to arrive at the historical climate debt has also been questioned, consisting as it often does of very rough extrapolations. There are for instance some studies indicating that Britain's emissions in the nineteenth century were not even half of the figure assumed by the Brazilians.

Country	Reduction %
United Kingdom	63.3
Luxembourg	41.7
Belgium	37.4
Germany	27.4
Sweden	25.0
France	24.4
USA	22.3
Hungary	20.3
Netherlands	18.8
Denmark	17.8
Austria	17.6
Poland	16.7
Canada	16.1
Ireland	14.0
Russia	11.5
Australia	11.3
Finland	10.7
Italy	10.5
Spain	10.5
Japan	9.5
Portugal	8.4
Greece	7.5

Table 4. Emission reduction targets for the fifteen EU countries and a selection of others in the Brazilian proposal.



Contraction, convergence

THIS IS AN APPLICATION of the environmental space approach that has been developed by the Global Commons Institute (GCI) in England. Assuming that the end aim will be to allow the concentrations of carbon dioxide in the atmosphere to rise to 450 ppmv at the most, a global CO₂ budget would yield a space for anthropogenic emissions equal to 630-650 gigatonnes of coal. But with deforestation taken into account, it would be no more than 295-315 gigatonnes.

In order to keep within that budget, emissions would have to be gradually reduced to the point where output and capture of carbon dioxide balance each other. That is the contraction part of the model. The GCI proposes stepwise reductions up to the target year. While they should not be set unrealistically high for the initial stages, if the reductions then turn out to have been too slow it will be necessary to bring about "negative" emissions (less than is being taken up by sinks) towards the end of the period. A reduction of altogether 60 per cent will be needed if the budget is to be met.

According to the GCI model, by 2045 every country should be emitting the same amount per capita. Here we have convergence. It means that the industrialized countries, with their present high per-capita

emissions, will have to make hefty reductions, while the developing ones will be able to go on increasing their emissions. Although the assumption is that convergence will take place exponentially, the model also allows for linear convergence. Reductions will have to continue even after all countries have got down to the same per-capita level, but then at the same rate for all.

The GCI argues that there can be no solution to the climate crisis without these two key elements: contraction and convergence. If a catastrophic change in climate is to be avoided, the developing countries will also have to accept reduction targets - which means that there must be a model for burden sharing that is not inherently inequitable.

It may of course be a question whether a solution requiring the industrialized countries to reduce their emissions of greenhouse gases by up to 80 per cent, together with calls for commitments on the part of the developing countries to reduce theirs within a relatively short time, will have any chance of being politically acceptable. But the answer may already have been given. The contraction-and-convergence model has surfaced several times at international meetings and found support in many quarters, including India, China, and the European parliament. But so far the backing has been insufficient for it to be taken up seriously in the climate negotiations.

Environmental performance disappointing

Has still not ratified any of the protocols on long-range air pollution.

UNLIKE MOST OF the countries of western Europe, by the end of the 90's Portugal had still not decoupled its emissions of pollutants from economic growth. As appears from a fresh environmental performance review published by the OECD at the end of last year, whereas European emissions of sulphur dioxide and nitrogen oxides were decreasing during that decade, Portugal's were increasing. The OECD reviews cover a wide range of issues, but here only air pollution will be considered.

Between 1990 and 1998 Portuguese emissions of SO₂, NO_x, and VOCs increased by 4, 17, and 27 per cent. A common indicator for expressing environmental efficiency is emission intensity, which is usually calculated as the ratio between emissions and economic output - expressed for instance as kilograms per thousand dollars of GDP, gross domestic product. High values indicate bad performance. By the end of the 90's Portugal's emissions intensities for SO₂ and NO_x were 40 - 50 per cent higher than the OECD average for Europe.

Although emissions have been increasing, monitoring has revealed some progress in lowering ambient levels of SO₂ and NO₂ in major cities such as Lisbon and Porto. The concentrations of these pollutants have however continued to increase in some industrialized areas, and according to the OECD the downward trend for NO₂ was likely to have ceased or even become reversed in major cities in 2000.

Elevated concentrations of ground-level ozone are common in Portugal, often exceeding EU information values for the protection of health. The frequency and severity of ozone episodes suggest - in the OECD analysis - a need to limit the precursors, NO_x and VOCs.

Studies relating ambient air-quality levels to health damage are lacking in Portugal. But if the current trend with rising concentrations continues - particularly of ground-level ozone and fine particles - such studies will, in the view of the OECD, be essential for evaluating the exposure risks and the measures that will be necessary for protecting the population.

Portugal is one of the parties to the 1979 Convention on Long-Range Transboundary Air Pollution (CLTRAP) to which seven binding protocols for reducing emissions have been added since its coming into force in 1983, and although Portugal has signed four of these, it stands out as the only EU member country that has (so far) not ratified any of them.

Portugal has signed the 1999

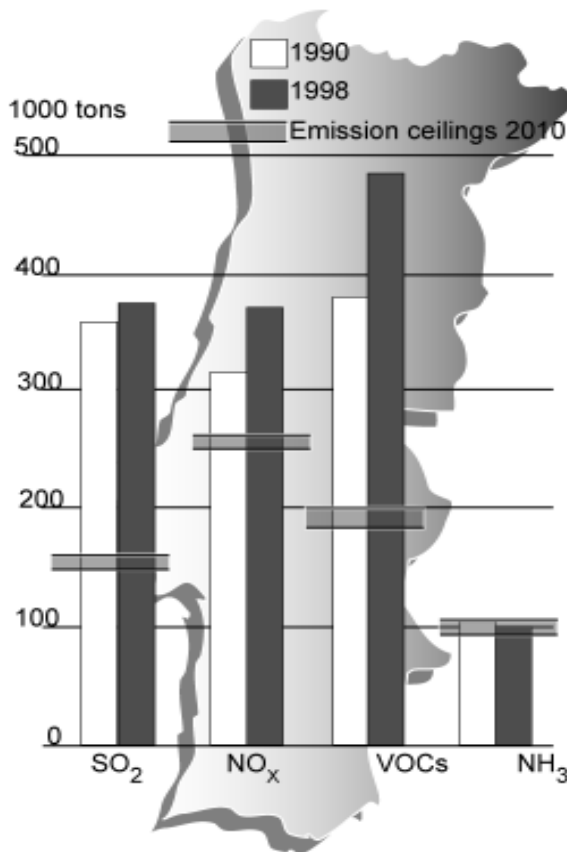
Gothenburg protocol, and in order to meet its commitments under that protocol it will need to reduce its emissions of SO₂, NO_x, and VOCs by 57, 32, and 63 per cent, respectively, by 2010 from their 1998 levels. And to achieve the reductions required in the recently adopted. EUDirective on national ceilings (the NEC directive) it will have to cut down emissions still further.

It can hardly be a matter of surprise that one of the recommendations in the OECD report is that Portugal should take further measures to reduce emissions of SO₂, NO_x and VOCs. These should include the development of energy-efficiency programs, improvements in fuel quality, a further development of public transport, and a strengthening of the guidance function of environ-

mentally related taxes affecting transportation. Moreover, air-quality monitoring should be expanded, and programs for the management of air quality in major cities should be set up or improved.

CHRISTER ÅGREN

¹ **Environmental performance reviews: Portugal (2001).** Published by and available from the Organisation for Economic Co-operation and Development (OECD), 2, rue André-Pascal, 75775 Paris Cedex 16, France.



Portugal's emissions, actual and required, of SO₂, NO_x, VOCs and NH₃, 1990 and 1998 (kilotons). Emission ceilings 2010 according to the Gothenburg protocol and the EU NEC directive.

Stricter limits for motorcycles

On March 19, conciliation talks between the European Parliament and the Council resulted in agreement on an amendment to directive 97/24/EC on the reduction of polluting emissions from two- and three-wheeled motor vehicles. New emission standards will be introduced in two steps, in 2003 and in 2006. Emissions of volatile organic compounds (VOCs) and carbon monoxide (CO) from new motorcycles are expected to drop by about two thirds. The text to the new directive has to be approved by the Parliament and Council at a third reading. The compromise text is available at the Parliament's website under "Joint texts approved by the conciliation committee": http://www.europarl.eu.int/plenary/default_en.htm

...and for other engines as well

The Council adopted a common position on April 22 regarding a proposal to set standards for emission and noise from pleasure-craft engines, to amend directive 94/25/EC. A common position has also been adopted on the amendment of directive 97/68/EC, dealing with emissions of gaseous and particulate pollutants from internal combustion engines installed in non-road mobile machinery. The European Parliament now has to give the proposals, which were presented in AN 1/01 (pages 10-12), a second reading under the co-decision procedure.

Infringement actions threatened

The European Commission has sent warnings of possible court action over alleged failures to comply properly with EU law. So-called reasoned opinions were sent in April to Germany, Greece, Ireland, Italy, Portugal, Spain, and the UK for failing to pass into national law limits on certain air pollutants contained in the first daughter directive on air quality (99/30/EC), as they should have done by July 19, 2001. Warning letters were sent to Germany, Greece, Ireland, Spain, and the UK for failing to notify the Commission concerning national regulations to give effect to the 1996 framework directive on air quality by July 19, 2001.

Signs of recovery now starting

Ecosystems damaged by acid rain are beginning to recover in the UK, but remaining problems make it necessary to continue cutting emissions.

THERE IS STARTING TO be clear evidence that the reduction of the emissions of air pollutants in Europe is having an effect. A report for the UK, made by the National Expert Group on Transboundary Air Pollution¹, shows for instance that ecosystems damaged by acid rain are now beginning to recover. Considerable remaining problems – concerning ground-level ozone and terrestrial eutrophication in particular – will however require further cut-downs of emissions for their solution.

The Group's 300 page report is a solid and exhaustive compendium of present-day knowledge in regard to acidifying, ozone-forming, and eutrophying air pollutants. Emissions, concentrations, depositions, and environmental effects are all treated in detail, as are computer modelling

and the mapping of areas with critical loads.

It sets off by confirming that emissions of sulphur dioxide (SO₂), both in Britain and Europe as a whole, have fallen away markedly in recent decades. Since 1990 those of nitrogen oxides (NO_x), volatile organic compound (VOCs), and ammonia (NH₃) are also reported as having gone down (there is a separate account of UK emissions on p. 10) and as being expected to continue to do so during the next ten years in consequence of international agreements and the directive on national ceilings for emissions.

