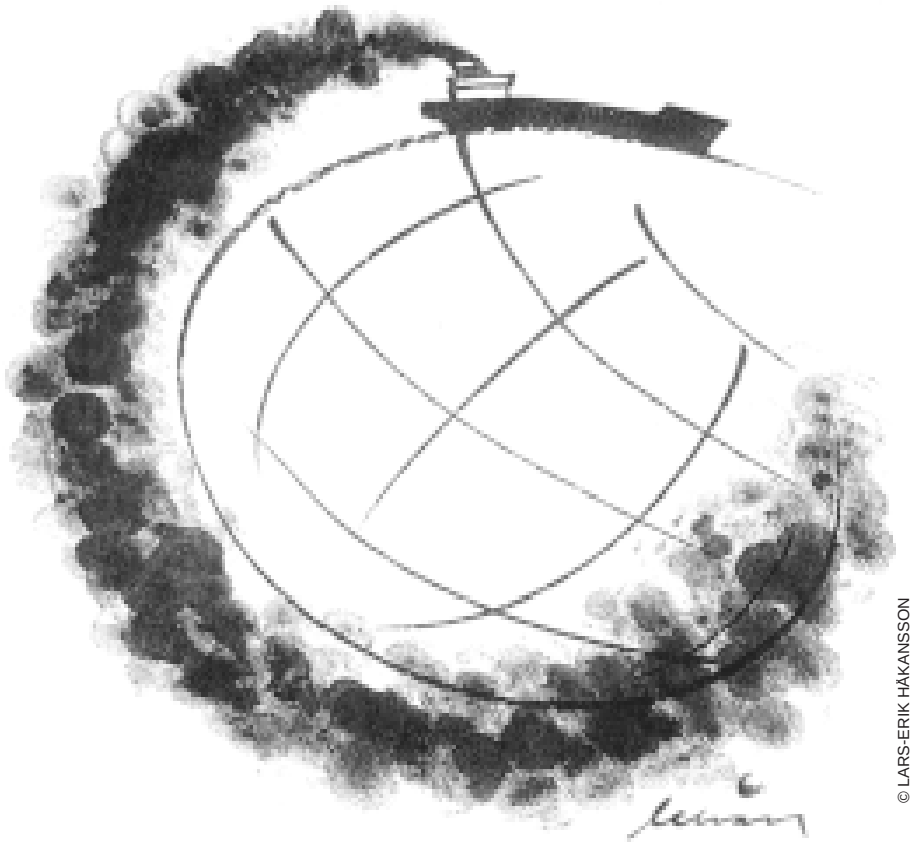
NO. 1, MARCH 2004

Acid News

In this issue:

New factsheet
Climate policy in the EU



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SHIPS' EMISSIONS

Twice as large

THE GLOBAL EMISSIONS of carbon dioxide and nitrogen oxides from shipping may be twice as large as previously estimated, according to a recent study.[1] Those of sulphur dioxide may be 50 per cent larger.

The writers who have tried to determine the size of the emissions from the present world fleet from data on engine types and the way the engines are used are James Corbett, University of Delaware, the US, and Horst W. Köhler, employed at MAN B&W Diesel AG in Germany.

They have come to the conclusion that internationally registered ships – cargo and commercial vessels as well as military ones – together consume about 289 million tons of fuel per year, of which 80 per cent is heavy fuel oil. That is about twice as much as in previous estimates, which have been based on the volumes of marine fuels that were sold internationally.

Since the amount of fuel consumed turned out to be so much greater, the emissions of air pollutants had to be recalculated too. See table.

It turned out that the emissions both of carbon dioxide and nitrogen oxides would increase in proportion to the amount of fuel consumed – in other words, they would also double, as would those of hydrocarbons and particles (PM_{10}), although the basic assumptions are in this case uncertain. Following an adjustment down-

Continued on page 3

Acid News

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

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

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

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THE SECRETARIAT

The Secretariat has a board comprising one representative from each of the following organizations: Friends of the Earth Sweden, the Swedish Anglers' National Association, the Swedish Society for Nature Conservation, the Swedish Youth Association for Environmental Studies and Conservation, and the World Wide Fund for Nature Sweden.

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

In furtherance of these aims, the secretariat operates by

• Keeping under observation political trends and scientific developments.

• Acting as an information centre, primarily for European environmentalist organizations, but also for the media, authorities, and researchers.

• Producing information material.

• Supporting environmentalist bodies in other countries in their work towards common ends.

• Acting as coordinator of the international activities, including lobbying, of European environmentalist organizations, as for instance in connection with the meetings of the Convention on Long-range Transboundary Air Pollution.

• Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.

It should pay, after all

AFTER HAVING EVALUATED 107 federal regulations that had come into force during the ten-year period from l992 to 2002, the White House Office of Management and Budget (OMB) has concluded that it actually pays, both economically and socially, to pass laws to protect the environment. Its latest report, which provides the most comprehensive federal study ever of the costs and benefits of regulatory decision-making, found that the total benefits of these rules were three to five times greater than total costs.

In particular, it noted that the majority of the quantified benefits are attributable to a handful of clean-air rules issued by the Environment Protection Agency (EPA). The benefits of these four rules are estimated to have amounted to $101-119 billion per year and the costs to $8-8.8 billion. The health and social benefits of enforcing clean-air regulations during the past decade are concluded to have been five to seven times greater, in economic terms, than the costs of compliance. This new OMB study thus reaffirms the conclusions of previous analyses made by the EPA to evaluate the costs and benefits of measures taken under the Clean Air Act.

Commenting on the OMB report, William K. Reilly, former administrator of the EPA, said: "Regulated businesses need to recognize that the nation's environmental progress has achieved greater benefits than we anticipated and earned a solid return on our investments."

Because cost-benefit analyses will be assuming ever greater importance both for decision-makers and public opinion, it will be of increasing importance to evaluate how well they are functioning. The American studies in fact confirm what environmentalists have long asserted – namely, that there has been a clear tendency to overestimate the costs and underestimate the gains.

The fact that the expected costs have been almost systematically overestimated in connection with environmental legislation is no news. As William K. Reilly observes: "The explanation for the large variation between anticipated and realized costs of regulation lies in the difficulty in foreseeing what new technologies, inventions or replacement strategies challenged companies will develop to comply with new requirements."

One reason for underestimating the benefits has been that many of them cannot be evaluated satisfactorily in economic terms. It is a matter for instance of the quality of life, human suffering, the preservation of biological diversity, and the risks of future damage to the climate and ecosystems. And beneficial factors that cannot be expressed in monetary terms just don't enter into economic calculations.

The inevitable conclusion of the American studies must be that environmental legislation in general, and clean-air laws in particular, can be very remunerative to society. They are moreover much more profitable than usually appears from the cost-benefit analyses that are made when proposing legislation.

All this carries a clear message for decision-makers both in America and elsewhere. And it should act as a spur to future tightening up of legislation affecting the atmosphere.

CHRISTER ÅGREN

A brief digest of the White House Office of Management and Budget report will be found on page 21 of this issue.

Continued from front page
wards of the average sulphur content of the fuel to 2.5 per cent (2.7 per cent in residual fuel, 1.0 per cent in marine distillate oil and 0.25 per cent in marine gas oil), emissions of sulphur dioxide were estimated to increase by only 50 per cent.

A possible explanation for fuel consumption turning out to be twice as large as had been thought may be found, according to Corbett and Köhler, in the fact that the fuel used by internationally registered shipping is booked in two sets of statistics, domestic and international.

"This implies either that ships operate along domestic routes much of the time or that marine fuel sales to these ships may be misassigned," they say. If international shipping moves closer to the coasts than had been thought, that may affect the calculations of the extent to which the fallout of pollutants over nearshore waters can be ascribed to shipping.

"Given that nearshore emissions from ships may be much larger than depicted in global inventories, regional and local policy jurisdictions may have additional reasons to consider stronger action than the global standard set by the International Maritime Organization," say the authors.

They also produce an analysis showing that most of the uncertainty regarding the amount of fuel consumed derives from estimates of vessel duty cycle and hours of operation. The same factors are also of greatest importance for calculations of the amount of pollutants emitted, although here the choice of emission factors are also important.

The study applies to all ocean-going vessels of more than 100 gross tons, almost 90,000 altogether, as well as close on 20,000 military vessels. The total installed engine power comes to some 450,000 MW.

PER ELVINGSON

[1] Corbett, J. J., and H. W. Koehler. **Updated emissions from ocean shipping**. J. Geophys. Res. Vol. 108(D20), 4650, doi:10.1029/2003JD003751, 2003.

Updated emissions, compared with previous best estimates (Tg=million tons).

	NOx (Tg N)	SOx (Tg S)	CO_2 (Tg C)	HC (Tg CH_4)	PM (Tg PM_{10})
Cargo fleet	5.00	4.72	176	0.574	1.19
Commercial fleet	5.98	5.73	214	0.675	1.45
World fleet	6.87	6.49	249	0.769	1.64
Previous estimate[1]	3.08	4.24	123	0.343	0.853

[1] Corbett et al. 1999.

Clean Marine Award

The Clean Marine Award is a new award scheme to promote low-emission shipping, launched by the EU Commission. The aim is to raise the profile of environmentally responsible EU shipping companies, shippers and ports, and help spread best practice EU-wide. It will also help support the promotion of shipping as an environmentally friendly transport mode.

Awards are available in three categories: EU ship operator, EU shipper, or EU authority (e.g. port, local or national authority). Deadline for receipt of entries is April 20. The award ceremony will be on June 1, during Green Week in Brussels.

Further information: www.europa.eu.int/comm/environment/clean_marine/

NEWS IN BRIEF

Big sport utility vehicles are popular in the US, and a main reason for the poor fuel economy of the vehicle fleet as a whole. Above a Hyundai Terracan.

Guide to Green Cars

The American Council for an Energy Efficient Economy, a non-profit research group in Washington DC, has ranked the cars that are best from the point of view of the environment.

Noting that the choice of car is of particular importance, and that the differences are great even between cars of the same size, the ACCEE asserts that the overall average fuel consumption would decrease by 18 per cent if all new car and light truck buyers chose the most efficient vehicles in each size class.

It says that the list shows further that US automakers are lagging behind foreign manufacturers in the production of environmentally friendly vehicles.

Further information: The guide is available online at www.aceee.org

It can be done

The pharmaceuticals company Pfizer says it has saved 145 000 euros by paying staff up to 7 euros per day to leave their cars at home. The company introduced the scheme at its British centre in Sandwich, where each staff car park space costs 9 euros per day. By offering a small incentive to staff who walk, cycle or use public transport, the company has not only saved money but cut car use by 15 per cent.

Source: **T&E Bulletin**, February 2004.

Harmonized transport emissions standards

Worldwide aligned emission standards for transportation are one step closer now that the European Union, China, Japan and the United States have agreed to jointly address air pollution emitted by vehicles. The agreement covers joint research on emissions and vehicle testing and the creation of a common scientific platform to measure and benchmark air pollution from traffic.

Source: **ENS**, December 11, 2003.

The cost of low sulphur oil

The price of low-sulphur marine fuel will increase as demand rises. Lowering the sulphur content to 0.5 per cent would nevertheless be socially-economically advantageous.

THE AVERAGE sulphur content of marine heavy fuel produced in Europe is currently around 2.9 per cent. In view of the fact that the European parliament is proposing that the content should be limited to 0.5 per cent (see AN 3/03, pp.6-7), a report[1] on the extra cost of such low-sulphur fuel has been prepared at the instance of the Commission.

The total annual sales of marine heavy fuel in the fifteen EU member countries reached 35.9 million tons in 2001, an increase of nearly 3 per cent over the previous year. In 2001, too, 8.8 million tons of marine distillates were sold (marine gas oil and marine diesel), just about 1 per cent more than in 2000.

According to the authors of the report, no statistics are available on the production of heavy fuel oil (HFO) containing less than 0.5 per cent sulphur. They have however tried to make a rough estimate of the refineries ability to turn out that kind of fuel. But it should be noted that their estimate concerns existing refinery capacity, without considering the possibility of additional desulphurizing facilities having been installed.

The global production potential for low-sulphur HFO is estimated to be around 230 million tons, most of which is however assumed to be used in furnaces on land. The potential for global use of low-sulphur HFO as marine fuel is put at 50 million tons, of which 11 million tons in northern Europe. (It may be mentioned by way of comparison that the total world market for marine HFO is around 110 million tons.) It says in the report that the supply of low-sulphur HFO for the marine market is at present constrained because the refiners have no incentive to sell this fuel on the bunker fuel market or any indication of a possibility.

There are three ways in which low-sulphur HFO can be produced. The first and lowest-cost option is re-blending (13-16 euros per ton), which is however not expected to be able to deliver any significant quantities of fuel with less than 0.5 per cent sulphur. The next in order of cost is the processing of lower-sulphur crude oils – replacing high-sulphur crudes with lower-sulphur ones (say, by African crude such as Bonney Light which contains 0.14 per cent sulphur). The incremental cost of this alternative would be 40-45 euros per ton of fuel.

The third and most expensive option is to desulphurize vacuum residue (VRDS). This process is not commonly used today solely for the desulphurization of residues, but it could be coupled with the conversion of residue to lighter products. If only applied for desulphurization, the cost is estimated to be 80-95 euros per ton of fuel.

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Estimated price premium of supplying low sulphur marine heavy fuel oil versus current quality (euro/ton fuel).

