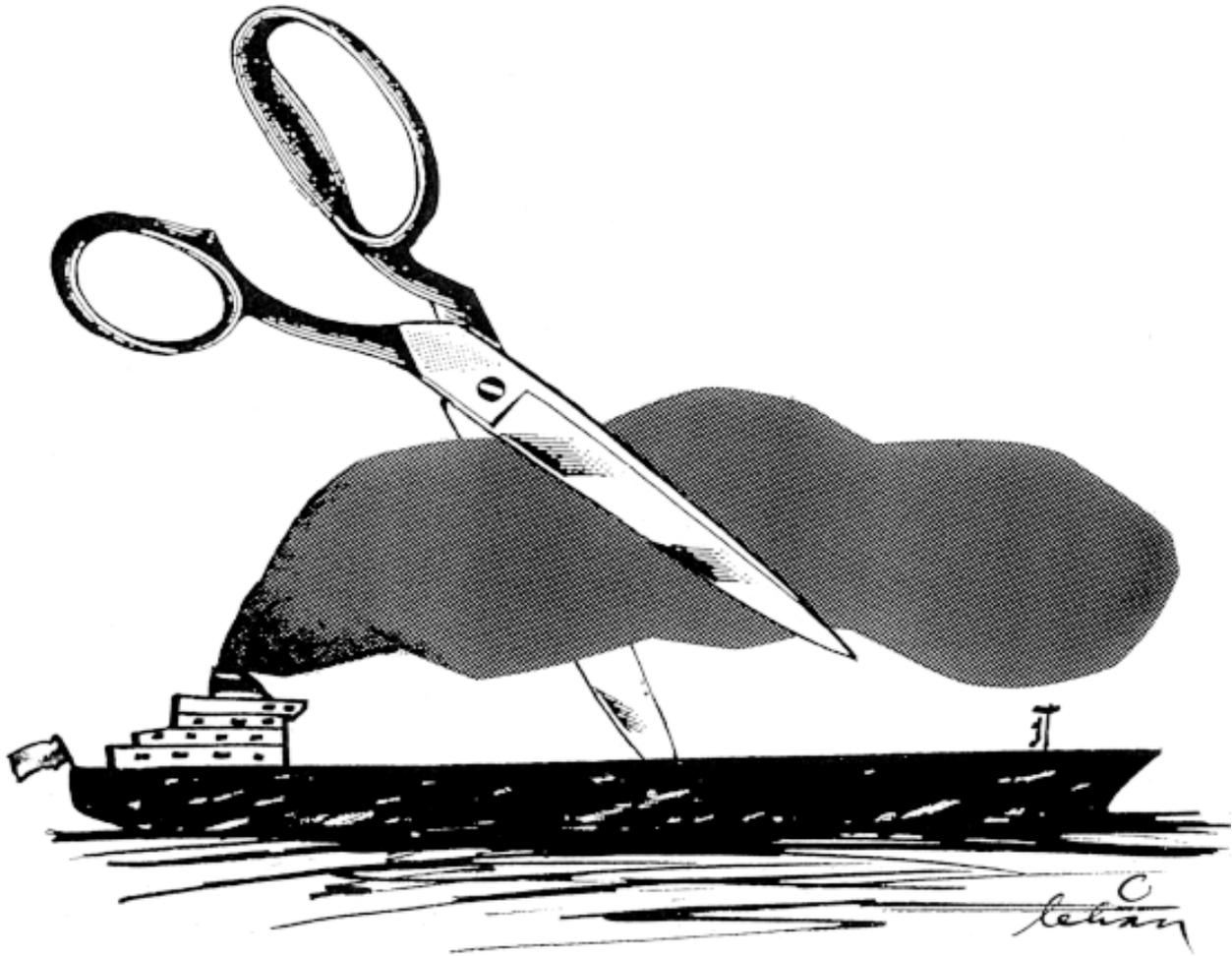


Acid News

NO. 4, DECEMBER 2002



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DIFFERENTIATED DUES

Something that works

CLOSE ON 80 PER CENT of the entries to Swedish ports are now of ships using low-sulphur bunker oil, and a greater part of all the vessels in the world fitted with catalyzers are sailing in Swedish waters.

This is largely a result of the system of differentiated fairway charges now being operated in Sweden, the impulse to which came in the nineties in consequence of a growing awareness that ships' emissions of sulphur dioxide and nitrogen oxides – and so their contribution to acidifying and eutrophying fallouts – was much greater than had previously been thought.

In 1996 an agreement was reached between the National Maritime Administration, Swedish Shipowners' Association, and the country's ports with the aim of getting ships' emissions of sulphur dioxide and nitrogen oxides down by 75 per cent soon after 2000. For its part the Maritime Administration undertook to introduce differentiated fairway dues as from January 1, 1998, to give an advantage to ships with lower emissions of these air pollutants. Most of the Swedish ports have followed suit by differentiating harbour dues.