Depositions of sulphur have become more than halved since 1986 as a result of emissions having been reduced, with a similar decrease in rainfall acidity. Whereas there was a very large decline in depositions

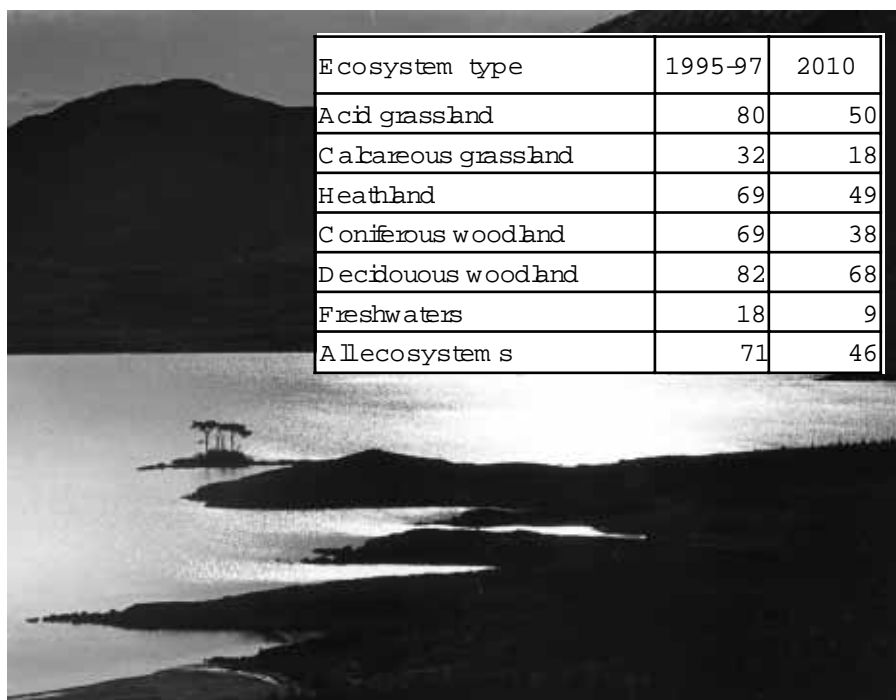
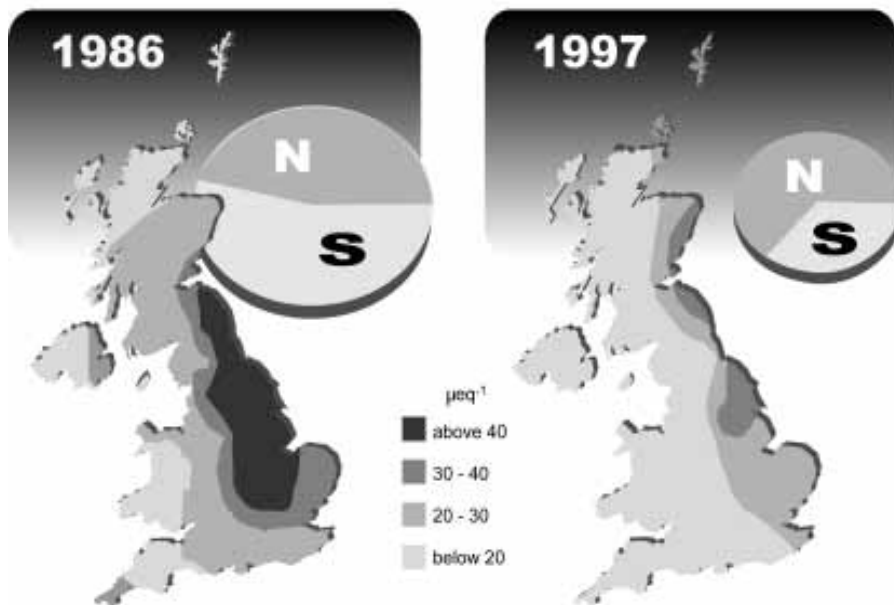


Table. Percentage of UK ecosystem areas exposed to deposition of acidifying pollutants in excess of their critical loads for acidity in 1995-97 and 2010.



Potential acidification by N and S (circles) and concentration of H⁺ (acidity) in UK rainfall (maps) 1986 and 1997.

and concentrations of sulphur in the central and eastern parts of the country, few reductions could be detected at west-coast sites – one reason being that the western side is exposed to sulphur pollution from international shipping and North American emissions. Between 1986 and 1997 US emissions had changed very little, only going down by 12 per cent. But what is more important is that those from North Atlantic shipping have shown a substantial increase in consequence of increases both in traffic and the sulphur content of marine fuel.

No comparative trends can be seen for nitrogen pollutants. Concentrations and depositions of oxidized nitrogen compounds (originating from NO_x emissions) do indeed appear to have fallen by 10-20 per cent during the 90s, but no significant changes have been recorded for the reduced kind (coming from emissions of ammonia).

While the total deposition of potentially acidifying pollutants has been declining as a result of lower sulphur deposition, the relative contribution of nitrogen has been increasing so as to substantially exceed that of sulphur. While the total nitrogen deposition averages 17 kg per hectare a year, on forest soils it is reckoned to be 33 kg/ha. Reduced nitrogen dominates the input, averaging two-thirds of the total. Nitrogen deposition is especially high in uplands exposed to frequent hill cloud in the polluted regions of the country, where it may be more than

50 kg/ha.

Like the Scandinavian countries, the UK has large areas of acid-sensitive soils, where widespread acidification has occurred all through the last century, and despite the reduced deposition there is as yet little evidence of recovery. Soil recovery is expressed in terms of base saturation, which is dependent on the supply of base cations from weathering and atmospheric inputs. Such recovery is expected to take a very long time, probably decades, even under assumptions of stringent reductions of depositions. Some upland soils are unlikely ever to be able to recover their pre-industrial status.

Records of lake sediments show the acidification of freshwaters to have become widespread all over UK uplands since the 1850s, with major damage to biodiversity. In Wales alone more than 12,000 of the 24,000 km of river have been affected, with serious consequences to plant and animal life. But in contrast to the situation for soil, here there is clear evidence of changes in water chemistry, indicating a start of recovery from acidification in most areas since the 1970s. There are also some signs of biological recovery, albeit modest and restricted to a small number of locations.

Decreases in SO₂ concentrations over the past two or three decades have had marked positive effects on vegetation, with substantial increases, for instance, in the distribution of many lichen species. It says in the report that the main threats

to vegetation come from nitrogen deposition and ozone. There is evidence of change due to nitrogen in semi-natural plant communities, seen for instance as reductions in diversity, especially in nutrient-poor habitats. Summer concentrations of ozone reach values that also pose a threat to the health and productivity of semi-natural plants and farm crops in the UK.

There are no signs of recovery whatsoever, either chemical or biological, from the eutrophying effects of nitrogen deposition, and recovery is expected to be very slow even after deposition has been reduced sufficiently to allow it to begin.

In general, the change in the pollution climate in the UK during the last two decades has been similar to that observed elsewhere in Europe – from domination by sulphur to domination by nitrogen compounds and ozone. Commitments by the UK and other countries to go on reducing their emissions over the coming decade will not however suffice to solve the problems – as can be seen from projections for the situation in 2010, based on the commitments of the 1999 Gothenburg protocol to the Convention on Long-Range Transboundary Air Pollution.

The most recent data on the exceeding of critical loads for acidification in the UK show the situation as it was in 1997, when 71 per cent of the sensitive ecosystems were estimated to be exposed to depositions in excess of such loads. That figure is expected to decline to 46 per cent by 2010. See table opposite.

Using a grid with 1x1 km squares, the critical loads for eutrophication were estimated to have been exceeded in 1997 in 25 per cent of the squares where there was sensitive grassland, and in 55 per cent of those with heathland. These percentages are expected to have declined approximately to 20 and 40 per cent by 2010.

As for ozone, the situation in the UK is similar to that in large parts of the European continent – with levels continuing to exceed the thresholds for damage to vegetation and human health. Since the mid-1980s there has however been a distinct decline in peak episodic concentrations, a process that is expected to continue as a result of strategies for the abatement of emissions both

Continued on following page

in North America and western Europe.

At the same time the mean, so-called background concentrations have however continued to increase. Evaluations of historical measurements indicate that the annual mean concentrations have more than doubled in Europe since the early 1900s, from 10-15 ppb to about 30 ppb. Studies have moreover shown this increase to be consistent with known changes in man-made emissions of the ozone precursors NO_x, methane (CH₄), and carbon monoxide (CO). While the emissions of these pollutants are on the way down in western Europe, increases in eastern Europe and Asia are expected to cause the annual mean concentrations to go on rising in Europe generally for a long time to come. Computer model runs for the years 2030, 2060, and 2100 show a steady rise in concentrations over the next century, with a considerable expansion of areas with levels exceeding 60 ppb.

In conclusion it may be said that ecological problems arising from air pollution are common to large areas of Europe. While emissions and depositions of sulphur have declined substantially over the last few decades, those of nitrogen compounds have changed very little. In continental Europe, as well as in the UK, nitrogen deposition and elevated concentrations of ozone constitute the major ecological problems from air pollution. Although the European emissions of the ozone precursors and nitrogen are expected to have come down by 2010, there will still be a widespread exceeding of critical loads and levels.

CHRISTER ÅGREN

¹ **Transboundary air pollution: acidification, eutrophication and ground-level ozone in the UK** (2001). Prepared by the National Group on Transboundary Air Pollution on behalf of the UK Department for Environment, Food and Rural Affairs (DEFRA). While primarily dealing with the UK, the report also includes copious data from other countries, as well as glances at the situation in Europe as a whole. Can be viewed on and downloaded from: www.nbu.ac.uk/negtap/finalreport.htm

	1970	1980	1990	1999	2010
SO ₂	6 518	4 880	3 754	1 187	585
NO _x	2 493	2 580	2 756	1 603	1 167
VOCs	-	2 373	2 657	1 744	1 200
NH ₃	-	-	365	348	297

Actual UK emissions in 1970-99 and projections for 2010 in line with the EU directive on national emission ceilings (kilotons per annum)

UK emissions decreasing

Emissions of SO₂ are traceable for the most part to burning of the fossil fuels coal and oil. In the UK, as in most of Europe, the proportion of sulphur emissions from oil burning dropped after the oil crisis of the seventies, from 40 per cent in 1970 to less than 20 per cent in 1999. The share of coal has consequently increased, from 56 to 74 per cent. During that period, the country's total emissions of sulphur nevertheless dropped, from 6.5 to 1.2 million tons a year – a reduction of more than 80 per cent.

Between 1970 and 1990 most of the reductions were from "low-level" sources brought about by a switch from solid and liquid fuels with high sulphur contents to natural gas in all sectors, industrial, commercial, and domestic. A downward trend in the sulphur content of liquid fuels also helped to reduce emissions. The reductions that took place after 1990 came on the other hand from "high-stack" sources – from the generation of electricity, where they were due in the main to the de-regulation of gas use, although laws on emission control, especially for the integrated control of pollution from large plants, also played a part.

Means envisaged by the reporting group to enable the UK to get under its ceiling for emissions by 2010 include a continued reduction of the sulphur content of liquid fuels and the switch to natural gas, as well as flue-gas desulphurization (FGD) and the use of low-sulphur coal for power generation. So far only two of the country's 40 or so large coal-fired power plants have been retrofitted for FGD.