	Quantity supplied			
Sulphur	8.5 Mt	17 Mt	25.5 Mt	34 Mt
1.5%	22-52	32-73	35-80	37-83
1.0%	35-81	39-87	40-90	41-92
0.5%	47-92	50-92	51-93	52-93

As can be seen from the table, the extra cost of producing marine HFO with 0.5 per cent sulphur is calculated to lie between 47 and 93 euros a ton. To produce it with 1.5 per cent sulphur would, it is thought, cost 22-83 euros per ton. In 2000 the price of marine HFO was 109 euros a ton.

The table also shows that the more HFO is processed, the higher will be the price, since producing larger quantities will need investments in residue desulphurization. The consultants say their cost estimates "try to demonstrate what is the maximum likely premium," but add "there is a considerable amount of uncertainty."

They have also estimated the price premium of producing low-sulphur distillates. Several kinds of fuel come under this category, but they have studied particularly something called DMC grade fuel, with a maximum sulphur content of 2 per cent. The average market price for this type of fuel (1997-2001) was 151 euros. In comparison, during that same period the price of gas oil for heating, which is a similar fuel but mostly

used ashore, and may contain more than 0.2 per cent sulphur, was l86 euros a ton.

According to the consultants, DMC with at the most 0.2 per cent sulphur would cost about the same as heating oil. The extra cost would therefore be 35 euros a ton, whereas DMC with maximum 0.5 per cent sulphur was estimated to cost 175 euros per ton.

It needs energy to desulphurize oil, so increased desulphurization at the refineries will also increase emissions of carbon dioxide. If half the quantity of the marine HFO sold in the EU (17 million tons) were desulphurized down to 0.5 per cent sulphur, the emissions of carbon dioxide would increase by 1.2 million tons. At present the European refineries are said in the report to emit about 163 million tons of carbon dioxide a year.

The Commission has proposed changing the 1999/32/EC directive so that the marine HFO used by ships (including ferries) in the Baltic and North Seas should contain no more than 1.5 per cent sulphur. When presenting this proposal in November 2002, it also showed a cost/benefit analysis in which the economic gain from the measures was reckoned to be about 2.5 times greater than the costs. See AN 1/03, pp. 4-5.

It would seem reasonable, in view of the fresh cost estimates for 0.5 per cent HFO, to make a new cost/benefit analysis in line with the parliament's proposal for changes in the 1999/32 directive. The political order means that the proposal is now in the hands of the Council of Ministers, who are expected to arrive at a common position during the Irish presidency of the EU, probably towards the end of June.

CHRISTER ÅGREN

[1] **Advice on Marine Fuels. Potential price premium for 0.5%S marine fuels.** Final Report. October 2003. By Beicip-Franlab. Available at: http://europa.eu.int/comm/environment/air/background.htm#transport

Parliament favours a tougher line, ministers are more cautious

IN RESPONSE TO the Commission's communication regarding an EU strategy for reducing emissions from seagoing ships, on December 4 the EU parliament adopted a report drafted by Caroline Lucas (UK) urging among other things that the Commission submit by the end of 2004 a proposal for NOx emission standards – based on the best available technology – for ships.

In the matter of revision of directive 99/32/EC, parliament has requested the Commission to amend its proposal so as to make it accord with the outcome of its first reading, the aim of which was to reduce the emissions of sulphur from shipping by 80 per cent. This was accompanied by a request to the Commission to analyze urgently the costs and benefits of these more ambitious measures.

Parliament is also calling on the Commission to come forward with proposals for all-EU economic instruments for reducing ships' atmospheric emissions generally.

It notes with concern that so far only five EU member states have ratified the IMO's MARPOL Annex VI, which has thus failed to gain a sufficient number of ratifications to enable it to come into force. It calls on those that have not yet ratified – accession countries as well as member states – to do so as a matter of urgency.

A few weeks later, the Council of Ministers adopted its conclusions in regard to the strategy communication. As expected, its attitude was considerably more cautious than the parliament's. The ministers emphasize the importance of pursuing international solutions through negotiations within the International Maritime Organization (IMO). It is somewhat of a paradox that the ministers of the EU countries should be urging the EU member countries that have not yet ratified Annex VI to do so as soon as possible. That would be mostly themselves.

The ministers consider it essential to promote, in the forthcoming revision of MARPOL Annex VI, the adoption of a tighter global sulphur cap for marine heavy fuel oils as well as tighter NOx emission standards, urging the member countries to submit proposals for such standards.

Recognizing the need to investigate specific EU moves concerning the reduction of NOx and greenhouse-gas emissions from ships, they also suggest that the Commission should consider making a proposal for tighter NOx standards by end of 2006 (should the IMO not have put forward any proposals by then), and to report on possible procedures for reducing ships' emissions of greenhouse gases. It should report in 2005. The need to promote emission-abatement technologies and the use of market-based instruments is underlined, with a request to the Commission to develop proposals "as appropriate."

CHRISTER ÅGREN

The texts both of the parliament's report and the Council's conclusions are available at http://europa.eu.int/comm/environment/air/transport.htm#3

The communication on an EU strategy for reducing atmospheric emissions from seagoing ships, which was issued in November 2002, says how the Commission intends to work on the matter (see AN 1/03). It has been handed over to the Council of Ministers and the EU parliament for comment.

The Commission's proposal for a revision of directive l999/32/EC was also presented that November (see AN 1/03). Since it will be a legal matter, it will eventually have to be approved both by parliament and the Council. The parliamentary procedure had come so far as to arrive at a first reading (see AN 3/03). The Council is expected to have reached a common position in June, whereafter the directive will be returned first to parliament for a second reading and then to the ministers for adoption. Should there be any disagreement between them, there will have to be recourse to "conciliation negotiations."

Economic instruments studied

The EU Commission has turned to the possibility of using economic instruments for reducing air pollutants at sea,which will amount to new thinking in regard to shipping.

SHIPS' EMISSIONS of air pollutants continue to rise in step with increasing transportation by sea – thus also increasing the contribution of shipping to the damage to health and the environment occasioned by these pollutants. But emissions from ships will assume relatively greater importance as emissions from land-based sources decline as a result of regulation. Within the next ten to fifteen years the emissions of sulphur and nitrogen oxides from ships trading in European seas are projected to equal all such emissions from land in the European Union.

Realizing the need to reduce the emissions from shipping, the Commission has now started to consider action, but because of shipping's international character, it may be difficult to quickly introduce requirements with generally binding effect. The Commission has therefore had a study[1] made of the possibility of using economic instruments.

The consultants who made the study have divided such instruments into two separate categories:

❏ Emission-trading programs, in which participants trade "quantities" (typically emissions, or more specifically rights to emit).

❏ Emission-charging programs, in which participants respond to a charge or price (either on emissions or some other quantity – such as sulphur in fuel – linked to emissions).

The study includes an analysis and appraisal of six types of "market based" programs – three for emissions trading and three for charging in different ways – as well as variations of these.

1. CREDIT-BASED TRADING. Credit programs provide tradeable "credits" to facilities that voluntarily reduce emissions below the business-as-usual levels. For shipping, such a program would allow shipowners to reduce emissions and sell the emission-reduction credits to land-based sources assumed to be subject to a cap-and-trade program.

2. BENCHMARK TRADING. Benchmarking programs identify a specific emissions rate to apply to covered activities and require that the average emission rate from these activities shall not exceed the benchmark level. For shipping, a benchmarking emission rate would be set for ships subject to the program. This would then allow shipowners or operators to buy and sell credits between themselves, based upon a formula linking emission rates to credits.

3. CAP-AND-TRADE. Here an aggregate cap on emissions is set for a given year by creating a total number of emissions "allowances," each of which provides its owner with the right to emit a unit (typically a ton) of emissions. Through the cap, total emissions are limited, not only emission rates. In the shipping context, a cap could be set for overall emissions within a given sea region, with individual ships allocated allowances and allowed to trade them amongst each other.

Effective monitoring and enforcement is critical under all programs

4. TAXATION. In this context, the intention of the tax is to reduce shipping emissions, not to raise revenue. A fuel sales tax could be aimed at reducing the sulphur content of fuel. Similarly, a fuel-use tax would tax the sulphur in the fuel used by each ship. Alternatively, an emissions tax would tax the emissions of air pollutants from ships.

5. EN-ROUTE CHARGING. These charges are based on the distance travelled, and on the level of emissions from each ship. In principle, authorities could collect charges from all vessels using European waters.

6. DIFFERENTIATED DUES. Port and/or fairway dues could be differentiated according to a ship's emissions of various air pollutants. (A revenue-neutral such system has been in use in Sweden since 1998, to encourage reductions in emissions of SO_2 and NOx.) Programs could be designed to be either voluntary or mandatory.

It is made clear that effective emissions monitoring and enforcement is critical under all type of programs. Methods must consequently be designed to monitor and report emissions (or other relevant operating data) from each participating ship, in order to measure compliance.

In order to compare the feasibility of various approaches to reducing ships' emissions, each type of program has been evaluated on the basis of a number of criteria such as environmental performance, cost-effectiveness, administrative costs, distributional impacts, and legal/political feasibility.

Not unexpectedly, each type of instrument has its advantages and disadvantages, which the consultants discuss fairly impartially.

Which of them is to be preferred will depend very much on the weight given to the various criteria – and that can vary very greatly, according to the involved interests.

In their conclusion, the consultants have discussed which of their alternatives seem most promising – emphasizing that these types of market-based instruments represent new thinking for the marine sector, and that it would therefore seem best to start with rather modest programs.

As "tentative recommendations" they advance three alternatives: one credit based, one involving benchmarking, and a third based on voluntary differentiation of port dues.

It is worth noting that all these are in fact voluntary programs, and that none of them can be expected to result in any marked emissions reduction. The first two will moreover need changes in current legislation for their adoption. The first (credit-

based) one would also give rise to extra complication since it assumes that a cap-and-trade system for land-based emission sources will already be in place.

Since the prime aim of launching instruments of this type will be to markedly reduce the emissions of pollutants from shipping, and so help the EU's environmental objectives as cost-effectively as possible, the alternative that fulfills that criterion ought to be the one to be preferred.

Those environmentalist organizations that have examined the NERA report (among them the EEB and T&E) from this aspect, advocate first proceeding with distance-based en-route charges. But they also think it would be worthwhile to investigate certain other alternatives, namely, emissions taxing (or emissions charging), mandatory port/fairway dues, and cap-and-trade. The EEB and T&E also emphazise that economic instruments should be used primarily as a complement – rather than an alternative – to binding regulations.

Although the consultants have appraised several alternatives, there may well be other kinds of economic instrument than those they have examined, which might also be suitable in this context. It might be equally worthwhile to consider whether it would have been better to deal with each pollutant separately, using different instruments for each, instead of relying on one single alternative.

CHRISTER ÅGREN

[1] **Evaluation of the feasibility of alternative market-based mechanisms to promote low-emission shipping in European Union sea areas.** (2004) A report for the Environment Directorate of the European Commission, prepared by NERA Economic Consulting. Will be available at http://www.europa.eu.int/comm/environment/air/transport.htm#3

MARPOL CONVENTION

Held up by countries delaying to ratify

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After more than six years, ten EU member countries have still not ratified Annex VI of the MARPOL Convention. They are Austria, Belgium, Finland, France, Ireland, Italy, Luxembourg, the Netherlands, Portugal and the United Kingdom.

AT THE END OF 2003, still only twelve countries had ratified MARPOL Annex VI, intended to limit the emissions of air pollutants from ships operating in international trade, despite several countries having promised, at a MARPOL meeting at the end of June, to do so quickly.

The annex sets limits to the sulphur content of marine heavy fuel oils (with a global cap of 4.5 per cent) and to the emissions of NO_x from new ship engines. They are however so weak as to be hardly likely to have any appreciable effect. It does on the other hand set a limit of 1.5 per cent sulphur in the heavy fuel oil of ships sailing in Sulphur Emission Control Areas (SECAs) which should lead to reductions in the two designated areas, the Baltic and North Seas.

The annex was adopted by the member countries of the IMO, the International Maritime Organization, more than six years ago, in the autumn of 1997. But to enter into force it needs the ratification of at least 15 states representing 50 per cent of the world's gross tonnage. The twelve countries that have ratified so far are the Bahamas, Bangladesh, Denmark, Germany, Greece, Liberia, the Marshall Islands, Norway, Panama, Singapore, Spain and Sweden, which together represent well over 50 per cent of the required tonnage.

Beyond that, ratification is obviously proceeding at a very slow pace –most countries having been giving very little priority to the matter. Moreover the very construction of the treaty permits still further delay – since the annex will not begin to apply until twelve months after fulfillment of the requirements for ratification.

Further, there will be a special exception from the 1.5-per-cent sulphur requirement in SECAs during yet another year after the annex has entered into force. In practice that will mean that even if the ratification requirements should have been fulfilled by mid-2004, which is probably optimistic, the 1.5-per-cent sulphur limit won't start to apply in the Baltic until the middle of 2006, while the corresponding requirement for the North Sea will be delayed yet another year, until the summer of 2007. That is because the decision to make it a SECA was taken a year later than that for the Baltic.

The weak requirements do not mean that proper ratification of Annex VI will be of little practical importance. For one thing the SECA limits, such as they are, will at least begin to apply, and for another ratification will open the way to further proposals and negotiations for tighter limits on fuels and emissions, as well as for setting up more SECAs.