Emissions of nitrogen oxides (NO_x) increased greatly after 1983, mainly because of the growth in road traffic. They reached a peak

in 1989, after which they declined by more than 40 per cent as a result of reductions in the power sector (caused by fuel switching and the installation of low-NO_x burners), but also of a decrease in emissions from road vehicles due to a growing fraction of cars with catalytic converters. In 1999 road transportation accounted for 44 per cent of all the country's emissions, power plants for only 21 per cent. The gradual accession of new vehicles fulfilling stricter EU emission standards is considered to provide the best possibility for attaining the 2010 ceiling for NO_x emissions.

It is hardly surprising that the trend for emissions of volatile organic compounds should be largely similar to that for nitrogen oxides, since the chief contributing factor is the same in both cases, namely, road transportation. Following their peak in 1989, they have come down by approximately 55 per cent, primarily as a result of cleaner vehicles. The reduction is expected to continue for some years, as new cars with increasingly effective emissions control replace older vehicles. Additional measures are however expected to be needed if the ceiling for emissions is to be attained by 2010.

Emissions of ammonia (NH₃) come mainly from farming, which was responsible for more than 80 per cent of the national total in 1999. It is highly likely that the data for ammonia are underestimates; computer modelling makes it appear that the real figures should be 30 per cent higher. The conclusion must be that the modest target of the directive on national ceilings for emissions can be met solely through forecast changes in agricultural policy.

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EU LEGISLATION ON AIR POLLUTION AND ACIDIFICATION



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Up to the early nineties, EU policy in regard to air pollution had tended to be fragmented. Such directives as existed were either those setting air-quality standards for a few selected air pollutants such as sulphur dioxide and nitrogen oxides, or others to control emissions from certain defined sources such as large power plants and road vehicles.

Some first steps towards a more clearly aimed and strategic policy could be seen in the fifth environmental action program, which was presented in 1992 and contained proposals for long-term environmental objectives both for air quality and acidification. As regards the former it stated that “all people should be effectively protected against recognized health risks from air pollution,” and that “permitted concentration levels of air pollutants should take into account the protection of the environment.” For the acidifying, ozone-forming, and eutrophying pollutants – sulphur dioxide, nitrogen oxides, volatile organic compounds, and ammonia – the aim was that there should be “no exceeding ever of critical loads and levels.”

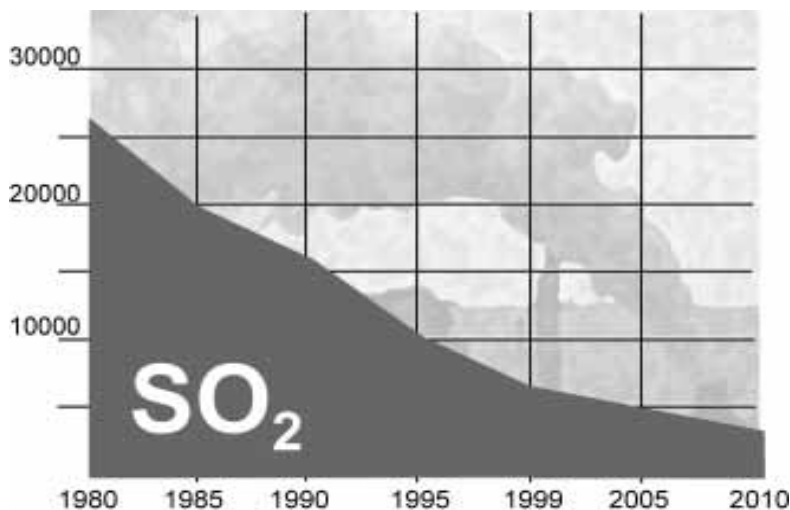
Also dating from 1992 was the auto-oil program, aimed at setting new environmental requirements for road vehicles (cars, trucks, and buses) and motor fuels. The requirements were to match certain defined aims for air quality and accord with the World Health Organization guidelines. They were to be cost-effectively attained by 2010. That program, which was concluded in 1996, resulted in several new directives being adopted in 1998 and 1999.

The mid-nineties also saw the emergence of a framework directive on air quality as well as a completely new directive for the integrated prevention and control of the pollution of air, water, and land (IPPC). The framework directive on air quality provided the springboard for various daughter directives setting limits to the concentrations of several separate air pollutants.

Strategy for combating acidification

In the wake of the fifth environmental action program and under the influence of the Convention on Long-Range Transboundary Air Pollution, the Commission presented in March 1997 a strategy for combating acidification within the Community which included an all-sector-embracing analysis to enable some clearly defined environmental targets to be attained as cost-effectively as possible by 2010. Presented as interim targets, these were to be regarded as first steps towards achievement of the long-term objectives of the fifth environmental action program.

The acidification strategy was later rounded out by a similar one to cut down the concentrations of ground-level ozone. The two laid the foundation for a Commis-



EU emissions of sulphur dioxide (thousands of tons) 1980-1999 and projection for 2010 according to the NEC directive. Source:EMEP.

sion proposal for a new kind of legislation to limit emissions – a directive setting binding national ceilings for the emissions of four acidifying and ozone-forming air pollutants, which was formally adopted last year (2001).

The EU acidification strategy came to involve a revision and tightening up of two important directives: the one for controlling the sulphur content of liquid fuels and the other on emissions of SO₂, NO_x, and particles from large combustion plants.

Clean air for Europe

The more strategically oriented work on air quality that was set going in the nineties will now be followed up by a new program under the name of CAFE, Clean Air For Europe, which was presented by the Commission in 2001. The need for this new program derives from the fact that several directives of importance for emission levels and air quality are due for revision around 2004, and for proper results it will, in the view of the Commission, be necessary to gather them into a single program. The idea is that CAFE shall evolve into an on-going, cyclical program, for which 2004 will only be the first milestone. It will also be the first of the so-called thematic strategies announced in the Commission's proposal for a sixth environmental action program.

The CAFE program will deal mainly with particles and ground-level ozone, both because of their serious effects on health, and the fact that much will have to be done if concentrations are to be brought down to acceptable levels. Problems in respect of acidification and eutrophication that will still remain will however also come in for attention, and a watch will be kept on developments in regard

to pollutants that are as yet unregulated, as well as on what is happening in "hot spot" areas with exceptionally extensive pollution.

One advantage of this more strategic and resolute action at EU level, as envisaged in the CAFE program, is that it should be able to bring about a more rapid and pronounced reduction in member states' emissions of pollutants. A further consideration is that such action by the EU will make it possible to put greater pressure on other European countries, outside the EU, to reduce their emissions by taking a more active stance in the context of the Convention on Long-Range Transboundary Air Pollution.

Here follows a list of EU legislative measures directly affecting emissions and concentrations of air pollutants. Over and above these are however a number of directives and other moves at EU level which can have indirect effect – such as those aimed at reducing the emissions of greenhouse gases and others capable of

influencing developments in the energy, transportation, and agricultural sectors.

The directives

EU directives affecting emissions and concentrations of air pollutants:

NECs, directive on national emission ceilings for acidifying and ozone-forming air pollutants (2001/81/EC)

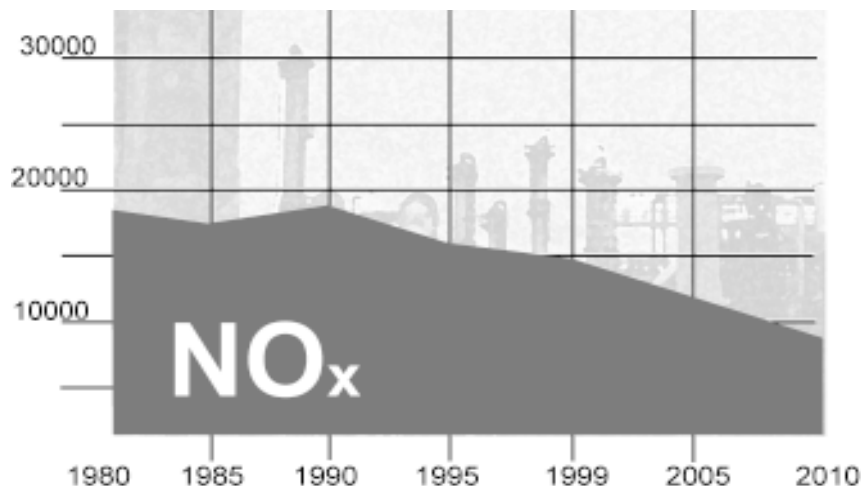
Sets binding ceilings to be attained by each member state by 2010. Covers four air pollutants: sulphur dioxide, nitrogen oxides, volatile organic compounds, and ammonia. The member countries' aggregate emissions of these four pollutants are to be reduced by 77, 51, 54, and 14 per cent respectively between 1990 and 2010. Scheduled for review and revision in 2004, when it is expected that proposals will be made to extend it to small particles and to set new ceilings.

Control of emissions from large combustion plants (2001/80/EC)

Covers plants with a rated thermal capacity of at least 50 MW and replaces the existing directive of 1988 (88/609/EC). Contains emission limits for sulphur dioxide, nitrogen oxides, and dust, varying according to the age and capacity of the plants, as well as the type of fuel burned. Not only tightens up the requirements for new plants, but also introduces for the first time emission limits for existing ones. Review and possible revision foreseen at latest by 2004.

Sulphur content of certain liquid fuels (99/32/EC)

Sets the maximum permitted concentration for sulphur in heavy fuel oil used in the EU at 1 per cent as from 2003, and for gas oils at 0.2 per cent, to be reduced to 0.1 per cent from 2008. Discussions are proceeding on a possible revision in or-



EU emissions of nitrogen oxides (thousands of tons) 1980-1999 and projection for 2010 according to the NEC directive. Source: EMEP.

der to include bunker fuel (heavy fuel oil used in ships).

Quality of petrol and diesel fuels (98/70/EC):

Prescribes among other things 350 and 150 ppm as maximum sulphur content for diesel and petrol respectively. As from 2005 the figure will be lowered to in both cases 50 ppm (0.005 per cent). A proposal to lower it even further, to 10 ppm by 2010, which was presented in May 2001 is being discussed by Council and Parliament.

Emissions of air pollutants from road vehicles

Three directives addressing mainly the emissions of nitrogen oxides, non-methane volatile organic compounds, and small particles. That for **passenger cars and light commercial vehicles** (98/69/EC) specifies emission standards to be introduced in two steps - the first put in place in 2000 and the second coming into force in 2005. Directive 99/96/EC takes a similar stepwise approach for **heavy vehicles**, but with the inclusion of a third step (for 2008). Directive 97/24/EC sets

Policy issue	Indicator	Assessment:
Human health: protecting the population against pollution exposures	Urban air quality exceedances for ground-level ozone	☹
	Urban air quality exceedances for particulates	☹
	Urban air quality exceedances for sulphur dioxide	☺
	Urban air quality exceedances for nitrogen dioxide	☹
Protecting the environment against exposure to ozone	Exposure of agricultural crops and forests to ozone	☹
Achieving the emissions policy targets	Aggregated emissions of acidifying substances	☺
	Aggregated emissions of ground-level ozone precursors	☹
Reducing emissions levels	Particle emissions	☺

Assessment of the present air pollution situation in the EU, according to the European Environmental Agency, EEA (Source: Environmental Signals 2002, EEA)

emission standards for two and three-wheeled vehicles, **mopeds and motorcycles**. A proposal for an amendment, with stricter standards for motorcycles, which was presented in 2000, was agreed - after conciliation negotiations - in March 2002.

Framework directive on ambient air quality assessment and management (96/62/EC)

Provides the means for setting limit values to the concentrations of pollutants in the air through **daughter direc-**

The EU legislative process

THE FOUR INSTITUTIONS playing the chief parts in the EU legislative process are the European Commission, the Council of Ministers, the European Parliament, and the European Court of Justice.

Of these only the **Commission** is entitled to put forward proposals for new laws. Its twenty members are appointed by agreement among the EU countries. While proposals for environmental law are usually elaborated within the Commission's General Directorate for Environment (DG ENV), for some matters they may come from other DGs, such as DG Enterprise, DG Transport & Energy, or DG Agriculture.

Present in the **Council** meetings are the ministers from each member state's government that are responsible for the matters on hand. Thus in the Environment Council it is the environment ministers who are representative. Two formal sessions are held in each six-month period. The Presidency is taken by each country in turn, also for a six-month period. From January to June 2002 it is being held by Spain, after which Denmark will take over (from July to December), followed by Greece from January to June 2003. And so on.

The **European Parliament** consists of

626 members elected for a five year period by universal suffrage in each member state. As a result of the Maastricht and Amsterdam treaties, its political role has become significantly strengthened, especially through extension of the co-decision procedure (see below) to practically all environmental legislation. There are several standing committees that draw up reports - usually with proposals for amendments - on draft laws. Environmental issues are usually handled by the Committee on Environment, Public Health and Consumer Policy.

Depending on the nature of the proposed legislation, various decision making processes can be applied. In the case of environmental issues, that most commonly used is the co-decision procedure, operating principally as follows:

1. Commission presents a proposal
2. Parliament adopts an opinion (at first reading), usually including proposals for amendments
3. On the basis of the Commission's proposal, the Parliament's opinion, and the views of member states, the Council adopts a Common Position (CP)
4. Commission presents its view on the CP
5. The second reading in Parliament

must take place within three months. Then

a) Parliament approves the CP and the legislation is eventually adopted by the Council.

b) Parliament proposes amendments to CP and Council has to react

6. Council has to reject or approve within three months. Then

a) Council approves; legislation will - after consultation with the Commission - be adopted by the Council.

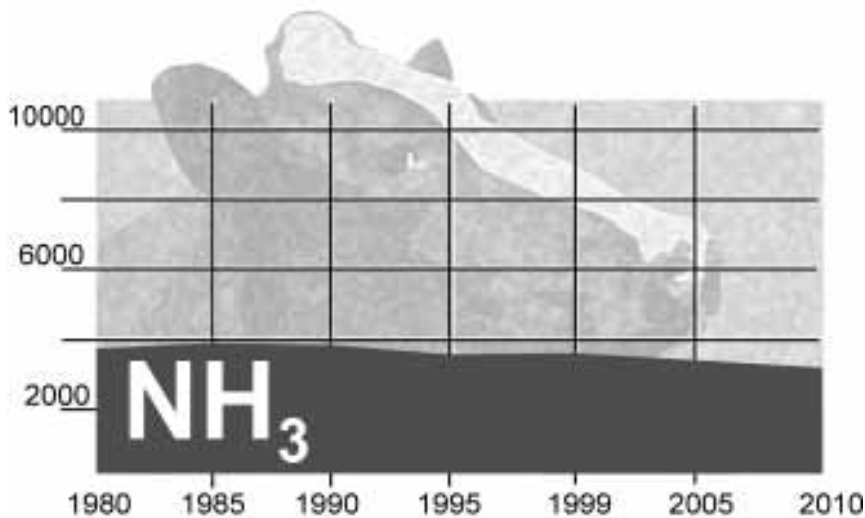
b) Council does not approve of (all) amendments. Conciliation procedure starts.

7. A Conciliation Committee is formed, involving in practice representatives of the Council, the Parliament, and the Commission, with the aim to agreeing on a compromise text within six weeks. Then there will either be

a) Agreement on a joint text and after approval by Parliament and the Council legislation will be adopted. Or

b) No agreement - no legislation.

The European Court of Justice is not directly involved in the preparation and approval of legislation, but is responsible for interpreting EU law and issuing judgement in cases of dispute.



EU emissions of ammonia (thousands of tons) 1980-1999 and projection for 2010 according to the NEC directive. Source: EMEP.

tives. The first (99/30/EC) sets standards for sulphur dioxide, nitrogen dioxide, particulates (PM₁₀), and lead. The second (00/69/EC) covers carbon monoxide and benzene, while the third deals with ground-level ozone (2002/3/EC). A proposal for a fourth daughter directive, covering polyaromatic hydrocarbons (PAH) and three heavy metals (nickel, cadmium, and arsenic), is expected to be presented by the Commission later this year. Review and revision of the first daughter directive is foreseen to take place in 2003.

Integrated pollution prevention and control (96/61/EC)

Aims at preventing or reducing pollution of air, water and land through a comprehensive system of permits. It applies to a significant number of activities, mainly industrial. Since the end of 1999 new installations are required to have a permit issued in compliance with the directive, which means they are expected to employ best available techniques (BAT). The same applies to existing plants, which however have until 2007 to comply. Guidance as to what is regarded as BAT for various sectors of industry is given in reference documents (BREFs). That for large combustion plants is expected to be adopted in 2002. (Altogether 30 to 35 BREFs will be published and regularly updated.)

Plants for incineration of waste (2000/76/EC)

Directive aiming to prevent or limit pollution from emissions to air, soil, surface and groundwater, from the incineration and co-incineration of waste – to be met by means of technical requirements, primarily in the form of binding emission-limit values. Review and revision foreseen to take place in 2008.

Emissions of VOCs from storage and distribution of petrol (94/63/EC)

Covers the whole chain from terminal to service station, but not the evaporative emissions that take place when cars are refuelling.

Use of solvents in industry (99/13/EC)

Intended to cut down the emissions of volatile organic compounds arising from the use of organic solvents in some twenty industrial processes.

There is yet no EU Legislation concerning the **VOC content of products** such as decorative paints and varnishes. Studies made by the Commission have shown however that the emissions from such products, as well as from operations such as vehicle refinishing, could be cost-effectively reduced. The Commission has indicated its intention to come forward with a proposal for a directive, probably by the summer of 2002.

Emissions from engines for non-road machinery (97/68/EC)

Applies only to compression (diesel) engines with power outputs of 18 to 560 kilowatts. In December 2000 the Commis-

sion presented a proposal to widen the scope of this directive so as to cover small spark-ignition (petrol) engines such as are used in lawn mowers, chain saws, etc. Since most of these smaller engines are of the two-stroke type, the biggest reduction in emissions will be for VOCs. The new directive is expected to be adopted in 2002. Emissions from **tractors** used for instance in agriculture and forestry are regulated by directive 00/25/EC.

A proposal for a directive regulating the emissions of pollutants as well as noise from pleasure boats was put forward in October 2000. Its main effect as regards air pollutants will be to reduce emissions of VOCs from new two-stroke marine engines sold after 2005. An amendment of directive 94/25/EC, it is expected to be adopted in 2002.

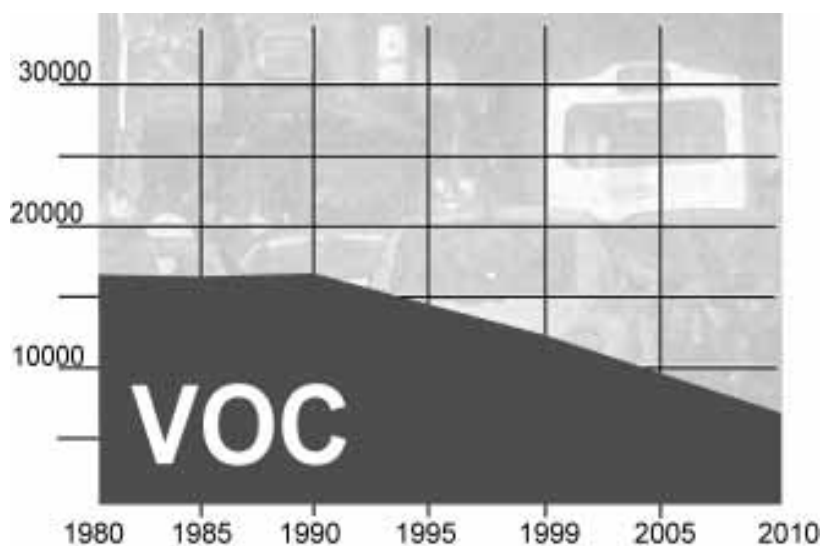
In January the Commission announced that it is preparing a **Community Strategy on Air Pollution from Sea-going Ships**, to be presented by summer 2002. It is expected to include a proposal for modifying directive 99/32/EC on the sulphur content on liquid fuels so as to extend its scope to include heavy bunker fuel oils, as well as proposals for the introduction of economic incentives.

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Further information

More information can be found e.g. at the website of the Commission's DG Environment:

www.europa.eu.int/comm/environment/air/index.htm



EU emissions of volatile organic compounds (thousands of tons), 1980-1999 and projection for 2010 according to NEC directive. Source :EMEP.

Rapid economic growth may lead to doubling of emissions

With its enormous dependence on coal, China is second largest emitter, worldwide, of carbon dioxide. But despite having ratified the convention, it shows no signs of taking up the matter of climate on a broad political basis.

WITH 14 PER CENT of the world total for emissions of carbon dioxide, China is only exceeded by the United States, which is responsible for 25 per cent. Apart from a rapid population growth, what keeps pushing up emissions is China's surging economic expansion, bringing an increasing use of energy, primarily from coal.

Between 1980 and 1995 China's gross domestic product rose on an average by 9.4 per cent yearly. The demand, for electricity doubled between 1986 and 1995, the increase occurring mostly in the cities, where it amounted to 16.5 per cent a year from 1986 to 1993. Out in the country it was only 2 per cent. In the cities the rise was mainly due to increasing household affluence, allowing people to spend money on such things as washing machines, TV sets, refrigerators, air conditioning, and electrical gadgets generally. Between 1986 and 1993 sales of washing machines and TVs increased by 80 per cent. Yet all the time 100 million Chinese in rural areas were still without electricity.

Due largely to increased car ownership, oil consumption will be likely to have risen by 80 per cent in 2010, according to a Shell forecast. Today there are no more than 3.2 cars per thousand of population in China – less than in India, and 200 times less than in the US.