CHRISTER ÅGREN

EU NEWS IN BRIEF

New pollution emission register

Detailed information on individual plants' emissions of pollutants in the EU area is now available in an internet database. It is named Eper, the European pollutant emission register, and run jointly by the EU Commission and the European Environment Agency.

Initially, Eper will present data on emissions of 50 named pollutants from industrial facilities in 16 countries (the EU-15 plus Norway), and cover 56 industry sectors regulated under EU's integrated pollution prevention and control (IPPC) directive. The register gives data on some 10,000 plants.

The data now published is for 2001. It will be updated to 2004 in 2006, when it will also include information on facilities in the 10 accession countries.

The availability of such information about individual plants is deemed likely to lead to increased pressure on the owners of the facilities to cut down emissions.

Web address: www.eper.cec.eu.int.

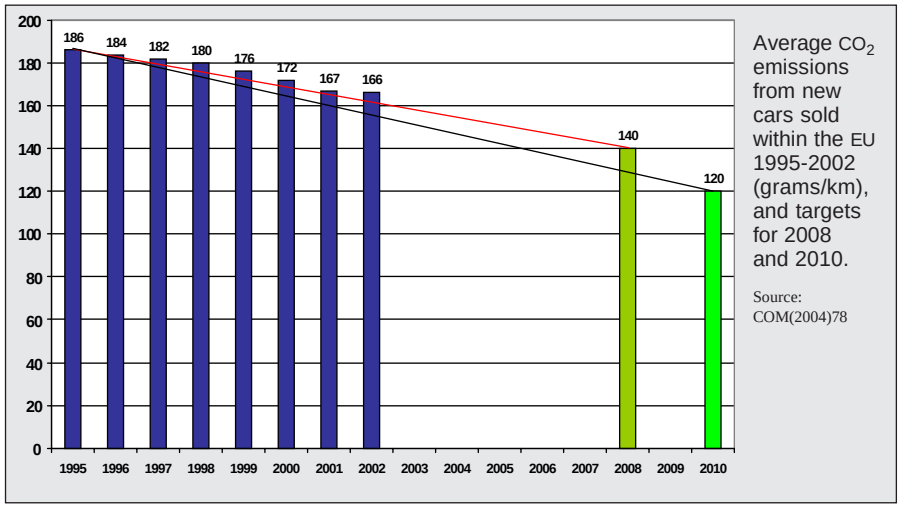
Environment in public procurement

Following conciliation, the EU parliament and the Council of Ministers have agreed on two directives to regulate public procurement contracts in the union. This gives hope of more "green" purchasing of anything from office equipment to public transport vehicles to food.

Contention has mostly revolved around the extent to which authorities can take social and environmental criteria into account in granting contracts. Under the new rules buyers are not obliged to accept the lowest bid, as the ministers wanted, but may also take into account production methods in any technical specifications laid down for a contract.

Actually the new directives will in practice be unlikely to bring about any great change. There was nothing in the replaced ones to prevent environmental considerations being taken into account, and in a verdict of 2002 the European Court of Justice had laid down that such considerations could be taken into account in public procurement (AN 4/02). Actually "green" procurement is more likely to be curbed by lack of money. It is now valued at about 1.4 billion euros per year, or 14 per cent of the EU's GDP.

Source: **Environment Daily**, December 4, 2003.



Average CO_2 emissions from new cars sold within the EU 1995-2002 (grams/km), and targets for 2008 and 2010.

Source: COM(2004)78

CO_2 FROM NEW CARS

Emissions coming down, slowly

TWO DIFFERENT TARGETS have been decided for the emissions of carbon dioxide from new cars in the EU:

❑ After having been threatened with obligatory standards, the European carmakers agreed in 1998 to "voluntarily" reduce emissions on an average by 25 per cent between 1995 and 2008. This will amount to lowering them from 186 to 140 grams per kilometre. The Japanese and Korean manufacturers will have until 2009 to comply.

❑ Both the Council of Ministers and the EU parliament have set as a target that by 2010 emissions shall not exceed 120 grams per kilometre.

The actual rate of progress can be read off from annual reports, of which the latest was published in February this year (COM(2004)78), showing that in 2002 emissions averaged 166 grams per km. That would be 11 per cent under the 1995 figure, but compared with 2001 the improvement was no more than 1 gram per km, a record low.

Attainment of the 140 gram target for 2008-09 will call for a drop in emissions of 3 percentage points, or just about 4 grams/km every one of the remaining years. The Commission is however of the opinion that at least the European and Japanese carmakers are "on track."

To attain 120 g/km by 2010, even greater annual reductions will be needed – close on 6 g/km during the remaining period. The Commission has however not given up hope, saying "it remains realistic to meet the objective by 2010 if the necessary measures are taken and all efforts are made."

Most of the reduction so far can be traced to an increased proportion of diesel vehicles. Although they emit less CO_2 than petrol-driven ones, they let out more in the way of nitrogen oxides and particles, so the Commission is not particularly enthusiastic.

The agreement with the carmakers is considered a "cornerstone" for attainment of the 2010 target. The Commission hopes to enhance the effect by obligatory labelling of new cars fuel economy and CO_2 emissions, as well as by fiscal instruments. Already in 2002 it had proposed that car taxation in the member countries should be based on emissions of CO_2 (COM(2002)431). Parliament has approved, but the ministers have yet to make up their minds.

The Commission has recently started negotiations for a new agreement with the carmakers for the time when the present one comes to an end. The German environment minister Jürgen Trittin has already called for legislation that would force manufacturers to reduce the emissions of CO_2 from new vehicles to an average of 120 g/km by 2012.

Commission's report on the current situation is available at http://europa.eu.int/comm/environment/co2/co2_home.htm

Favoured standards not included in proposal

IN FEBRUARY THE EU parliament's environmental committee voted for the introduction of binding limits for arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons (PAHs), as proposed by its rapporteur, Hans Kronberger, Austria. It also wanted to see the requirements for mercury strengthened.

The limit values favoured by the environmental committee are based on the recommendations put forward by the Commission's working groups of experts in their "position papers," which however the Commission decided not to include in its proposal for a directive. That now only sets a requirement for monitoring when concentrations cross certain thresholds (see AN 3/03, p. 19). The parliamentary committee wanted to set the term for compliance with the proposed limits to 2010, while yet allowing for extension of that deadline under certain conditions.

The committee's decision was welcomed by EEB, the environmentalist umbrella organization. It expressed surprise, though, at liberal members of the parliament, as well as a UK labour party member, voting against the proposed standards.

The directive is expected to come up for a first reading in parliament early in March. If accepted, it will be the fourth in a series of daughter directives to the framework directive on air quality that was adopted in 1996 to set uniform air-quality standards for the EU. The other three daughter directives regulate sulphur dioxide, nitrogen dioxide, particulate matter, lead, benzene, carbon monoxide and ozone.

RENEWABLE ENERGY

No agreement on a EU target for 2020

IT WAS GENERALLY AGREED at the European Conference for Renewable Energy in Berlin this January, instigated by the EU Commission, that 20 per cent of the EU energy supply could come from renewables. But that was not set as a target.

The chief aim of the conference was to prepare a common attitude for the EU countries to take at the Renewables 2004 conference which is to take place in Bonn in June as a sequel to the UN meeting on sustainable development in Johannesburg in 2002.

In the concluding recommendations from the Berlin conference – which was attended by ministers from ten EU and two accession countries – the EU institutions are urged "to start a political process of setting ambitious, time-bound targets." But no details were given. The conference did however conclude that "at least 20 per cent [by 2020] is achievable."

The difficulty of agreeing on a specific target is blamed by many on the attitude of Loyola de Palacio, the energy commissioner, who has openly criticized the Kyoto protocol and didn't even attend the Berlin meeting. A target for 2020 is hardly likely to be discussed before the new EU Commission assembles this autumn. Warnings were also heard in Berlin that it would be difficult for the EU even to attain the accepted 12-percent target for renewable energy by 2010.

Information: www.renewables2004.de (website for the Renewables 2004 Conference)

EU NEWS IN BRIEF

VOCs in paints

At their meeting last December, the EU environment ministers formally adopted a common position regarding a directive for limiting organic solvents in paints and varnishes (COM(2002)750). A political agreement had already been reached in October.

Differing little from the Commission's proposal, the ministers' position means that manufacturers will have to reduce the amounts of organic solvents in paints, varnishes and vehicle refinishing products to maximum limits set out in the directive from January 2007. A second round of reductions would apply from January 2010.

The Parliament will consider the proposal in a second reading within shortly.

Exemptions for new members

All accession countries except Cyprus have asked for temporary exemption from the requirements of the EU directive on energy taxation, which was concluded in October 2003. The exemptions the Commission now proposes to allow are similar to those that many of the present member countries have already been granted. The minimum requirements in the directive must be into force everywhere at the latest by 2012.

COM(2004)42, available at http://europa.eu.int/comm/taxation_customs/whatsnew.htm

To be more effective

The Commission wants to see an improvement in energy efficiency. A proposed new directive[1] would require the member countries to have attained two energy savings targets and to ensure that suppliers of energy offer energy services for the period 2006 to 2012. Energy services are defined as integrated packages of energy and the energy-efficient technology needed to deliver these services.

What is now proposed is a general end-use savings target of 1 per cent a year and a demand-side sectoral target requiring member states to improve energy use by at least 1.5 per cent a year, mainly through energy-efficient public procurement. To help member states achieve the targets and obligations and to make sure that progress can be monitored, the draft directive sets up a harmonised framework through common definitions, tools and methodology.

[1] Proposal for a directive on energy end-use efficiency and energy services COM(2003)739 final.

EU NEWS IN BRIEF

Linking directive

The Commission's proposal for linking the flexible mechanisms of the Kyoto protocol with the emissions trading directive is to be taken up in the parliament's environmental committee in March.

Alexander de Roo, the parliamentary rapporteur, has proposed in a draft report dropping the requirement that the Kyoto protocol must have come into force before those mechanisms can start to be used in the EU trading system. He also proposes that the clean development mechanism should be introduced in 2005, not 2008 as in the Commission's proposal. In compensation for these "industry friendly" proposals, de Roo would allow a country to fulfill no more than half its commitment through measures taken somewhere else. There is no such ceiling in the Commission's proposal.

Efforts are now being made both in the council and the parliament to find a solution by which they would be so much in agreement that the directive would only have to be dealt with once in the parliament. The plenary session in April will be the last before the summer elections. Most of de Roo's proposals are acceptable to the member countries – except that for the ceiling on flexible mechanisms, which is opposed by many of them.

Source: **Environment Daily**, February 5, 2004.

Urban environment

The Commission has put forward a basis for discussion of a strategy for urban environment, which is supposed to be ready in the summer of 2005. Outstanding items to be taken up include the development and implementation of urban environmental management plans and sustainable urban transport plans by the 500 largest cities in the EU 25 (with more than 100,000 inhabitants).

Towards a Thematic Strategy on the Urban Environment. COM(2004)60. Open for comments until April 15. See http://europa.eu.int/comm/environment/urban/thematic_strategy.htm

Co-generation directive adopted

Following a compromise between the parliament and the council, the directive for the promotion of cogeneration (2004/8/EC) could finally be adopted on January 26. Although it sets no binding targets for the member states, it does contain a series of concrete measures in favour of cogeneration and provides a framework for national policies to increase its use.

Air pollution down but slower on other aims

AUSTRIA GETS MOSTLY positive acclaim in the OECD's evaluation of its efforts in the environmental field, noting amongst other things its steady progress in reducing a range of air pollutants and its decoupling of the emissions of sulphur, nitrogen and carbon dioxide from economic growth. It has attained low levels in the intensity of pollution (a reflection of low energy intensity) and come to use renewable energy to a relatively high extent (bringing it up to 24 per cent of the total energy supply).

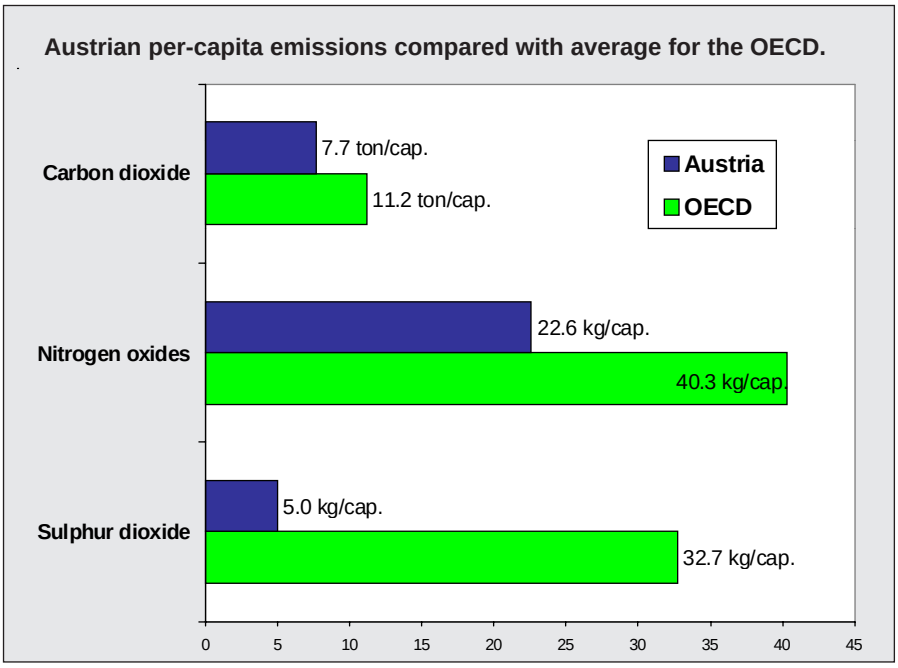
The OECD draws attention particularly to detailed environmental regulation, targeted investment support, use of the best available technology and solid environmental administration as key mechanisms driving such performance. Compared with other OECD countries, Austria spends relatively large sums on pollution abatement and control (more than 2.1 per cent of GDP). It is considered to have been unusually successful, too, in informing on and bringing about compliance with environmental regulations.

While well on the way to meeting its commitments under the EU emission ceilings directive, Austria has still far to go, says the OECD, towards meeting its national targets for the reduction of nitrogen oxide emissions and those of non-methane volatile organic compounds.

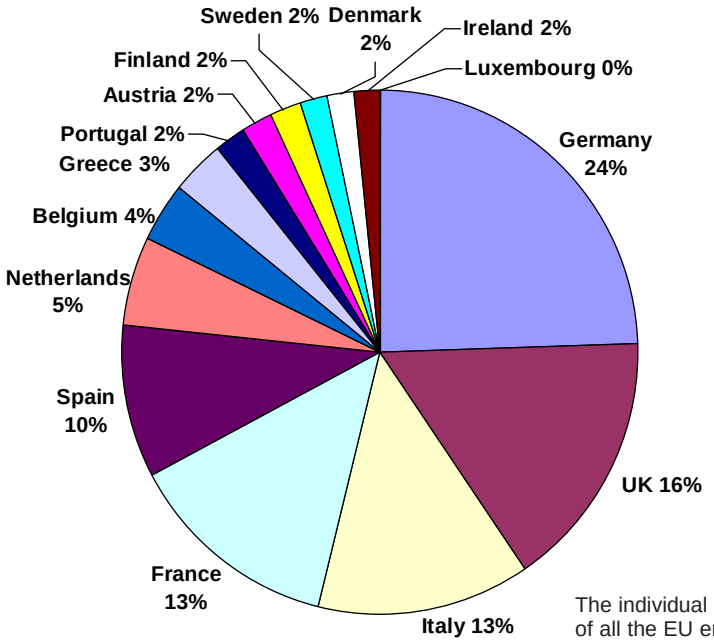
The country is also far from meeting its commitments under the EU burden-sharing agreement for greenhouse-gas emissions. Since l990 these have risen by 3 per cent, whereas the target for 2008-12 is to have reduced them by 13 per cent. To aid reductions, the OECD urges Austria to take further steps in environmental tax reform.

In its review, the OECD also recommends the country to improve the efficiency of its environmental policies by integrating efforts in sectors such as energy, transportation, agriculture and forestry, urging a wider use of economic instruments and better demand management in the transportation and waste sectors.

Source: **Environmental Performance Review: Austria**. 208 pp. 37.00 euros. Can be downloaded free of charge from the OECD online bookshop: www.oecd.org. Also available in printed format from OECD, c/o Turpin Distribution Services Ltd., P.O. Box 22, Blackhorse Road, Letchworth SG6 1YT, UK.



EU ON CLIMATE CHANGE: TARGETS, STRATEGIES AND LEGISLATION



The individual countries' parts of all the EU emissions of greenhouse gases in 2000.

Environmental Factsheet No. 15 February 2004

See also related factsheets in this series:

No. 10, June 2002: EU legislation on air pollution and acidification

No. 11, December 2002: The Intergovernmental Panel on Climate Change (IPCC)

No. 12, February 2003: The Kyoto Protocol.

Available at www.acidrain.org/publications.htm

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A FIRST STRATEGY to limit emissions of carbon dioxide and improve energy efficiency in the EU was proposed by the Commission in 1991 – a year before the UN Framework Convention on Climate Change was signed.

The EU was among the most active in the negotiations leading to the Kyoto protocol to the climate convention, urging the industrialized countries to reduce their emissions of the main greenhouse gases – carbon dioxide, methane and nitrous oxide – by 15 per cent between 1990 and 2010, with an interim target of 7.5 per cent for 2005.

Commitments under the Kyoto protocol

When the protocol was finally signed in 1997, the EU had committed itself to reducing emissions of the six gases included in it by 8 per cent for the period 1990 to 2008-12. That will amount to a reduction of the annual emissions by 336 million tons of CO_2 equivalents.

EU's ratification of the protocol was agreed by the Council of Ministers in April 2002. The relevant directive (2002/358/EC) also put into law the previously agreed burden sharing among the member states (see Fig. 1). The fact of its now being law means, among other things, that each country must fulfill its commitment – no one country can, for instance, reduce its quota by claiming that another has brought down its emissions more than needed. The directive sets however no limit for member countries to meet their commitments by buying emission rights from countries outside the EU.

Short and long-term aims

Combating climate change was one of the items in the **Strategy for Sustainable Development** that was adopted by the European Council[1] in June 2001, but the strategy says little more than that the EU has to fulfill its commitments under the Kyoto protocol, and supports the aims set forth by the Commission in its proposal for Sixth Environment Action Programme, and that the target of the directive for renewable energy – to ensure that 22 per cent of the gross electricity supply shall be coming from renewables by 2010 – shall remain unchanged.

The **Sixth Community Environment Action Programme**, adopted in 2002 (1600/2002/EC), lays the foundation for EU activity in this field during the next ten years, with climate change as one of four priority areas for urgent action. The objective is said to be "to stabilize the atmospheric concentrations of greenhouse gases at a level that will not cause unnatural variations of the earth's climate," which is just about what it says in Article 2 of the UN climate convention.

While noting that a short-term target for the EU must be to meet its commitments un-

[1] Attended by members' prime ministers and foreign ministers, as well as some heads if state, the European Council rarely passes measures having legal force.

der the Kyoto protocol it adds that according to experts' estimates the global emissions will have to be reduced by 70 per cent to meet the long-term objective. As a medium-term aim those emissions should be brought down, through international agreement, by 20-40 per cent from 1990 to 2020. The need "to move towards a global equitable distribution of greenhouse gas emissions" is also emphasized.

Mentioned, too, are some of the indicative targets included in various directives, such as that 12 per cent of the energy used in 2010 must come from renewables, and that combined heat-and-power shall then constitute 18 per cent of gross electricity generation.

The Council of Environment Ministers had further laid down, in a statement dated October 17, 2002, that "global efforts should be guided by a long-term objective of a [maximum] global temperature increase of 2 degrees Celsius over pre-industrial levels and a stabilization of CO_2 concentrations below 550 ppm."[2]

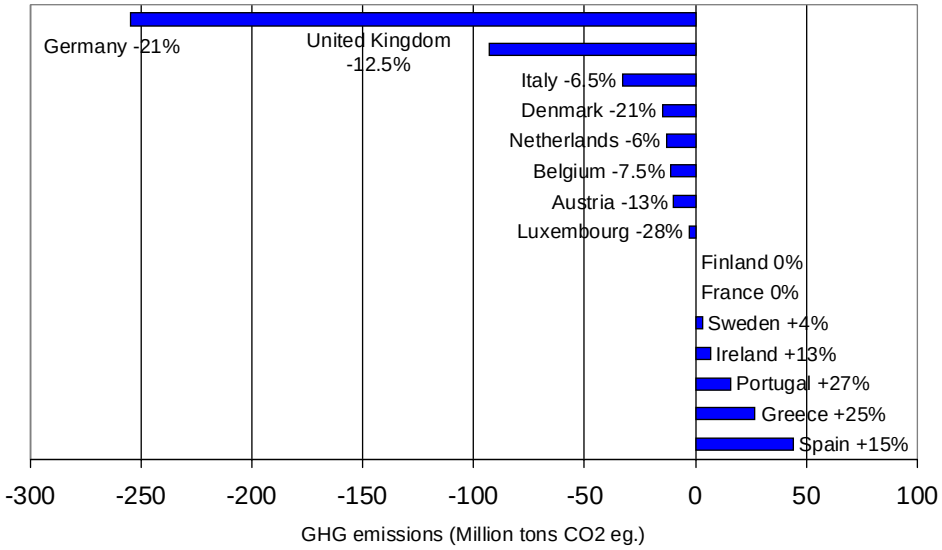

Fig. 1. How the EU commitment under the Kyoto protocol has been allocated among the member countries, showing the reductions or increases in per cent that will be required of each country between the base year and 2008-12. The columns show how the annual emissions of greenhouse gases from each country must be changed during the same period (expressed as million tons of CO_2 eq). The overall figure of 8 per cent will mean a reduction of 336 million tons.

European Climate Change Programme

In October 1999 the Council of Environment Ministers requested the Commission to put forward a list giving priority to the actions and policy measures needed for achievement of the EU's Kyoto commitment. The Commission subsequently started on the European Climate Change Programme (ECCP) in June 2000. A year later, following collaboration with groups of representatives of the EU member countries and other interested parties, a report was produced with their findings.

That report identified 42 possible measures that could lead to reducing the emissions of CO_2 equivalents by 664-765 million tons annually at a cost of less than 20 euros per ton – that reduction being about double what is required of the EU for the first period of the Kyoto protocol.

Then in October 2001 the Commission followed up with a plan of action (COM (2001)580) to implement the first phase of the ECCP, outlining the priorities the Commission had set itself to carry out in 2002 and 2003. A proposal for a directive for ratification of the Kyoto protocol was put forward at the same time (see above), and also for a system of trading in emission quotas (see below).

A second ECCP report was published in April 2003, giving an overview of the work done in the various working groups, concerning for instance flexible mechanisms and an investigation of the potential for carbon sequestration in soils and forests. It also gives a general account of the follow-up work for the implementation of measures that were identified in the first phase of the program.

Trading in emission allowances

When the EU undertook, under the Kyoto protocol, to reduce its emissions as whole by 8 per cent from 1990 levels by 2008-2012, it argued that the target should be met primarily through reductions within the EU itself.

In October 2001 the Commission proposed a system of trading between the member countries (COM(2001)581 Final). After a compromise between the Council of Ministers and the parliament, a directive was agreed in the summer of 2003 (2003/87/EC). It allows limited trading in carbon-dioxide emissions from certain sectors, comprising altogether about 10,000 plants. It is to start in 2005. The intention was to ensure that the private sector would find the most cost-effective ways of reducing its emissions of CO_2. Each country will have to inform the Commission, at the latest by March 2004, of the way in which it intends to allocate its quotas. Provided the Kyoto protocol has by then entered into force, trading at a global level will start in 2008.

When once the rules for trading within the EU had been adopted, the Commission proposed a way of making the internal trading scheme compatible with the flexible mechanisms of the Kyoto protocol (in COM(2003)403). The aim of this "linking directive" is to enable an EU company to bring about a reduction of emissions in some other part of the world and count the gain as a credit in the EU scheme. Such projects would however have to fulfill the requirements of the Kyoto protocol. The proposal is now (March 2004) being discussed between the Council of Ministers and the parliament.

Energy and transportation – general

There are several programs, white papers,[3] directives and so forth that are likely to affect, directly or indirectly, EU emissions of greenhouse gases.

In the Commission's **green paper**[4] **on a European strategy for the security of energy supply** (COM(2000)769 Final), presented in 2000, it was noted that fossil fuels account for four fifths of total energy use, and that two thirds of the current need has to be imported. Since the EU's sources of energy are limited, more efficient use was urged as a means of reducing dependence on foreign sources in times of crisis – a line that was generally supported in the replies to the Commission (COM(2002)321 Final).

Integrated pollution prevention and control (96/61/EC). The IPPC directive applies to large industrial and agricultural installations. To obtain IPPC permits, op-

[2] According to the researchers' estimate in the IPCC's third assessment report of 2001, the concentrations of CO_2 would however have to be limited to 450 ppm or less if the 2 per cent mark is to be attained.

[3] Commission White Papers are documents containing proposals for EU action in a specific area. In some cases they follow a Green Paper published to launch a consultation process at EU level.

[4] A green paper essentially provides matter for discussion.

erators must demonstrate that they are using the best available techniques (BAT) to control all kinds of pollution. They must also, in principle, be using energy efficiently, although this requirement has been partly overridden by the emissions trading directive. Work on developing a "horizontal" BREF (best available techniques reference document) on energy efficiency was scheduled to start in 2003. Industries covered by the emissions trading directive (most of those requiring IPPC permits), will not be required to reduce their CO_2 emissions in order to receive such a permit. When the emissions trading has been expanded to cover other greenhouse gases as well, the emissions of these gases may also be exempted.

Liberalization of the electricity and gas markets (2003/54/EC). The markets are to be opened for non-household users by July 2004, and for all users by July 2007. The directive does not require however any declaration of the energy's source or of its effects on the environment, as the parliament and others had demanded. An expected effect of the directive is that gas will be favoured at the expense of coal, with a consequent lowering of the emissions of CO_2. Lower prices for electricity may on the other hand result in an increased use of energy and slower modernization in this sector.

In a **white paper for a common transport policy** (COM(2001)370), the Commission explains how it intends to act, saying that it will be important to break the connection between increased economic growth and increased transportation. One aim will be to bring back the modal split in the transportation sector to its 1998 level by 2010. Some sixty measures are proposed that have either already been put forward by the Commission or will be. These include charging for use of the infrastructure and liberalization of the railways. Environmentalists regard the white paper more as a means of solving the problem of congestion that creating a sustainable transportation system.