Carbon dioxide emissions

Recent statistics from the International Energy Agency show China's emissions of carbon dioxide to have peaked in 1996, when they amounted to 3.2 billion tons. Although they have since declined year by year, which is of course all to the good, that will hardly affect the long-term

China may be up against a less tangible wall when it comes to reducing greenhouse gas emissions.

trend in emissions generally.

According to Jonathan Pershing, head of the Energy and Environment Division of the International Energy Agency, this drop in the emissions of carbon dioxide can be ascribed to several factors, among them being the closure of illegal coal mines, change in the quality of the coal that is being burned, and a strong switch to gas. It may also be that coal use is now being calculated differently.

From the point of view of climate, the innumerable coal fires are of special significance. Some 100 to 200 million tons of coal go up in smoke

every year as a result of spontaneous combustion. That is five to ten times as much as China exports. Since many of the fires occur in isolated desert and mountain regions, too, they are often not immediately noticed.

Foreign analysts have often questioned the reliability of Chinese statistics. There is for instance uncertainty as to the number of coal mines that are actually being shut down, as well as to the rate at which the switch from coal to gas is proceeding in the larger cities. Nevertheless there can be no doubt that China is

Sixth environment action plan agreed

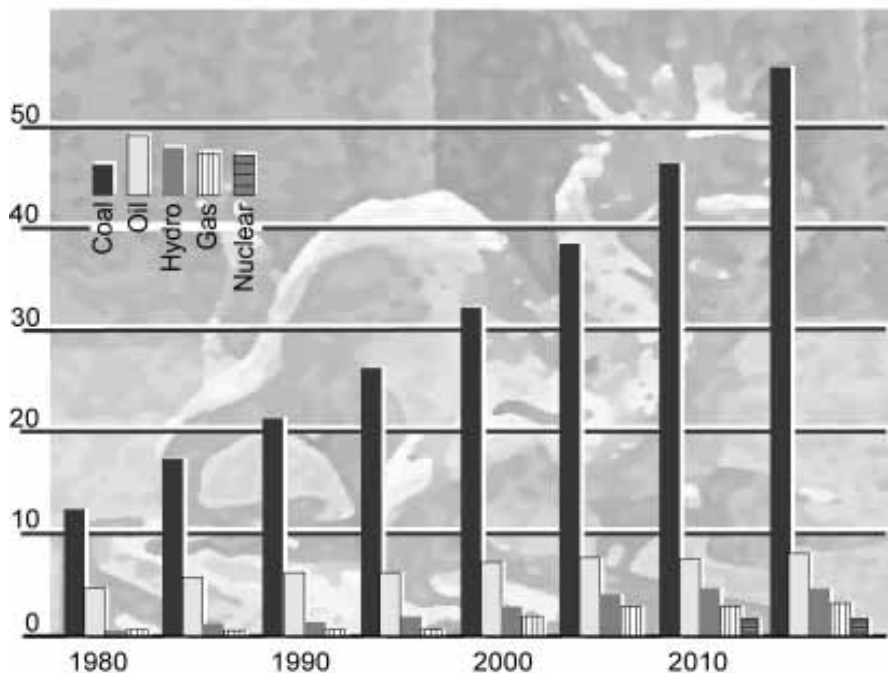
After conciliation talks, representatives of the Council and Parliament agreed on March 12 the main outline of EU's sixth environment action program. The Parliament had already dropped a number of amendments from its first reading, introducing a series of more concrete environmental targets. During the conciliation talks, Parliament also abandoned a proposal aiming at reducing greenhouse-gas emissions by 1 per cent annually up to 2020. The text of the compromise, which has to be approved by the Parliament and Council at a third reading, is available at the Parliament's website under "Joint texts approved by the conciliation committee": http://www.europarl.eu.int/plenary/default_en.htm.

- Don't touch our VOC's...

Fighting to dilute EU paint curbs

Proposed new EU curbs on volatile organic emissions from paints and varnishes will hit small and medium-sized solvent producers hard and give no guarantee of justifiable environmental gains, according to their trade association, Esig. The industry is trying to get a preliminary text for a directive text by the Commission's environment directorate softened down. It would impose limits on VOCs in decorative paints and varnishes. The directorate says the curbs will prevent the emissions of 279,000 tons of VOCs by 2010, at an annual cost of 108-157 million euros. By contrast, it puts the health-related benefits at more than triple that amount.

Source: Environment Daily 1216, 16/05/02



Chinese energy production by fuel 1980-2015 (quadrillion British Thermal units, Btu). Source: Energy Information Administration, International Energy Outlook 1997 (www.eia.doe.gov.)

the world's largest producer and consumer of coal.

Although coal is firmly established as the chief source of energy in China, there are possibilities for diversification and even eagerness to seize them, according to Joakim Nordqvist, who is working on a doctorate at Lund technical university. He is studying the ways in which improved energy efficiency and reduced emissions of greenhouse gases can best be promoted in China's process of industrial development. He thinks China has great possibilities for increasing its production of energy from renewable sources. In rural areas biomass from farm residues could, he says, easily compete with coal. There are enormous amounts available, and it has always been used, albeit ineffectively, for domestic heating and cooking. He also notes a rapid expansion of wind power, with big projects proposed for Inner Mongolia and Xinjiang. Even as early as the mid-nineties, China had installed 50 MW of wind power.

A government plan for the development of renewable energy has been set for the period from 1996 to 2010. But according to the Dutch NRP during the next couple of decades most of the alternative energies will cost more than coal. It seems therefore most unlikely that that market forces alone will suffice to bring about an increase in the use of "green" energy. Any real advances will need

action by the Chinese government in company with foreign partners.

Today natural gas accounts for no more than 2.5 to 3 per cent of the country's energy. At the present rate of consumption China's reserves should last for 70-120 years. A great part of them lies in the Tarim region of western China, and cooperation is now being sought with foreign firms to build pipelines from the western parts of the country to the east coast. There are also plans for importing gas from Russia and Kazakhstan, which would however call for enormous investments in infrastructure. China still only accounts for 1 per cent of world consumption of natural gas.

The NRP opines that the best chances China has of reducing its emissions of carbon dioxide will lie in improvement of the use of energy in the various sectors. After passing a law on energy saving in 1998, in 2000 the government stepped out on an entirely new policy for the promotion of combined heat-and-power. The forces working most for greater efficiency in the use of energy in China are economic reform and the need to cut down on air pollution locally. Standing in the way of a better use of energy is however, according to NRP, the all-too-low price of electricity in China.

Climate policy

Despite having formed a national

Too many holes in Spanish plan

The EU presidency, Spain, has put forward a detailed proposal for a directive on energy taxes, which could be finalised by the end of this year. It includes recommendations for minimum national rates for excise duty on various fossil energy products plus electricity, to be introduced within four years. A long series of exemptions in it has already been criticized by the Commission.

According to the proposal only energy used for heating or fuel, and not as a feedstock material, would be taxed. Member states would have the option of exempting household use of electricity, gas and coal as well as charities from all taxes.

All coal used for electricity generation, as a chemical reductant, in electrolysis, and in the lime, cement, glass, and ceramics production would be exempt from taxation. Member states where natural gas provides less than 15 per cent of final energy consumption could exempt it for up to ten years. Electricity from cogeneration and renewables could likewise be exempt.

Frits Bolkestein, EU internal market commissioner, criticized the proposal as "A gruyere cheese with too many holes".

Source: Environment Daily 1211, 07/05/02

EU clears the CO₂ hurdle

The European Union's long-standing commitment to stabilize emissions of carbon dioxide (CO₂) at their 1990 level by 2000 has materialized, despite the fact that emissions had increased in that last year.

Emissions of CO₂ from all 15 EU member states were 0.5 per cent lower in 2000 than 10 years earlier. On the other hand EU emissions of CO₂ and other greenhouse gases rose between 1999 and 2000, the latest year for which data for the whole EU are available. About 80 per cent of the unions greenhouse-gas emissions is CO₂.

By latest incout, in 2000 the total EU emissions of greenhouse-gases were 3.5 per cent below their 1990 level. In 1999 they had been 3.8 per cent lower.

Under the Kyoto protocol the EU is required to cut its combined emissions of the six gases to 8 per cent below their 1990 level by the years 2008-2012.

Source: European Environment Agency: <http://www.eea.eu.int/>

committee on climate in 1990, and ratifying the climate convention early in 1993, China still shows no signs of taking up the matter of climate on a broad political basis. The debate continues to be dominated by local environmental problems such as untreated sewage and unhealthy air. A poll carried out by the Asian development bank a couple of years ago revealed the matter of climate to come tenth among the most pressing environmental issues even for those actively engaged for such matters.

During international negotiations China has repeatedly emphasized that attention to climate cannot be a priority for developing nations - maintaining that it must rest on the industrialized countries to take the first steps to cut back emissions.

"China does not intend," says Joakim Nordqvist, "to take any responsibility for climate matters until the industrialized countries, which are responsible for the overwhelmingly greater part of the accumulated, historical emissions of greenhouse gases, show themselves prepared to shoulder responsibility by taking concrete measures."

As Bo Kjellén, who headed the Swedish delegation at international meetings from 1992 to 2001, has noted: China's participation in the negotiations has been distinguished by close collaboration with other developing countries in the so-called G77 group. At times it has been the

most vigorous exponent of the view that binding commitments to reduce greenhouse gas emissions should only be required of the industrialized countries.

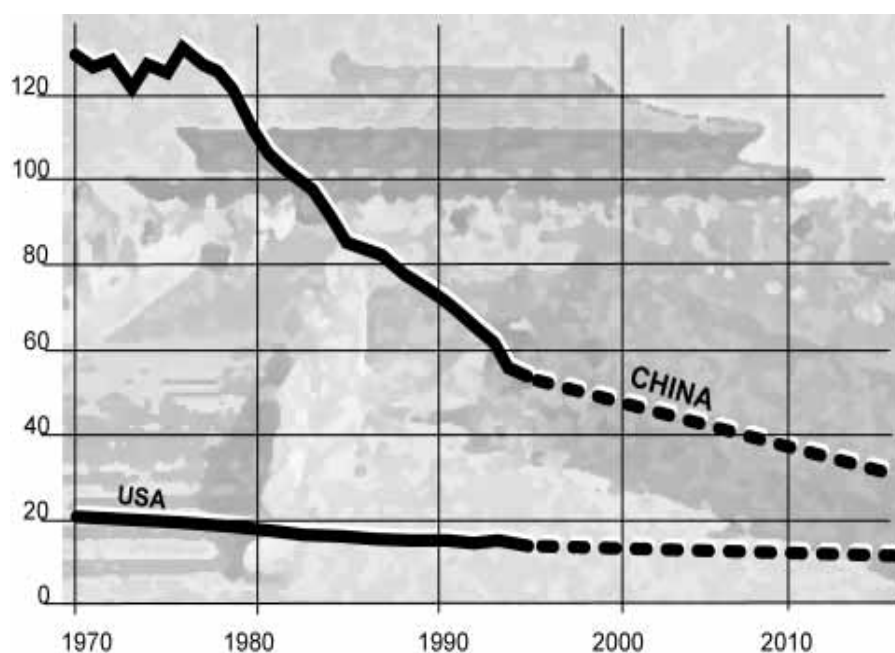
Kjellén goes on to say that up to the Kyoto meeting of 1997, China often took a distinct "anti-colonialist" attitude, but has since toned down the rhetoric. At the conferences in Bonn and Marrakech in 2001, it appeared to wish to be genuinely constructive.