Public procurement. After a compromise between the parliament and the Council of Ministers, rules were adopted in December 2003, making it possible to set environmental requirements and make them the criterion for acceptance of bids. It has emerged from work on the Climate Change Programme (ECCP) that a directive on energy-efficient public procurement, aimed at directing the demand from the public sector for energy and energy-using equipment, would enable emissions to be reduced by 25-40 million tons of CO_2 equivalents a year, at a cost for the most part of less than 20 euros per ton.

Economic instruments

Minimum taxation of energy products and electricity (2003/96/EC). Besides setting new minimum rates for the taxation of mineral oils, this directive adds similar ones for electricity, gas and coal. The still low rates and various exceptions to individual countries will mean however that there will be little effect on the emissions of greenhouse gases. There is to be no revision of the rates before 2012. An amendment to allow the accession countries temporarily to apply excise duty exemptions or lower rates of duty was presented by the Commission in January 2004 (COM(2004)42).

Proper prices for transportation. There are a number of documents and statements emphasizing the need to find methods for better internalization of the external costs of transportation in the EU – in other words to make it pay for the social costs it gives rise to. At the meeting of the European Council in Gothenburg in 2001, it was decided that the costs of all four modes of transportation should be internalized by 2004. The Commission is however only proceeding slowly with the matter, and the communication that is expected to precede a proposal for a framework directive is still awaited. The framework directive will be succeeded by daughter directives for each mode.

Charging of heavy goods vehicles for the use of certain infrastructures (1999/62/EC). The so-called Eurovignette directive permits those member countries that so wish to charge vehicles weighing more than 12 tons for the use of the country's motorways. The Commission has proposed alterations in the directive (COM(2003)448) so as to make it possible to make the charges dependent on the distance travelled and to include all vehicles of more than 3.5 tons – although still only on the main road network. A controversial part in the proposal is to earmark the accruing income for extension of the infrastructure.

Increased use of renewables

An all-inclusive document is the Commission's **White paper for a Community Strategy and Action Plan on renewable sources of energy** (COM(97) 599 Final), proposing a doubling of renewable sources in the EU's gross internal energy consumption, from 6 per cent in 1995 to 12 per cent in 2010. If necessary for achievement of the targets, the Commission should submit proposals that may include mandatory targets. A communication on implementation of the white paper was presented in 2001 (COM(2001) 69(01)).

Electricity Production from Renewable Energy Sources (2001/77/EC). Directive aiming at making 22 per cent of the electricity production come from such sources, as against 14 per cent in 1997. Sets indicative targets for each member country. The Commission calculates that if these targets should be attained, they will have the potential for reducing emissions by 100-125 million tons of CO_2 eq. per annum. The Commission is to report, before October 2005, on the extent to which national schemes in support of the directive have been applied, and on their effectiveness. If it appears appropriate, that report should be accompanied by a proposal for an EU framework for such schemes.

Promotion of the use of biofuels or other renewable fuels for transport (2003/30/EC). Each country is asked to bring about a 2-per-cent penetration of biofuels in petrol and diesel by December 2005, and further to 5.75 per cent by December 2010. Exception may be granted if there is little potential in the country for the production of biofuels, or if the biomass is being used for other purposes. Attainment of the indicative target will, in the Commission's estimate, bring an

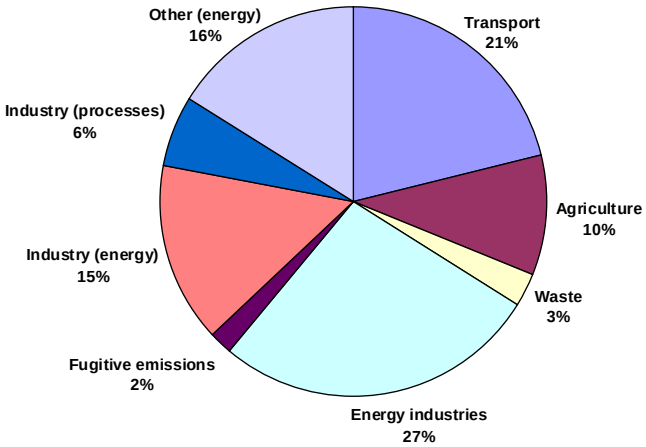

Fig. 2. The EU countries' emissions of greenhouse gases in 2000, by sector.

Note. The distribution by sector has been made in accordance with the guidelines of the climate convention. The "Other (energy)" sector includes the use of energy by households, small commercial businesses, and services.

annual saving of 35-40 million tons of CO_2 equivalents, although at a relatively high cost of 100 euros per ton.

More efficient use of energy

Energy performance of buildings (2002/91/EC). Since they account for as much as 40 per cent of the energy use in the EU, buildings mean much for the emissions of CO_2. The directive contains a general framework for calculation of their energy performance and sets minimum requirements for new buildings as well as for existing ones of more than 1000 sq.m. when subject to major renovation. As from 2006 it will also require certification of buildings and regular inspection of boilers and air conditioning equipment. Besides bringing down the use of energy, many of the proposed measures are estimated to be profitable.

Framework directive on the energy labelling of household equipment (92/75/EC). This one has been followed by a series of daughter directives requiring energy labelling of refrigerators, freezers, washing machines, tumble dryers, dishwashers, lamps and air conditioners.

A proposal for a directive on establishing a framework for the setting of eco-design requirements for energy-using products (COM(2003)453). Aims at integrating environmental considerations as early as possible into the product development process. The proposal does not introduce directly binding requirements for specific products, but does define conditions and criteria for setting them.

Reduced emissions of carbon dioxide from new cars. After being threatened with legislation, the carmakers' three trade associations gave way to an agreement in 1998, stipulating that the average emission of CO_2 from new cars sold in the EU shall have been reduced to 140 grams per kilometre, or by 25 per cent from 1995 to 2008-09 (COM(98)495 and COM(99)446).

The aim for the EU is however to get the emissions from new cars down to 120 grams per kilometre, by 2010 at the latest (COM(95)689 Final). To meet the difference of 20 g/km, there is also a directive on the compulsory labelling of new cars for fuel economy and CO_2 emissions (1999/94/EC). Economic instruments to influence consumers' choice are also envisaged. The Commission has issued a communication (COM(2002)431) on the taxation of passengers cars proposing that the member countries differentiate vehicle taxing on the basis of the CO_2 emissions. It met with a positive reception from parliament, but still remains to be dealt with in the Council of Ministers.

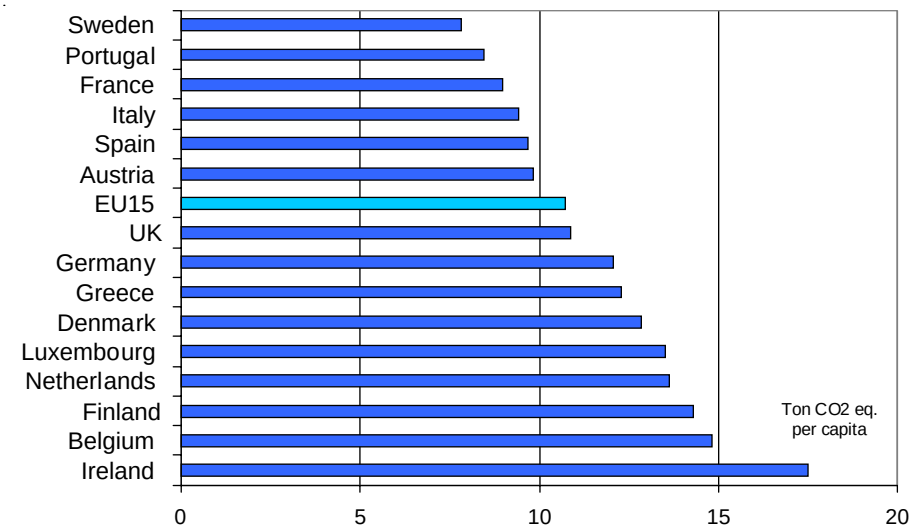

Fig. 3. Per capita emissions of the member countries, expressed as tons of CO_2 equivalents per annum (emissions data from the EEA, with population figures from IEA/OECD).

Cogeneration directive (2004/8/EC). The aim of the Commission's cogeneration strategy of 1997 (COM(97)514) was to have increased the EU proportion of electricity from combined heat-and-power from its 1994 level of 9 per cent to 18 per cent in 2010. The new directive to promote cogeneration was accepted in January 2004. Although it sets no binding targets for the member countries, it does contain concrete measures in favour of cogeneration and provides a framework for national policies to increase its use.

A proposal for a directive on energy end-use efficiency and energy services (COM(2003)739 Final), presented in December 2003. Aims at promoting energy efficiency and the market for energy services[5] in the EU. Contains a general energy end-use savings target of 1 per cent per year. Member state public sectors would be making a particular contribution as they will need to save at least 1.5 per cent energy a year, notably through energy efficient public procurement. The draft directive sets up a harmonized framework through common definitions, tools and methodology.

Emissions of non-CO_2 gases

Some 80 per cent of EU's greenhouse gas emissions consists of CO_2. Methane, nitrous oxide and fluorinated gases contribute to the remaining 20 per cent.

The emissions of greenhouse gases other than CO_2 from large industrial and agricultural sources are dealt with to some extent in the IPPC directive (see above).

A proposal for a directive to curb the emissions of fluorinated gases, aimed especially at the use of HFC 134a in cars' air conditioning equipment, was sent out in 2003 (COM(2003) 492 Final).

There are considerable emissions of methane, mounting to 4 per cent of the EU total emissions of greenhouse gases, from waste dumps. During the nineties they fell off by 22 per cent and are expected to fall still further as a result of the **landfill directive** (99/31/EC), stipulating the amount of organic waste that may be deposited, and decreeing that all new landfill sites must have gas recovery systems, and existing ones at the latest by 2009. Taken in combination with national measures, the directive is expected to cause the emissions of methane from landfills to fall away by 80 per cent between 1990 and 2020, bringing a yearly reduction of 199 million tons of CO_2 equivalents.

For further information

The EU Commission, europa.eu.int/com/environment/climat, gives information on decisions made, current proposals from the Commission, and work in progress within the European Climate Change Programme, amongst other matters.

European Environment Agency, europa.eea.int. Regular reports on emissions in relation to set aims, especially of the Kyoto protocol.

Climate Network Europe, www.climnet.org. Umbrella organization for environmentalist groups. Describes and comments on current EU climate policy.

How to obtain EU documents

Every communication and directive has a number, by which the text can be found by using the search function at www.europa.eu.int/prelex. Alternately one can visit the above sites, where there often links to the relevant texts. Hard copies can also be ordered from national distributors of EU documents.

[5] Energy services are defined as integrated packages of energy and the energy-efficient technology needed to deliver these services.

GMOs to be allowed as clean development

Although negotiations for a second commitment period are due to start in 2005, this was not discussed at the COP9 meeting.

AT THE NINTH MEETING of the adherents to the climate convention (COP9) in Milan last December, it was finally decided how the remaining items of the six-year-old Kyoto protocol were to be interpreted.

Discussion focused particularly on the rules regarding tree planting in the arrangements for the Clean Development Mechanism[1] in the protocol. It had already been decided at COP7 in Marrakech that carbon sequestration through forest management could be counted as a reduction under the CDM scheme.

It was now agreed that genetically modified trees and monoculture plantations would be allowable under the final rules for carbon sinks. But it is a matter for each country to "evaluate, in accordance with their national laws, potential risks associated with the use of genetically modified organisms."

"Trying to solve the climate change problems by using inherently risky GMOs [genetically modified organisms] is like trying to put out fire with gasoline," was the comment of Climate Action Network, an alliance of 340 non-governmental environmentalist organizations. Environmentalists in general are critical of allowing sinks to be used as an alternative to reducing emissions. They concede however that the new set of rules is better than nothing.

The transfer of know-how and financial means was also a matter that came up at the Milan meeting. There the EU, Canada, Iceland, New Zealand, Norway and Switzerland renewed an earlier pledge to contribute $410 million annually to developing countries, in particular through two funds: the Special Climate Change Fund and the Least Developed Countries Fund.

There was also discussion of the Kyoto protocol's future – how for instance to design a second commitment period after 2012. Provided the treaty has entered into force, official negotiations to this end are due to start in 2005.

A discussion paper proposing a viable, multi-stage global framework that could set going "common but differentiated responsibilities," with an equitable division of effort to keep global warming below 2°C, was presented by the Climate Action Network.

In a commentary, CAN wrote that "many will have differing views on various aspects, but the long-term implementation of the convention will never succeed if we do not begin to draw the map now."

The meeting was attended by more than 5000 individuals, including 95 government ministers, from 180 countries.

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[1] CDM projects are those where countries that have made binding commitments under the protocol (industrialized ones) can carry out measures in countries that have made no such commitment and account the effect as their own.

Climate change is expensive

According to experts of the UNEP's Finance Initiative, in 2003 the rising average world temperature, with associated extreme weather patterns, gave rise to damage estimated to have cost more than $60 billion. Costing most was the summer's heatwave in Europe, which according to UNEP caused 20,000 deaths and harvest losses worth more than $10 billion. Second came the floods along the Huai and Yangtze rivers in China between July and September. Some 650,000 dwellings were damaged, and overall losses put at almost $8 billion. The largest insured losses were however in the US, where a series of tornadoes struck the Midwest, leaving a trail of destruction that cost the insurers more than $3 billion.