China supports the Kyoto protocol and wants to see it come into force as soon as possible. Its environmental protection agency sees a chance for China to reduce its emissions of greenhouse gases in an economically advantageous manner in the protocol's Clean Development Mechanism, which allows industrialized countries to fulfil part of their quotas by giving support to climate projects in developing countries.

China states blankly that it cannot make any binding commitments before it has attained "medium status" as regards economic development - which it considers impossible before 2020. But according to the NRP, in the view of some experts on the Chinese situation it is more likely to be 2040 or 2050.

MAGNUS ANDERSSON

An Asian Dilemma (2002). NRP, the Dutch National Research Programme on Global Air Pollution and. Climate Change. Further information at Joveeta.Gupta@ivm.vu.nl.



Energy intensity 1970-2015, China and USA, thousand Btu per GDP dollar. Source: Energy Information Administration, International Energy Outlook 1997.

Environmentalists rage over Bush's "Clear Skies" plan

Said to contain no new strategy whatsoever that could bring about changes from the current trend of steadily increasing greenhouse-gas emissions.

IN FEBRUARY PRESIDENT George W. Bush presented his plan for curbing US emissions of greenhouse gases and other air pollutants. The proposal has been described by the White House as "the most aggressive initiative in American history to cut power plant emissions, as well as a bold new strategy for addressing global climate change." It has nevertheless met with widespread criticism both from governments in other countries and environmentalist organizations everywhere.

Bush's proposal consists of two main parts, the one being the Clear Skies Initiative aimed at cutting the emissions of sulphur dioxide, nitrogen oxides, and mercury from power plants by 70 per cent by 2018, from today's levels, and the other a strat-

egy for reducing greenhouse-gas intensity by 18 per cent over the next ten years. The latter, according to the White House, is intended to slow the growth of greenhouse-gas emis-

"Virtually identical with a scheme that Enron lobbied"

sions. Greenhouse gas intensity is the ratio of emissions to economic output, expressed in terms of GDP.

Today power plants are responsible for about two-thirds of US emissions of sulphur, a good third of those of mercury, and a quarter of the nitrogen oxides. If emissions from

other sources should remain constant over the next sixteen years, the country's total emissions of SO₂ should drop by about a half as a result of the Bush plan, those of mercury by a quarter, and NO_x by a sixth.

It is intended that reductions shall be achieved in two stages by a so-called cap-and-trade program, with 2010 and 2018 as the target years. The program can be regarded as a continuation and extension of the Acid Rain Program accompanying the Clean Air Act of 1990. Between 1990 and 2000 emissions of SO₂ from power plants came down by some 30 per cent as a result of Phase 1 of that program - from 15.7 to 11.2 million tons a year. The US total shrank by 20 per cent.

During the same period EU emissions of sulphur had come down by about 60 per cent. While the US had increased its emissions of nitrogen oxides by 5 per cent, or 1.7 million tons, between 1990 and 1999, the fifteen EU countries had brought theirs down by 25 per cent. See Figure 1.

American environmentalists' response to Bush's air pollution plan was scathing. The Clean Air Trust called it a "cynical PR ploy to distract public attention away from roll-backs of existing Clean Air Act requirements." Frank O'Donnell, executive director of the Trust, said it "could also be called the Ghost of Enron, "because it is virtually identical with a scheme that Enron lobbied before the company imploded." He noted that the plan would permit more

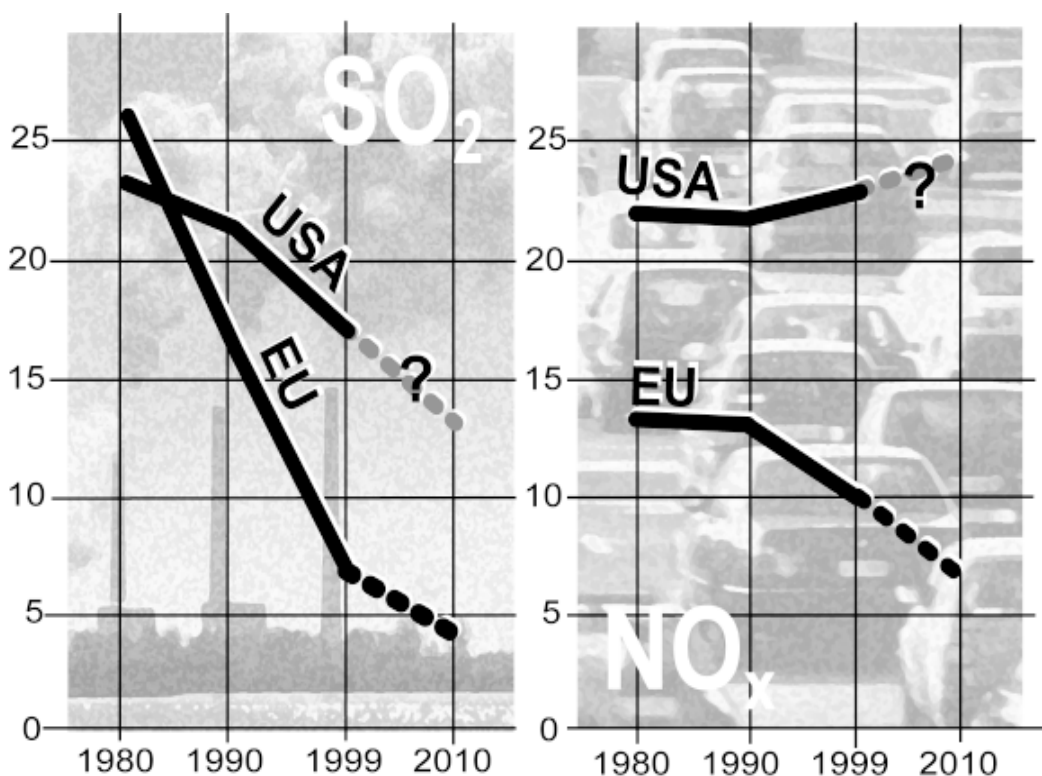


Figure 1. US and EU emissions of SO₂ and NO_x (millions of tons) 1980-1999, with projections for 2010. Source: EMEP MSC-W Note 1/01 (www.emep.int)



Figure 2. Emissions intensity for SO₂ and NO_x in 1999 in the US as compared with the EU. Expressed as emissions intensity per capita (kg/individual) and as ratio of emissions to economic output (kg/US\$1000 of GDP). (Population and GDP data for 1990 from the OECD report, giving total populations of 271 million for the US and 376 million for the EU. Gross domestic product, GDP: US\$ 8681 billion for the US and US\$ 7880 billion for the EU, in terms of 1995 prices and purchasing power parity).

air pollution in the future than strict enforcement of the current Clean Air Act would.

Less than a week after publication of the Bush plan, the Natural Resources Defense Council (NRDC) issued a press release in which it made public previously undisclosed Environmental Protection Agency documents which according to the NRDC reveal ways in which the Bush administration is scheming to undermine federal air-pollution standards.

"These documents show in black-and-white how Bush political appointees at EPA are trying to cripple the Clean Air Act," said John Waike, director of NRDC's Air Program. "More than 30,000 Americans die every year from power plant pollution alone, and weakening of the standards would," he said, "only make things worse."

The way in which it is proposed to limit greenhouse-gas emissions has also met with heavy criticism. According to Environment Defense, the Bush administration's "greenhouse gas intensity policy" contains no new plan, no new requirement, and no new strategy whatsoever that could bring about changes from the current US trend of steadily increasing greenhouse-gas emissions.

Criticism has also been forthcoming from outside the US. The official EU attitude was made public on February 20 in the form of a common statement by environment commissioner Margot Wallström and the Spanish environment minister Jaume Matas, in which they emphasize that "the Climate Change Convention of 1992, to which the US is a party, requires industrialised coun-

tries to stabilise their greenhouse gas emissions at 1990 levels. Achieving this would only be a first step towards stabilising global greenhouse gas concentrations at a level that would prevent dangerous climate change. This is the ultimate objective of the Convention to which the US has subscribed."

Scrutinizing developments in the US, they note further: "Over the past years greenhouse gas emissions intensity in relation to GDP has been falling in the US. The Bush plan is based on a prolongation of this trend, thereby in effect foreseeing little more than business-as-usual." Current emission projections for the US indicate an increase of 39 per cent above 1990 levels in 2012. While the intensity improvements may reduce this to around 33 per cent, that is still a very substantial increase in absolute emissions." They add that the EU is concerned about the purely voluntary nature of the actions proposed, and that a review of the effectiveness of the measures will, moreover, not take place before 2012.

CHRISTER ÅGREN

For more information:

www.whitehouse.gov/news/releases/2002/02/

www.nrdc.org

www.cleanairtrust.org

www.environmentaldefense.org

NEWS IN BRIEF

Good indicators of global warming

Butterflies have increased their range up to 200 km northwards both in North America, and mosses have started to grow on previously bare ground in the Antarctic. And 16 per cent of all the coral reefs in the world have died as a result of record-high temperatures in coastal waters. According to a study published in *Nature*, the effect of global warming are already evident, and can be seen all over the world, from the polar regions to tropical seas.

Butterflies, it says, are a good indicator of change, since they move about easily and can adapt their choice of biotope to the climate. The early arrival of spring is an effect of global warming that can be seen everywhere. In Britain the first butterflies are coming out on an average six days earlier than they did seventy years ago.

Source: *Nature*, vol. 416, p. 38

Heading north.

Cleaner diesel trucks in USA

Following a court decision in May, a new regulation is to be introduced, starting in 2006, to lower the sulphur content in diesel fuel and reduce emissions of air pollutants from diesel-fuelled trucks and buses. The proposal was challenged in court by a coalition of trucking and oil industry groups. This new EPA regulation requires the sulphur content in diesel fuel is to be reduced from the current level of 500 ppm to 15 ppm. The new standards will also significantly reduce the emissions of small particulates.

Source: Environmental News Service, May 7, 2002.

Next page: US worst polluters identified!

Not so good as sinks

Forests will not be such effective carbon sinks as has been thought and hoped, says a group of researchers at Duke University, North Carolina. Previous attempts to assess the ability of forests to bind carbon had been made in enclosed surroundings such as greenhouses. These last tests were carried out in natural forest, with trees that were allowed to grow in an atmosphere where the concentrations of carbon dioxide had been raised artificially to levels likely to prevail in 2050.