Source: **ENS**, December 11, 2003.

Bringing delinquents to court

THE EU COMMISSION is bringing legal action against nine countries for failure in adopting and implementing EU legislation aimed at improving air quality in the union. It concerns seven different directives:

AIR QUALITY LIMITS FOR BENZENE AND CARBON MONOXIDE: Because they have failed to incorporate the directive into national law, the Netherlands and Greece are being arraigned before the Court of Justice.

FRAMEWORK DIRECTIVE FOR ASSESSING AND MANAGING AIR QUALITY: The member countries are obliged to submit specific information to the Commission. Italy is being brought before the court on account of incomplete data.

NATIONAL EMISSION CEILINGS: The deadline for transposing this directive into national law was November 27, 2002. The Netherlands, Germany, Italy and Greece have still not complied and are therefore being brought before the court. Belgium and Luxembourg have been given final written warnings because of failure to report properly.

LARGE COMBUSTION PLANTS: The deadline for transposing the directive into national law was November 27, 2002. Belgium, the Netherlands, Austria, Italy, Greece and Spain have so far failed to comply, so the Commission has decided to refer them all to the court. It has also sent Germany a final written warning.

SULPHUR CONTENT OF FUELS: By June each year, member states are required to report on the sulphur content of fuels used the previous year. Austria has yet to provide the necessary information for 2001 and is therefore being brought before the court.

Belgium, Italy, Greece, Portugal and the Netherlands have received criticism concerning the directive on incineration of waste, and likewise Spain, Greece, Portugal and Italy in respect of the directive limiting emissions of ozone-depleting substances.

Source: Commission press release, Jan. 22, 2004.

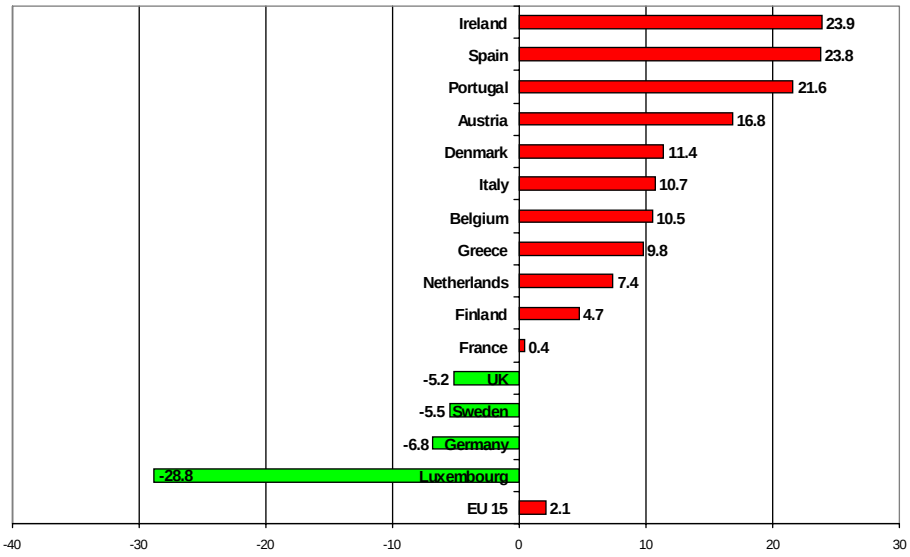
Many countries falling short of their emission targets

FRESH PROJECTIONS from the European Environment Agency[1] indicate that the measures so far decided will only result in a reduction of 0.5 per cent in EU emissions of greenhouse gases between 1990 and 2010, as against the 8 per cent agreed under the Kyoto protocol. The outstanding cause will be a runaway increase in the emissions from transportation, especially on the roads.

Even so, a reduction of one-half per cent assumes that Sweden and the UK will be cutting their emissions more than is required of them under the EU burden-sharing scheme. If these countries were merely to keep to their quotas, the EU's overall reduction would only amount to 0.2 per cent. Unless they take further measures, the other thirteen member countries will all fall short of their Kyoto targets. Denmark, Spain, Ireland, Austria and Belgium will actually be overstepping their quotas more than 20 per cent.

The latest projections are much more pessimistic than last year's because Germany – alone responsible for about a quarter of the EU's emissions of greenhouse gases – is now forecasting a substantially smaller reduction than previously. But they take no account of the effects of some domestic policies and measures that are being worked out in the Commission-led European Climate Change Programme (ECCP), such as the emissions-trading scheme that is due to start in 2005. That scheme is expected to have a marked effect on emissions, although it is difficult to determine in advance just how great it will be.

Then there will also be the effects of the additional domestic policies and measures (see box), mainly in the energy sector, that have been announced by eleven member countries. If these are carried out, and have the expected effect, emissions may be reduced by a further 6.7 per cent over and above the 0.5 per cent deriving from existing measures, re-



Distance to target for EU member countries 2001. The distance-to-target indicator measures the deviation (in per cent) of actual emissions in 2001 from a (hypothetical) linear path between base-year emissions and the burden-sharing target for 2010. A postive value suggests an under- achievement and a negative value an over-achievement by 2001. It assumes that the countries meet their targets by domestic policies and measures alone.

Greenhouse gases in the European Union

Between 1990 and 2001, EU emissions of greenhouse gases declined by 2.3 per cent, but most of that reduction took place in two countries, the UK and Germany, during the first half of the nineties. Between 2000 and 2001 EU emissions increased by one percentage point. See AN 3/03, p. 3, for details.

By "domestic policies and measures" is meant regulatory, negotiated or economic instruments which, at the EU or national level can have the effect of reducing emissions. Examples are legislation to promote energy efficiency, the voluntary agreement reached between the Commission and the carmakers to reduce the emissions of carbon dioxide from new cars, energy/carbon taxes, and the internal EU emissions-trading scheme.

The Kyoto protocol, which has yet to come into force, is intended to control the industrialized countries' emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), as well as three fluorinated industrial gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

It is clearly stated in the directive setting national emission quotas for the EU members that each country must fulfill its commitment. No country may claim to have achieved its quota by adding figures from other member countries that have done more than they need.

sulting in an overall decrease of about 7.2 per cent.

But that would still be nearly 1 per cent short of the EU target. It assumes, moreover, that France, Finland, Greece, Ireland, Sweden and, in particular, the UK will reduce their emissions more than required. If these six countries do not overdeliver, the total EU reduction will only be 5.1 per cent, leaving a gap of 2.9 per cent to the target.

Despite additional domestic policies and measures, Austria, Belgium, Denmark, Italy, the Netherlands and Spain project their emissions to still remain higher than allowed – and by more than 10 per cent in the cases of Denmark, Belgium, Spain and the Netherlands.

No account is taken in the EEA projections of the effects of the flexible mechanisms of the Kyoto protocol – international emissions trading, Joint Implementation and the Clean Development Mechanism – nor of the possibility for countries to affect part of their quota through the sequestration of carbon in "sinks" such as forests and agricultural land.

To judge from information received from eight of the member countries, it appears however that very little use is going to be made of these possibilities – it being chiefly the Netherlands that is calculating on achieving part of its quota through measures taken outside the EU. The total EU cut from the use of carbon sinks is preliminarily projected to be no more than 0.3 per cent.

By far the biggest obstacle to achievement of the Kyoto targets lies in the transportation sector, which is responsible for one-fifth of the EU's greenhouse-gas emissions – largely due, as the EEA points out, to fast-growing emissions from road traffic. Between 1990 and 2001 the emissions of carbon dioxide from transportation increased by 20 per cent, and greenhouse-gas emissions from the sector are projected to have risen to 34 per cent above 1990 levels by 2010. This does not include rapidly increasing emissions from international air travel, which is not covered by the Kyoto protocol.

PER ELVINGSON

[1] **Greenhouse gas emission trends and projections in Europe 2003**. Environmental issue report 36. December 2003. Available at the EEA website: http://eea.eu.int

After marked decline, emissions now on way up

During the early nineties greenhouse gas emissions dropped markedly in central and eastern Europe. The aggregate emissions from the ten accession and candidate countries in the region are now a third less than they were in 1990. Calculated on a per-capita base, however, the levels still remain high, not least on account of the extensive use of coal for power generation.

SLOVENIA IS THE ONLY ONE of the ten acceding or candidate countries in central and eastern Europe[1] that is expecting to miss its target under the Kyoto protocol, according to projections compiled by the European Environment Agency.[2]

Under the protocol, by 2008-2012 Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Romania, the Slovak Republic and Slovenia must each have cut their greenhouse-gas emissions by 8 per cent below a certain base year. Hungary and Poland have reduction targets of 6 per cent from their base years, to be met by the same dates.[3]

During the nineties the emissions of greenhouse gases declined markedly in the region as a whole. This was mainly due to the introduction of market economies and the consequent restructuring or closure of heavily polluting and energy-intensive industries. Estimates for the latest year for which complete data is available – usually 2001 – suggest that these ten countries' greenhouse-gas emissions, taken together, were then 36 per cent below their base year levels.

The latest national projections show that six of the countries – Bulgaria, the Czech Republic, Estonia, Latvia, Poland and the Slovak Republic – expect, as a result of measures already being implemented, to meet their Kyoto targets with ease.

Latvia and Estonia anticipate having made the largest reductions of all by 2010 – 58.2 and 56.6 per cent – from the levels of their base year, 1990.

With 6 per cent, Hungary would be making the smallest cut, but nevertheless just meeting its reduction target. Slovenia, on the other hand, expects its emissions to be 9.6 per cent higher in 2010 than in its base year, thereby missing its 8-per-cent reduction target by a substantial margin. Neither Lithuania nor Romania have submitted projections.

A growing concern is the increase in greenhouse-gas emissions from transportation in these countries. Since the middle of the nineties, these emissions have been increasing strongly in central and eastern Europe, after a drop in the early part of the decade. In 2001, the ten countries' combined emissions of carbon dioxide from transportation had exceeded their 1990 level, for the first time, by 4 per cent.

[1] The ten covered by the EEA report are the ten accession countries except Cyprus and Malta, plus the candidate countries Bulgaria and Romania.

[2] **Greenhouse gas emission trends and projections in Europe 2003**. Environmental issue report 36. December 2003. Available on the EEA website: http://eea.eu.int

[3] Countries with base years other than 1990 are Bulgaria (1988), Hungary (average 1985-87), Poland (1988), and Romania (1989). Cyprus and Malta have no targets under the Kyoto protocol.

Side effects can be considerable

Gains from reducing emissions of carbon dioxide have now been assessed.

IT DOESN'T ONLY COST MONEY to reduce emissions of carbon dioxide. While several attempts have been made to determine what it will cost for the EU countries to fulfill their commitments under the Kyoto protocol, the savings that arise because of the lowered cost of meeting other environmental aims have tended to be overlooked.

But now the researchers RIVM in the Netherlands and IIASA in Austria have made estimates for the EU's environmental agency EEA.[1]

They have started by taking as a baseline a scenario that describes the expected development on the assumption that no further measures will be taken to reduce the emissions of gases that affect the climate than those already decided or in place. They have followed this with three scenarios in which various forms of emissions trading are thought to lead to attainment of the Kyoto aims. See box. Carbon dioxide is the only climate gas considered.

For the purpose of their analyses, Europe is divided into three groups of countries:

- Western Europe (WE = EU-15 plus Norway and Switzerland).
- Central and Eastern Europe (CEE).
- The Russian Federation and western countries of Eastern Europe, Caucasus and Central Asia Countries (RF&EE).

The expected increase in the use of energy in western Europe in the baseline scenario (up 15 per cent) is considered likely to lead to emissions of carbon dioxide increasing in that region by 8 per cent during the period from 1990 to 2010. A reduction of 7 per cent is expected on the other hand for the whole of Europe, due to emissions in the other two groups having markedly declined as a result of restructuring of the energy and industrial sectors during the first half of the nineties.

Ancillary benefits highest for sulphur dioxide

As regards other air pollutants, it is assumed in the baseline scenario that each country will carry out already decided measures. Those that have had emission ceilings imposed on them either under the EU's NEC directive or the Gothenburg protocol are assumed to comply. See Table 1.

It is evident from the calculations that it will be impossible for WE to meet its Kyoto obligations under the baseline scenario. More than that will be needed.

The Domestic Action Only scenario implies that western European emissions of carbon dioxide will decline by 7 per cent between 1990 and 2010. Primary energy use would drop to 7 per cent under the baseline figure and coal use to a whole 38 per cent below. Oil and gas would recede by 9 and 2 per cent respectively. Since the CEE and RF&EE groups are accounted to have met their Kyoto targets already under the baseline scenario, there will be no changes there in the DAO one.

Under the two other scenarios, which allow for trading in emission allowances with countries outside the EU-15, the changes in the western European energy system are not considered likely to be so great. Significant changes are however foreseen in the rest of Europe, where the cost of the necessary measures will on the whole be lower than in the west. The use of coal, for instance, should drop by 20-30 per cent.

Since lowering the emissions of carbon dioxide will mean changes in the energy system, reductions in those of other air pollutants will follow as a matter of course. These ancillary benefits will be considerable but vary a lot in size, depending on which scenario is chosen to meet

The three climate policy scenarios

Domestic Action Only (DAO) assumes that the Kyoto targets will be met solely through domestic implementation, allowing only for internal emission trading (for instance within the EU).

Trade – with No use of Surplus emission allowances (TNS) assumes full use of the Kyoto mechanisms, but without resort to "surplus emission allowances." These surplus allowances exist because the emissions of greenhouse gases in many CEE and RF&EE countries are projected to be kept well below their Kyoto targets, even without any specific climate policies. Thus, under this scenario, part of the reduction by the parties that are required to reduce their emissions under the Kyoto Protocol (i.e. WE) will be met by means of emission trading, Joint Implementation and Clean Development Mechanisms (CDM).

Trade – With Surplus emission allowances (TWS) also assumes full use of the Kyoto mechanisms, but includes the use of surplus emission allowances (also known as "hot air"). This use of surplus allowances is, however, restricted in order to maximize the revenues from their trading for the CEE and RF&EE regions, leading to the use of only a quarter of the available surplus allowances during the first commitment period (up to 2012).

All three scenarios assume full use of land use, land-use change and forestry activities and Clean Development Mechanisms to achieve carbon credits for sinks, as agreed in the Kyoto Protocol.

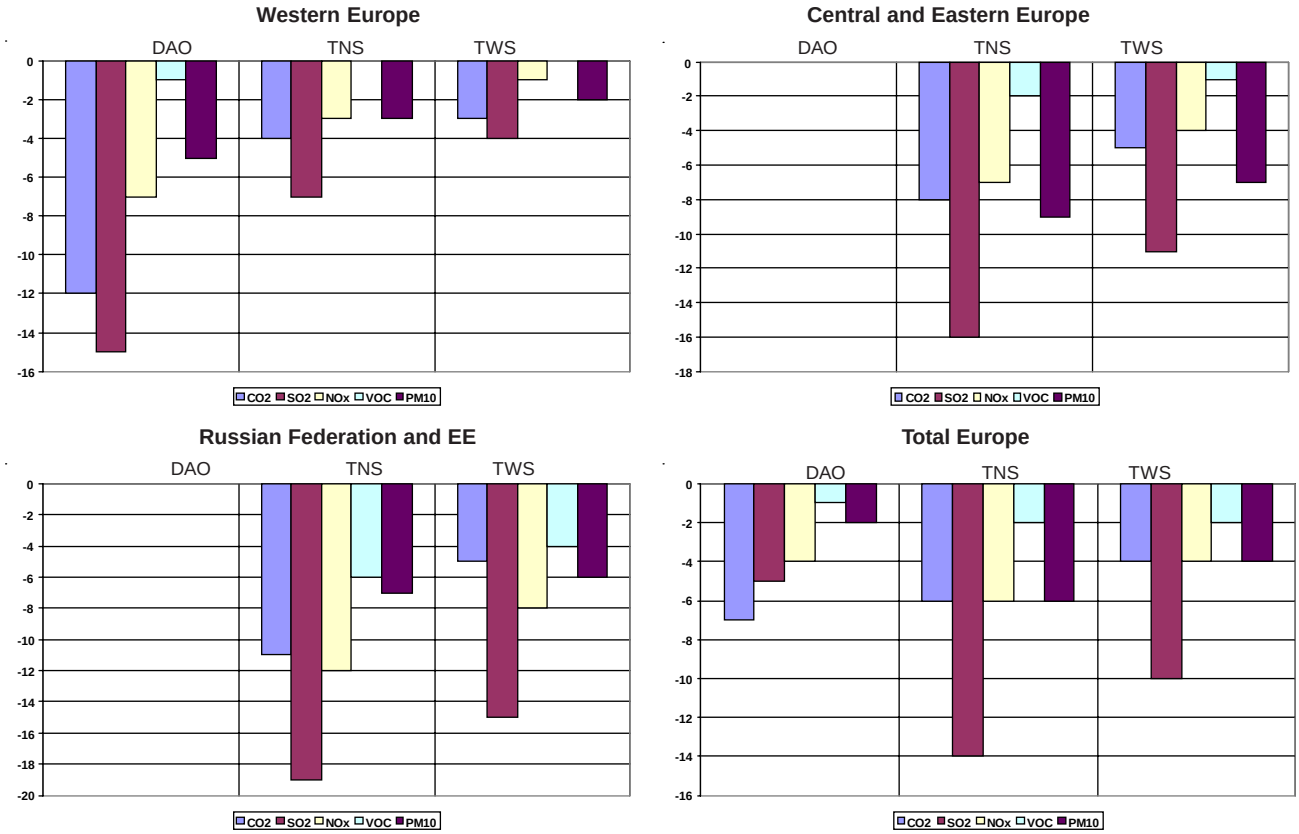


Figure 1. Changes in the emissions of various air pollutants (in %) in 2010 compared to the baseline scenario.

Europe's Kyoto targets. See Fig. 1.

In general, the ancillary benefits from climate policies are highest for sulphur dioxide (SO_2), followed by particulates (PM_{10}) and nitrogen oxides (NOx), and lowest for volatile organic compounds (VOCs). The strong link between carbon dioxide and SO_2 is due to the great influence of decreased coal use on the emissions of both compounds. This link is particularly strong in CEE and RF&EE countries, as current emission standards for SO_2 are less strict there. The reductions of NOx are less strongly coupled to changes in fuel mix and occur mainly as a result of carrying out energy efficiency options.

In the two external trading scenarios, the implementation of a significant share of the required reductions of CO_2 emissions in CEE and RF&EE – on account of the lower implementation costs there – also implies that some of the ancillary benefits will be shifted from WE to the CEE and RF&EE regions.

Interestingly, for Europe as a whole, the external trading scenarios (TNS and TWS) should actually lead to higher ancillary benefits than the DAO scenario. This is because the reduction of carbon emissions will have a strong effect on those of SO_2 in CEE and RF&EE – again due to less stringent environmental policies, but also to a larger share of coal in primary energy use in CEE. The same result can be seen for PM_{10}.

The TWS scenario, where trading in surplus emission allowances ("hot air") is permitted, would need fewer changes in the European energy system for attainment of the Kyoto targets than the other two. Reductions of air pollutants would also be lower – 10 per cent for instance for SO_2 as against 14 per cent in the TNS scenario. See Figure 1 for details.

The costs of attaining the Kyoto targets will differ greatly from scenario to scenario. The EEA study puts them at 12 billion euros a year under the DAO scenario. They would be significantly less under the other two, dropping to 7 and 4 billion euros a year in the TNS and TWS, respectively. These cost estimates accord well with those of other studies.

While markedly lowering the costs of fulfilling climate commitments, the external trading scenarios also bring changes in the ancillary benefits. The reduced emissions of air pollutants can in fact be translated into monetary terms, since they lower the countries' costs of fulfilling various commitments, such as that for ceilings under the Gothenburg protocol.

The savings in the control costs for air pollutants are put at 6.6 billion euros per year (in WE alone) under the DAO scenario, with somewhat lower savings under the TNS and TWS ones, 4.1 and 2.5 billion

Table 1. Emissions changes under the baseline scenario in 2010 as compared with 1990 (figures in per cent)

	CO_2	SO_2	NO_x	NH_3	VOCs	PM_{10}
WE	+8	-81	-52	-15	-54	-56
CEE	-10	-68	-42	-15	-22	-67
RF&EE	-32	-71	-32	-36	-26	-68
Total	-7	-74	-45	-18	-44	-64

Table 2. Annual costs and benefits in 2010 of reducing CO_2 emissions in Europe in line with the Kyoto targets (billion 1995 euros).

	DAO	TNS	TWS
Total costs	12	7	4
Cost savings	6.6	4.1	2.5
Net cost	5.4	2.9	1.5

Continued from previous page

euros per year respectively. See Table 2. All told, it appears from the EEA's analysis that a substantial part – almost 50 per cent – of the control costs for carbon dioxide reduction can be offset against the reduced costs of controlling other air pollutants, although the uncertainty is considerable in all the calculations.

A lower cost for the control of air pollution is however not the only benefit accruing from measures aimed at carbon dioxide, if one compares it with that of buying emission allowances or acting in other regions:

❑ The problems of acidification, eutrophication and damage from ground-level ozone are also lessened, since the emissions of several air pollutants sink more than they would in the baseline scenario. The EEA has however not tried to convert this benefit into monetary terms. Since the baseline scenario brings such a large reduction of the emissions of air pollutants (see Table 1), the differences between the three trading scenarios will be quite small.

❑ By stimulating innovation and the development of domestic industry an aggressive climate policy can give rise to gains, and hasten a revitalization that would have to be brought about in any case. Giving impetus to the industry of other countries by buying emission allowances from them could on the other hand become a competitive disadvantage to the buyers.[2]

The question of the size of the ancillary benefits is also relevant when pondering the effect of binding carbon in biomass or pumping carbon dioxide far down into the ground instead of reducing emissions. While such measures could indeed slow down the increase in the amount of carbon dioxide in the atmosphere, they would result in no side benefits, either economic or environmental.

PER ELVINGSON

[1] **Exploring the ancillary benefits of the Kyoto Protocol for air pollution in Europe**. European Environment Agency, 2004. Soon available at the EEA website: http://eea.eu.int

[2] The economic gains resulting from an active climate policy are set forth in **Cutting Carbon Emissions While Making Money. Climate Saving Energy Strategies for the European Union**, a study made by International Project for Sustainable Energy Paths (IPSEP). Available at www.ipsep.org. See also AN 1/2000.

In the country's official strategy half of the Netherlands reduction of greenhouse gases is to be attained through domestic measures and half through measures taken abroad.

But it would pay to make at least 75 per cent of the reductions at home, since that would result in reductions of nitrogen oxides and a number of other pollutants into the bargain.

NETHERLANDS

It would pay to make more of the cuts at home

BUYING CO_2 ABROAD would mean the Netherlands taking a serious risk of not achieving the NOx ceiling for 2010, because few options are left to reduce more NOx," contends Johan Sliggers of the Dutch environment ministry in an article[1] in Environment Science and Policy.

Johan Sliggers is basing his view on the fact that the Netherlands has decided to cut its emissions of greenhouse gases only by half through domestic measures. It wants to arrange the rest by falling back on the flexible mechanisms of the Kyoto protocol, which allow reductions to be claimed as a result of measures taken elsewhere.

If one compares the cost of reducing emissions of carbon dioxide at home with that of buying emission quotas or acting in other countries, the Netherlands decision would appear to make economic sense. But measures to cut carbon dioxide emissions at home would also reduce those of nitrogen oxides – which the country must take large-scale steps to reduce if it is to get under the ceiling set in the EU's NEC directive.

If the gain in the form of reduced emission of nitrogen oxides resulting from reducing carbon-dioxide emissions through domestic measures is taken into account, it would, in Sliggers' view, be definitely worthwhile for the Netherlands to fulfill a greater part of its Kyoto commitment by taking steps at home.

Instead of making only half of the necessary reduction there, it would pay to make it at least 75 per cent, since that would reduce the need for abatement of nitrogen oxides. And the proportion of measures that are profitable to take at home would actually be still greater, since cheap measures such as switching from coal to gas are for instance not taken into account in the calculations, nor are the gains from reduced emissions of sulphur dioxide, VOCs and particles. And Sliggers adds yet another factor that he considers should be included:

"It must be realized that domestic expenditure has a much smaller negative impact on GNP since the environmental investments flow back as expenditure into the economy and measures taken abroad only postpone measures that will have to be taken anyway."

PER ELVINGSON

[1] **The need for more integrated policy for air quality, acidification and climate change: reactive nitrogen links them all**. By Johan Sliggers. Environmental Science & Policy. Vol. 7, No. 1, 2004.

UNITED STATES

More profitable than thought

AN ASSESSMENT made by the White House's Office of Management and Budget of measures taken in the US over the last ten years shows reducing emissions of air pollutants in the US to be more profitable than has previously been thought.

The OMB has assessed the effects of altogether 107 federal rules that came into force during the period from 1992 to 2002.

Four issued by the Environment Protection Agency were found to be outstanding in a comparison of costs and benefits. Two of them were for limiting the emissions of particulate matter and NOx from heavy-duty highway engines, another the Tier 2 rule for limiting emissions from light-duty vehicles, and one for implementation of the sulphur dioxide limits of the acid rain provisions in the 1990 amendments to the Clean Air Act.

The estimated benefits of these four rules are put at $110-119 billion a year, and the costs at $8-8.8 billion. In other words, the benefits exceeded the costs 11 to 15 times over. The acid rain rule alone has yielded a benefit of $80 billion a year. A greater part of the improvement is ascribable to the lower concentrations of particles in the air, which in turn has a positive effect on health.

Source: **Informing Regulatory Decisions: 2003 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local and Tribal Entities**. OMB, September 2003. Available at www.whitehouse.gov/omb/inforeg/regpol-reports_congress.html

CLIMATE CHANGE

Disappearing ice

The cryosphere, all the frozen water and soil on the earth's surface, seems to be more responsive than thought to warming.

AS GLOBAL TEMPERATURES increase, ice is melting at an alarming rate in the polar regions, on Greenland and in glaciers all around the world, and this could have radical implications for the future global climate, say the authors of a new book.[1]

One of the editors, the glaciologist Dr Jonathan Bamber, speaking at COP9, the UN climate conference in Milan in December, said:

"In the Arctic, Greenland, West Antarctic and in glaciers globally, ice and snow levels are generally in retreat, and the scientific consensus that average global temperatures will continue to increase over the next century means that the risk to these already climatically sensitive areas is increasing," He continued:

"The level of scientific understanding about how global temperature increase affects snow and ice is constantly improving and it appears that our estimates of how rapidly the cryosphere – all the frozen water and soil on the surface of the earth – responds to climate change have been underestimated in the past."