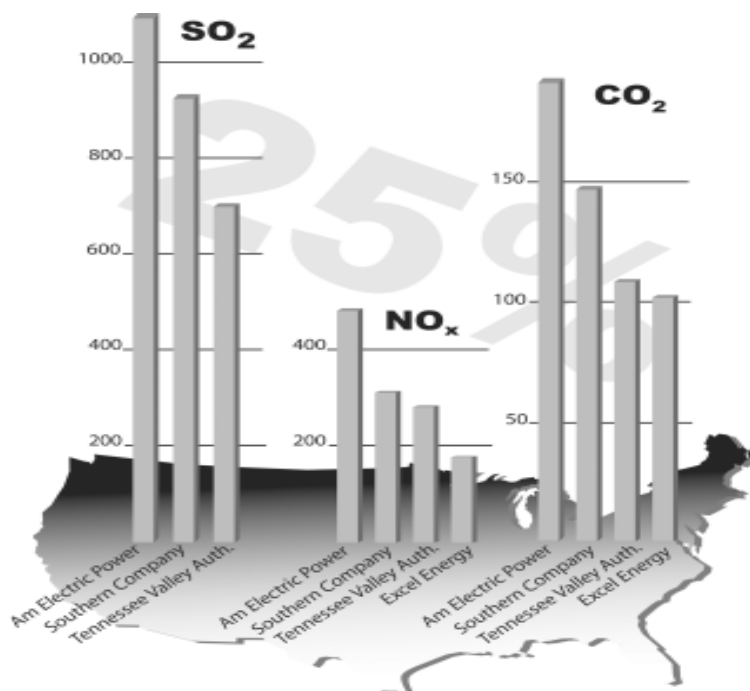
The experiments showed that trees growing in an atmosphere with more carbon dioxide do indeed bind extra carbon, but not as much as previous tests have seemed to indicate. The trees in the Duke University experiment actually bound 27 per cent more carbon than others growing in an atmosphere with today's CO₂ concentrations. If the trees in all the world's temperate forests should react similarly to a rise in concentrations, they would bind no more than 10 per cent of the man-made emissions. "The result throws doubt on nations such as the US that have carbon sequestration as their only strategy for dealing with the problem," says William Schlesinger, leader of the Duke research project.

Source: New Scientist No. 2338/202, Nature 116, p.617.

Linking small particles to lung cancer

Long-term exposure to fine particles (PM_{2.5}) significantly raises the risk of dying from lung cancer and heart disease, according to a study published in the March issue of the *Journal of the American Medical Association*, in which data was analyzed from some 500,000 adults whose cases were followed from 1982 to 1998. The number of lung cancer deaths was found to have increased by eight per cent for every additional 10 micrograms (mg) of fine particles per cubic metre of air, while deaths from other heart- and lung-related causes increased by six per cent for every 10-microgram rise. While annual average levels of fine particles have come down in US cities over the last twenty years, the study shows that current levels are still high enough to be associated with a significantly increased risk of cancer and cardio-pulmonary deaths.

Sources: Associated Press and Environmental News Service, March 6, 2002



A few giant power companies are responsible for the greater part of the air pollution from the US energy sector. Here are the emissions of SO₂, NO_x (1000 tons) and CO₂ (mill tons) from the 3 or 4 largest emitters, accounting for 25 per cent of the sector's total emissions.

POWER PLANT EMISSIONS

US polluters listed

OF ALL THE CARBON DIOXIDE, mercury, nitrogen oxides, and sulphur dioxide emitted by the 100 largest power-generating companies in the US, half comes from just twenty of them. Four to six companies alone have been found to account for 25 per cent of the emissions of each of these pollutants.

There are more than 5,000 plants for the generation of electricity in the US. Of these, 1,900 are owned and operated by the 100 largest utility companies. They generate 90 per cent of the electricity – and also produce 90 per cent of the country's emissions.

In the year 2000 fossil fuels were being used to generate about 70 per cent of US electricity, with coal accounting for 52 per cent. Also according to the report here quoted, there is practically no state-of-the-art pollution control in any of the existing plants.

Although it might seem obvious that the largest generators would be the greatest emitters, there are considerable differences between them as regards emissions per generated megawatt-hour. In this respect four companies had twice the average US rate for NO_x emissions, and eight more than twice that for

SO₂. The little difference in companies' performance as regards CO₂ can be explained by the fact that this pollutant cannot be reduced by technical abatement measures.

The chief reason for the differences between companies is that they use different fuels. Those using fossil fuels only will in general show higher emissions per megawatt-hour than companies with some nuclear generation. There are nevertheless considerable differences between companies using the same kind of fuel, the worst emitting twice as much NO_x and four times as much SO₂ per ton of coal burnt, as the best performers. While revealing variety in the techniques used for firing and flue-gas cleaning, the statistics also give an idea of the potential for emission reductions, even with no change in electricity output or fuel mix.

ROGER OLSSON

¹ **Benchmarking Air Emissions of the 100 Largest Electric Generation Owners in the U.S. - 2000.** Published by the Natural Resources Defense Council (NRDC), the Coalition for Environmentally Responsible Economies (CERES) and the Public Service Enterprise Group Inc. (PSEG). The report is available at <http://www.ceres.org/publications/main.htm>.

Could possibly cover a quarter of world need

WITHIN TWENTY YEARS electricity for a billion people could come from solar cells. Their manufacture and installation is already a billion dollar business, and if the market continues to grow at the present rate (at about 30 per cent a year), by 2020 we should be obtaining 276 TWh a year from solar cells. The industry would then be employing 2.3 million people, have an investment value of US\$75 billion a year and bring the cost of solar modules down to 1 dollar per watt delivered.

This scenario is presented in a report from Greenpeace international and the European Photovoltaic Industry Association.¹

If the 276 TWh from solar cells should replace electricity from coal, it would cut 165 million tons from the emissions of carbon dioxide – the same amount as from 44 million cars or 75 coal-fired power plants. But 276 TWh would only be 1 per cent of the world demand for energy in 2020. If on the other hand the market for solar energy should grow by 15 per cent a year between 2020 and 2040, at the end of that period solar out-

put would be more than 9000 TWh, and meet 25 per cent of the total forecast demand for electricity.

Sven Teske, Greenpeace expert in energy matters, emphasizes however that such a development will not come about of itself, saying that it is a realistic, achievable goal, but requiring clear political support from governments around the world. He adds "In particular the European Commission must ensure that innovative national incentive schemes for solar electricity are not invalidated on competition grounds."

Japan and Germany are mentioned as countries with determined policies involving far-reaching support for the expansion of solar power. Also pointed out is the importance of clearing away regulatory barriers hindering solar power, as well as the subsidies to fossil and nuclear fuels that now put energy from renewable sources at a disadvantage.

PER ELVINGSSON

¹ **Solar generation.** Available at www.greenpeace.org.

Thousands die from power plant emissions

Air pollution from some eighty power plants in the Midwest and southeastern United States are blamed for causing almost 6,000 premature deaths every year, according to a study prepared by Abt Associates for the Rockefeller Family Fund, who also estimated that pollutants from these plants lead to 140,000 asthma attacks and 14,000 cases of acute bronchitis each year. The study focuses on power plants run by eight utilities that have all been cited by the US Environment Protection Agency (EPA) for violations of the Clean Air Act. Under the Clinton administration, the EPA started enforcement actions against them because they had modified or upgraded their old, coal-burning plants without installing modern pollution control equipment, as required by the New Source Review provision of the Clean Air Act. According to the Natural Resources Defence Council, internal EPA documents released earlier this year show that the Bush administration has plans to weaken the NSR provisions. The study is available at: www.rffund.org.

Natural disasters increasing

The declining environmental quality of planet Earth, and the apparent increase in the strength and frequency of natural hazards such as cyclones, floods and drought are making peoples ever more vulnerable to food insecurity, ill health and unsustainable livelihoods.

These are some of the findings from the UN Environment Programme's Global Environment Outlook-3 (GEO-3) report. Behind nearly all the assessments and forecasts outlined in it lies the spectre of global warming and its potential to wreak havoc on weather patterns over the coming decades.

The number of people affected by disasters is estimated to have risen from an average of 147 million a year in the 1980s to 211 million in the nineties.

According to the GEO-3 great deal of environmental change has taken place in the thirty years since the Stockholm conference in 1972. Generally the environment has been undergoing a steady decline, especially in large parts of the developing world.

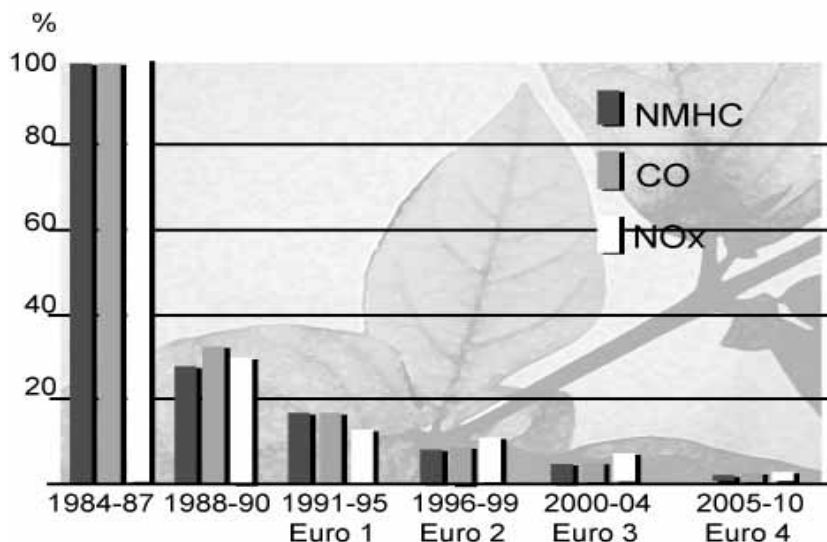
PHOTO: GREENPEACE INTERNATIONAL

One more.... The market for solar cells is presently growing by 30 per cent annually.

Experts outline global motor vehicle policy

An international regulatory system that would force manufacturers to employ the best techniques and comply with the most stringent emission standards would not only spare the environment but also money.

A SET OF RULES that will be applicable everywhere is needed if motor vehicle manufacturers and associated businesses are to be made to adopt the best techniques and adhere to the strictest standards concerning emissions anywhere. Although operating on a worldwide scale, the auto and oil industries are having to meet greatly differing regulations even in their chief markets. They are having to spend billions of dollars in designing products to suit different regulatory systems. Consequently hundreds of millions of people are getting no gain from the best ones there are for reducing pollution and cutting the waste of energy.



EU emission standards for car emissions 1984-2010. Source: Michael Walsh, www.walshcarlines.com

“In developing countries new vehicle industry should be based on new technology, not used as a dumping ground for old ones.”

Whereas the markets for vehicles are approaching saturation in Europe and North America – with an expectation of only marginal growth, if any, in the years to come – vehicle registrations are increasing very fast in many of the countries, such as China and India, that are now undergoing rapid industrialization. Vehicles sold there are typically more polluting than comparable ones marketed in already industrialized countries. Taking the step from early control strategies to the most advanced (moving, say, from Euro 1 to Euro 4 emission standards) costs very little, but the benefits can be enormous.

Bellagio recommendation

In order to penetrate these problems further, some leading experts in techniques and public policies for motor vehicles met last summer at Bellagio, Italy, with the intention of defining the principles for a single global policy on motor vehicles and fuels. Arranged by The Energy Foundation¹, the meeting culminated in 43 recommendations, representing a consensus of the views of eighteen experts from Japan, China, the United States, and the EU countries².

An ever growing number of vehicles the world over is threatening to nullify the considerable advances made in many places to cut down the emissions from motor vehicles. It will be crucial, for stabilizing the atmospheric concentrations of greenhouse gases, to reduce emissions from the transportation sector – which is now accountable for 26 per cent of the global carbon emissions. The International Energy Agency projects that the transport sector emissions will rise by 75 per cent between 1997 and 2020. A similar

“Emission standards should always reflect the best available technology.”

About 80 per cent of the world’s new cars are produced by ten companies, all making vehicles that comply with the most stringent requirements in effect at any given time, either in Europe or the US or Japan. They are therefore capable of installing the most advanced technologies, no matter where the vehicles are made.

Bellagio recommendation

trend is foreseen for all air pollutants. And unless vigorous controls are applied, emissions from road vehicles in non-OECD countries are projected to be three to six times higher in 2030 than they were in 1990.

According to the Bellagio experts, there are good technical possibilities for averting such a development. In many of the industrialized countries

“Measures for reducing emissions should be designed so as not to promote increases in the size, weight, or engine power.”

Many of the technologies developed over the last decade, which could have been used to improve fuel economy (and thereby reduce emissions of greenhouse gases) have mostly gone to improve performance. Between 1988 and 2001, the average horsepower of passenger vehicles in the US, for instance, increased by 53 per cent, acceleration by 18, and weight by 19 per cent, but fuel economy declined by 8 per cent. The EPA has estimated that the improvements in technology that made these increases possible could have been used instead to improve the fuel economy of new vehicles by 20 per cent.

Bellagio recommendation

new cars are now certified to emit less than 10 per cent of the pollutants that used to come out of vehicles without catalyzers.

The group summarized its 43 recommendations in just eight broad ones for policymakers, saying they should:

1. Design programs and policies so as to reduce toxics and noise as well as other types of pollution, including greenhouse gases, in parallel, and ensure that future technologies will provide major improvements in each case.

2. Base policies explicitly on performance in relation to societal objectives, without any special consideration to specific fuels, technologies, or vehicle types.

3. Developing as well as industrialized countries should expect and require use of the best technologies that are available anywhere. It will neither be necessary nor cost-effective for developing countries to follow exactly in the footsteps of the industrialized ones when trying to make improvements.

4. Use combinations of economic instruments and regulatory requirements and make related policies complementary.

5. Make policies treat vehicles and fuels as a single system, and move towards standards taking consideration of life-cycle emissions –

from the production, distribution, and disposal both of vehicles and fuels.

6. Use more realistic and representative test procedures, greater manufacturer accountability, improved inspection and maintenance programs, on-board monitoring and diagnostics, retrofit and scrappage programs as means of preventing high emissions from vehicles when they have come into use.

7. Consider the cost-effectiveness of imminent measures as well as the market potential for future technologies.

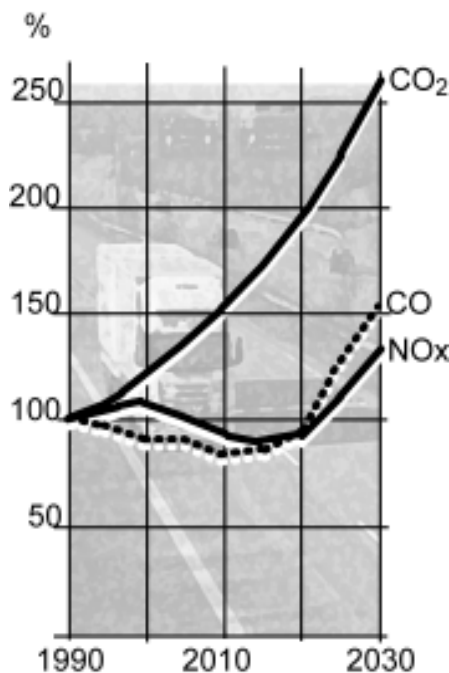
8. Work across jurisdictions, national and international, in order to strengthen programs and give cohesive signals to the affected industries.

Among actual measures considered most urgent by the Bellagio group was one for an immediate stop to leaded petrol and the introduction of a near-zero limit (10 ppm) for sulphur in all fuels except residual bunker oils.

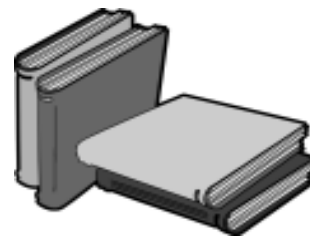
ROGER OLSSON

1. The Energy Foundation is a partnership of major US foundations interested in sustainable energy. It was launched in 1991 by The MacArthur Foundation, The Pew Charitable Trusts, and The Rockefeller Foundation.

2. **Bellagio memorandum on Motor Vehicle Policy.** Principles for vehicles and fuels in response to global environmental and health imperatives. Can be downloaded from www.ef.org/bellagio.



Projected trends in the emissions from road vehicles worldwide 1990 - 2030. Source: Michael Walsh, www.walshcarlines.com



Recent publications

Clearing The Air: European Advances in Tackling Acid Rain and Atmospheric Pollution (2002).

By J Wettestad. 189 pp. Gives an in-depth analysis of the processes leading up to the adoption of the 1999 Gothenburg Protocol under the Convention on Long-Range Transboundary Air Pollution and the EU directive on national emission ceilings, as well as a comparison of the two different air pollution control regimes. Published by Ashgate Publishing Ltd, Aldershot, England (www.ashgate.com).

Environmental Policy in the European Union: Actors, Institutions & Processes (2002).

Edited by A Jordan. 354 pp. Contains a series of articles on the main actors, the dynamics of policy making, case studies, and challenges for the future, in their historical and institutional context. Published by Earthscan Publications Ltd, London, England (www.earthscan.co.uk).

Assessment of Recovery of European Surface Waters from Acidification 1970-2000 (2001).

Edited by A Jenkins, R C Ferrier, and R F Wright. 542 pp. Special issue of Hydrology and Earth System Sciences. Published by European Geophysical Society, Katlenberg-Lindau, Germany (www.copernicus.org/EGS/ECS.html).

Freshwater Acidification and Recovery in the United Kingdom (2001).

By C Evans, A Jenkins, R Helliwell, R Ferrier, and R Collins. 80 pp. Concludes that by 2050 the emission reductions planned in Europe will have resulted in clear benefits to UK surface waters, but that these improvements will not represent a return to the “natural” (pre-industrial) situation. Moreover, even though recovery is expected in surface water chemistry in most UK waters, the prospects for biological recovery are uncertain. Published by the Centre for Ecology and Hydrology, Wallingford, England (www.ceh.ac.uk).

US supports new IPCC chair

BY A VOTE of 76 to 49 Dr BK Pachauri, economist and technologist, has been elected chairman of the UN panel of experts on climate (IPCC) in place of Robert Watson, the atmospheric chemist. Pachauri's candidature was strongly supported by the developing countries, but also by the US, where the auto and oil industries had been exercising strong pressure on the Bush administration to get Watson removed. Watson has been one of the foremost proponents of the thesis that all the world's countries will have to cut down their emissions of carbon dioxide, in which he has had strong support from IPCC scientists.

Commenting on the shift, Harlan Watson, the chief US negotiator on climate matters, asserted that it would make the developing countries more inclined to take part in the proceedings – adding that it was also timely in view of the fact that the scientific aspect of the climate problem would recede somewhat into the background during the coming negotiations, which will be more concerned with political measures and technical solutions. But he also insisted that there is still great uncertainty as to the extent to which man-made emissions are contributing to global warming.

Canada tergiversating on Kyoto protocol

CANADA IS NOW RAISING new objections to ratifying the Kyoto protocol to limit the emissions of greenhouse gases. At a meeting with EU government representatives in May, the Canadian prime minister, Jean Chrétien, said certain aspects of the protocol would have to be clarified before Canada could ratify it.

Canada wants to count its exports of hydro power and natural gas to the US as part of its commitment to cut back emissions, citing the flexible mechanisms rule. It argues that these exports, by making it unnecessary for the US to use so much

coal, enable it to emit so much less carbon dioxide.

Like all other industrialized countries with the exception of the US, Canada signed the protocol last autumn, but the government has since been under strong pressure from the country's energy generators not to ratify. It had in any case already managed to get its vast forests counted as carbon sinks.

The EU is now definitely refusing to allow Canada any further opportunities for making swaps instead of reducing emissions.

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Coming events

Thermal Waste Treatment and Prevention of Air Pollution from Ships. Lübeck-Stockelsdorf, Germany. June 19-21. International conference on the marine environment. Information: Elke Lonicer, lonicer@t-online.de. Internet: www.euleandpart-nets.com.

EU Environment Council. Luxembourg. June 24-25, 2002.

Air Pollution 2002. Segovia, Spain. July 1-3, 2002. Information: Conference Secretariat, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, England SO40 7AA. E-Mail: lshouthcott@wessex.ac.uk. Internet: www.wessex.ac.uk/conferences/2002/air02/.

The Sustainable City 2002. Segovia, Spain. July 3-5, 2002. Information: Wessex Institute of Technology, address as above. Internet: www.wessex.ac.uk/conferences/2002/urs02/.

World Summit on Sustainable Development (Rio +10). Johannesburg, South Africa. August 26-September 4, 2002.

Working Group on Effects of the LRTAP Convention. Geneva, Switzerland. August 28-30. Internet: www.unece.org/env/lrtap/

EMEP Steering Body of the LRTAP Convention. Geneva, Switzerland. September 2-4. Internet: www.unece.org/env/lrtap/

Clean Air For Europe (CAFE) Steering Group Meeting. Brussels, Belgium. September 11-12. Internet: www.europa.eu.int/comm/environment/air/cale_steering_group.htm

Working Group on Strategies and Review of the LRTAP Convention. Geneva, Switzerland. September 16-20. Internet: www.unece.org/env/lrtap/

Workshop on Economic Valuation of Benefits on Ecosystems due to Air Pollution Abatement. Scheveningen, the Netherlands. October 2-4. Organized by the Dutch Ministry of Environment in cooperation with the LRTAP Convention. Information: eduard.dame@minvrom.nl

Framework Convention on Climate Change. 8th Conference of the Parties. New Delhi, India. October 23 - November 1. Internet: <http://unfccc.int/>