Among the possible consequences that Bamber named was the loss of pristine wilderness and the risk that the ocean currents that give Europe its relatively mild climate might be disrupted by influxes of fresh water from melting ice in the Arctic, and that the Gulf Stream might slow down or even stop.

[1] **Mass Balance of the Cryosphere. Observations and Modelling of Contemporary and Future Changes**. Edited by J. L. Bamber and A. J. Payne. 712 pp. £85.00. Published by Cambridge University Press, 2004. Internet: http://books.cambridge.org/0521808952.htm

Key findings

❏ The amount of summer ice has lessened dramatically in the Arctic during the past 20 years, and could disappear completely within, say, 100 years.

❏ Except for a few glaciers in Europe that are not retreating, mountain and alpine glaciers everywhere are losing mass, and the rate of retreat is expected to accelerate over the next century.

❏ The Greenland ice sheet, the largest ice mass in the northern hemisphere, is losing mass from around its margins. Some climate models predict it could lose half its mass in the next 500-1000 years, adding 3 metres to the rise in global sea level.

❏ Evidence indicates that some of the changes observed in the cryosphere are related to man-made global warming.

The implications of the decline of the cryosphere are far-reaching and include risks of:

❏ Increased fresh water influxes from the Arctic which could trigger a slowdown or diversion of the thermohaline circulation of the North Atlantic (Gulf Stream) that helps give most of Europe its relatively mild climate. In turn this could impact other sea currents and temperatures around the globe.

❏ A rise in global sea level that would be measurable in metres, depending on how much of the cryosphere is lost. A rise of only 1.5 metres in sea level would displace up to 17 million people in Bangladesh alone.

❏ Increased moisture fluxes in the Arctic and northern European atmosphere, resulting in increased rainfall and serious changes to the climate.

❏ Accelerated warming in the Arctic due to the strong feedback between snow cover and absorption of solar radiation.

❏ Loss of habitat for Arctic animals such as polar bears, seals and other large predators.

❏ Reduction of glacier meltwater, which in many parts of the world provides water for human consumption, agriculture and hydroelectricity.

Recent publications

Climate Change and Human Health – Risks and Responses (2003)
By A.J. McMichael et al. Published by the World Health Organization. Describes the context and process of climate change, its actual or likely effects on health, and how human societies and their governments should respond, with particular focus on the health sector.

333 pp. US$18.00. ISBN 92 4 156248 X. Order Number 1150551. Available from bookorders@who.int or from national retailers of WHO publications.

Climate Change And The Kyoto Protocol (2003)
By M. Faure, J. Gupta and A. Nentjes (Eds). Brings together researchers from the disciplines of law, economics, political science and sociology to analyse the instruments which have been set up to manage climate change and the institutional shifts that are required for the reduction of greenhouse gases.

384 pp. £75.00. Published by Edward Elgar Publishing Ltd, Glensanda House, Montpellier Parade, Cheltenham Glos GL50 1UA UK. E-mail: info@e-elgar.co.uk

Our Future Climate (2003)
An elementary overview of global climate science. Reviews climatic history and projects models of the future of global climate. Explores the scientific, economic and social implications of future climate change. Also reveals how extreme weather and climate events currently occurring around the globe may be glimpses of what may await future generations if human-induced climate change is not brought under control.

36 pp. 15.00 franc. Published by the World Meteorological Organization, 7 bis. ave de la Paix, P.O. Box 2300, 1211 Geneva 2, Switzerland. Also available in pdf format at www.wmo.ch/wmd/pdf/wmd2003.pdf.

Integration of environment into transport policy – from strategies to good practice (2003)
An attempt from the EU Commission to provide inspiration and insights about how to promote integration of environmental considerations into transport policy. Available in pdf format (880 kB) at http://europa.eu.int/comm/environment/gpc/pdf/transp_policy_en.pdf

BIODIVERSITY

Millions of species at risk from global warming

CLIMATE CHANGE COULD drive more than a quarter of the world's land animals and plants to extinction. According to the estimates of a major study,[1] the change projected to take place between now and 2050 will put 14-35 per cent of all species in several biodiversity-rich regions at risk. The authors believe there will be a high likelihood of extinctions due to climate change occurring in other regions as well.

The scientists had studied six biodiversity-rich regions around the world, representing 20 per cent of the planet's land area, and projected the future distributions of 1103 species of plants, mammals, birds, reptiles, frogs, butterflies and other invertebrates.

Three different climate change scenarios were considered, all relatively moderate. Assumptions were also made of the ability of some species to disperse successfully, or move to another area, and so avoid climate-induced extinction.

Computer models were used to simulate the ways in which species' ranges are expected to move in response to changing temperatures and climate.

"This study makes it clear that climate change is the most significant new threat for extinctions this century," said Lee Hannah, one of the co-authors from the US-based organization Conservation International. "The combination of increasing habitat loss, already recognized as the largest single threat to species, and climate change, is likely to devastate the ability of species to move and survive."

The forecasts are for proportions of species doomed to extinction in consequence of climate change over the next fifty years, *not* the number

Left: Boyd's forest dragon (*Hypsilurus boydii)* is found in the Wet Tropics region of Queensland, Australia. About 90 per cent of its distribution is predicted to become climatically unsuitable by 2050, in maximum climate warming scenarios.

This page: The buttefly is Orange White-spot Skipper (*Trapezites heteromacula*). Endemic in Australia it risks losing 63-90 per cent of its habitat, depending on the extent of temperature increase.

of species that will become extinct during this period. Information is unavailable as to the time lags between climate change and extinctions, although decades may elapse between loss of habitat and extinction. Species under threat include many types of tree in the Amazon, the Spanish imperial eagle, and Boyd's forest dragon lizard in Australia. Birds such as the Scottish crossbill could probably survive only if they discovered they could fly to Iceland.

The study estimates the probability of extinction for various extents of warming to be 18 per cent of the species (at a temperature increase of 0.8-l.7°C), 24 per cent (l.8-2.0°C) and 35 per cent (more than 2.0°C).

The figures indicate great differences in the effect of the scenarios, only about half as many species being affected in the case of the lowest than of the highest change.

Another conclusion is that even the target the EU and others are aiming at – confining the temperature rise to 2°C above the pre-industrial levels – will result in almost a quarter of the world's species being at risk. Returning to near pre-industrial global temperatures as quickly as possible could prevent much of the projected but slower acting climate-related extinction from occurring, say the authors.

"If these projections are extrapolated globally and to other groups of land animals and plants, our analyses suggest that well over a million species could be threatened with extinction as a result of climate change," says Chris Thomas, professor of conservation biology at Leeds University, lead author of the study.

Small fluctuations in climate can affect a species ability to remain in its original habitat. Slight increases in temperature can force a species to move toward its preferred, usually cooler, climate range. If development and habitat destruction have already altered those habitats, the species often have no safe haven. According to Lee Hannah, the study underscores the need for a two-part conservation strategy:

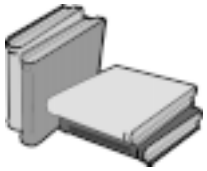
"First, greenhouse gas emissions must be reduced dramatically, and a rapid switch to new, cleaner technologies could help save innumerable species. Second, we must design conservation strategies that recognize that climate change is going to affect entire ecosystems, and therefore have to prepare effective conservation measures immediately."

Still greater increases in average global temperature than those described – regarded as quite possible by many scientists – would bring a risk to still more species.

"We have not done the calculations, but my expectation is that the projections would result in progressively higher extinction estimates. There is likely to be a sigmoid relationship. A tiny bit of warming causes few extinctions, then the relationship becomes steeper with a great increase in extinctions per degree warmed, and then a flattening off as most of the sensitive species are destined to eventual extinction, and one is left with widespread species that can live in many climate zones," comments Chris Thomas.

PER ELVINGSON

[1] C.D. Thomas et al., 2004, Extinction risk from climate change. *Nature*, vol 427, pp.145-148.



Further publications

Implementing Sustainable Urban Travel Policies: National Reviews (2003)
Examines the experiences of eleven European countries (including Russia) and the US in designing and implementing sustainable urban transport policies. A series of national reports are included with a synthetic analysis that draws lessons on the design of successful policies, appropriate institutional and financial frameworks and innovative partnerships for effective implementation.

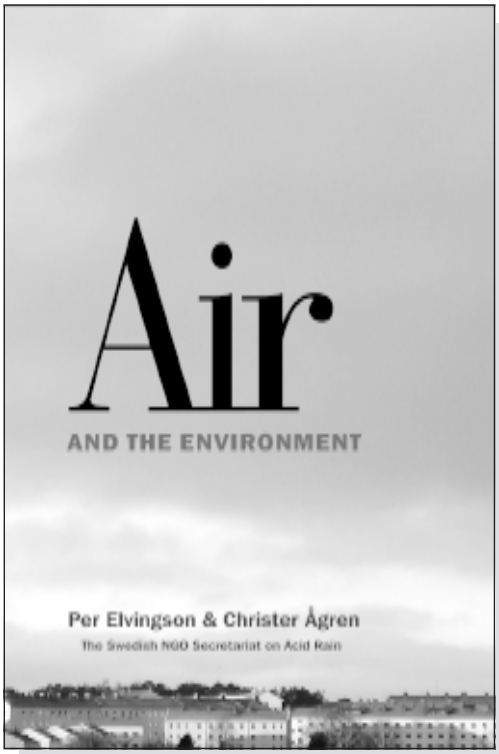
270 pp. 65 euros. ISBN 92-821-0305-6. Can be ordered from OECD Electronic Bookshop (www1.oecd.org/bookshop) or from OECD Turpin, P.O. Box 22, Blackhorse Road, Letchworth SG6 1YT, UK.

Fifty Years of Transport Policy. Successes, Failures and New Challenges (2003)
Transport policy may well have reached a turning point. It will not be possible to manage projected traffic growth using traditional methods that concentrate on increasing infrastructure capacity. New incentives, new pricing, and new instruments to better manage investment and demand are all required. In order to meet the emerging challenges, this publication outlines a number of strategic directions for transport policy in the coming years.

116 pp. 25 euros. Published by the European Conference of Ministers of Transport and available from the OECD, address as above.

Reforming Transport Taxes (2003)
Examines the economic principles for efficient systems of taxation and provides a framework for international comparisons of transport taxes and charges. It investigates the price and tax changes likely to result from the reform of transport charges to maximize efficiency, and their impact on motorists, hauliers and users of other transport services. It also assesses the impact of national differences in taxation on the competitiveness of hauliers internationally.

197 pp. 40 euros. Published by the European Conference of Ministers of Transport and obtainable from the OECD, address as above.



New publication from the secretariat

THIS IS ABOUT the pollutants that are infecting our air. Seeing that they amount to no more than a few hundredths per cent of the atmosphere, they might seem to be of no consequence, yet their effects on humans and the environment are considerable – causing changes in the world's climate, damaging health, threatening rare animals and plants with extinction, acidifying lakes, accelerating the weathering of ancient monuments, to mention only some of the more obvious effects.

WHICH THEN ARE these pollutants, how they arise, and what they are doing to us and our environment, as well as what can be done to counteract their spread, is described in detail in this book, which also brings out the fact that it will actually pay to cut down the emissions from various sources that give rise to them.

ESPECIALLY IMPORTANT but often overlooked are the connections between aspects of the matter that tend to be treated separately, their effects, causes and what can be done about them.

THE BOOK IS PUBLISHED by the Swedish NGO Secretariat on Acid Rain as part of its work to arouse and keep alive public awareness of these threats and of the need to contain and cut back the spreading of air pollutants.

AIR AND THE ENVIRONMENT. The Swedish NGO Secretariat on Acid Rain, February 2004. 174 pp. Will shortly be sent to all regular recipients of Acid News in Europe. Single copies can be obtained from the Secretariat (free of charge within Europe). Please call for quotation if more copies are required. Also available in pdf format at www.acidrain.org.

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Coming events

For the latest news and direct links, please visit www.acidrain.org (choose "Coming events" in the lefthand column).

AIRNET Workshop. Bilthoven, The Netherlands. March 11-12, 2004. *Information*: Annike Totlandsdal, RIVM, P.O. Box 1, 3720 BA Bilthoven, The Netherlands. Annike.Totlandsdal@rivm.nl. AIRNET: airnet.iras.uu.nl

Improving Energy Efficiency in Commercial Buildings. Frankfurt, Germany. April 19-20, 2004. Organized by the Joint Research Centre of the EU Commission. *Information*: http://energyefficiency.jrc.cec.eu.int/events.htm.

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

International Conference for Renewable Energies. Bonn, Germany. June 1-4, 2004. In parallel to the conference there will be side events, NGO meetings, etc. *Information*: www.renewables2004.de.

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

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

European Mobility Week. September 16-22, 2004. Topic: Safe streets for children. *Information*: www.mobilityweek-europe.org/thematic/safe_streets.html

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

Third International Nitrogen Conference. Nanjing, China. October 12-16, 2004. *Information*: Dr. Zhengqin Xiong, P.O.Box 821, Chinese Academy of Sciences, Nanjing, 210008, China. E-mail: n2004@ns.issas.ac.cn. Internet: http://n2001.esa.org/n2004.html.