In 2001 altogether 2800 ships were making some 127,000 calls at

Swedish ports. For most of those that were calling only once or twice a year, charge differentiation meant little. The system has greatest effect for frequent arrivals, and it is of course the emissions from these that are of greatest importance for the Swedish environment.

At least 1200 of the ships plying in Swedish waters are now running on low-sulphur fuel. To be eligible for the lower rates, ferries must use fuel with a maximum sulphur content of 0.5 per cent. For other types of vessel the limit is 1.0 per cent.

Among the most frequent callers

Continued on page 4

Acid News

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

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

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

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THE SECRETARIAT

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

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

In furtherance of these aims, the secretariat operates by

- Keeping under observation political trends and scientific developments.
- Acting as an information centre, primarily for European environmentalist organizations, but also for the media, authorities, and researchers.
- Producing information material.
- Supporting environmentalist bodies in other countries in their work towards common ends.
- Acting as coordinator of the international activities, including lobbying, of European environmentalist organizations, as for instance in connection with the meetings of the Convention on Long Range Transboundary Air Pollution and policy initiatives in the European Union.
- Acting as an observer at the proceedings involving international agreements for reducing the emissions of greenhouse gases.

EDITORIAL

Can they be serious?

A WELL-KNOWN PROBLEM for something like fifteen years has been the enormous emissions of sulphur dioxide and nitrogen oxides from ships. But shipping's character of an international business has always been used as an excuse or manoeuvre to delay any action. The emissions of air pollutants from ships have in consequence continued to increase.

The few attempts to improve matters by legislation have either been ignored or deliberately delayed. Although the marketing of marine gas oils with a sulphur content of more than 0.2 per cent was supposed to have been forbidden in the Community after October 1, 1994 through the EU directive 1993/12/EC, it seems that only a few countries have complied.

Six years later that directive was replaced by another, 1999/32/EC, which instead of prohibiting the marketing of marine gas oils with more than 0.2 per cent sulphur content, saddled the member countries with the responsibility of ensuring that, as from July 2000, such oils would not be used within their territories. But there is no real evidence to show whether they have taken any action.

An agreement reached within the International Maritime Organization (IMO) in the autumn of 1997 concerning an appendix to its MARPOL convention, called Annex VI, set some rather modest limits on the sulphur content of marine fuels and the emissions of nitrogen oxides. Yet the implementation of these requirements has been greatly delayed as a result of many countries putting off ratification of Annex VI. See opposite page.

But, as shown in the first article in this issue, there is one good example of a measure that has really brought about a lowering of ships emissions – the use in Sweden of environmentally differentiated harbour and fairway dues. Although clearly effective, the system could nevertheless be improved, for instance if it were also made to take

into account the distance travelled, since that greatly affects the amounts of pollutants emitted. It would also make it easier for more countries to apply it if the EU were to introduce either a common system of fairway dues or some kind of common infrastructure charging for shipping. The latter alternative was aired last year in the Commission's White Paper on Transport, but what is of importance is of course that some such system should be agreed upon and put into practice.

In view of all this it is indeed somewhat surprising to see how various groups connected with shipping suddenly seem prepared to spend hundreds of thousands of euros on so-called preparatory studies of something of a quite different type of economic instruments, namely emissions trading (see pp.8-9). One's confusion is ever greater on noting that principally the same groups are involved in two altogether diverging – and obviously competing – proposals. One is inclined to ask if they are really seriously meant, or simply aimed at muddying the debate and so preventing any effective measures being taken.

If the industry were really interested in reducing emissions, it ought logically to support EU legislation setting the minimum requirements for fuel quality that will be necessary both for marine gas oils and heavy bunker oils. Both the shipping industry and the EU member countries must at last, too, take upon themselves the responsibility for the practical carrying out of the legislation.

Economic instruments will be a necessary complement, because they can help to bring about still greater reductions than are likely to be attainable solely through EU and IMO procedures. If economic instruments are to be properly effective, they must however also be so arranged as to further the internalizing of the environmental costs of shipping.

CHRISTER ÅGREN

IMO ANNEX VI

Moving towards ratification

AS ANNOUNCED at a meeting of the IMO Marine Environment Protection Committee October 7-10, altogether six nations – accounting for about a quarter of world gross tonnage for merchant ships – have now ratified the air-quality annex of 1997 to the IMO's MARPOL Convention (Annex VI).

It seems that in view to some extent of an EU proposal that is on the way for dealing with air pollutants from ships, more and more countries are now belatedly starting to get around to ratifying the annex. The six that have already ratified are the Bahamas, Liberia, Marshall Islands, Singapore, Norway, and Sweden. Ratification by at least 15 states representing 50 per cent of the world's gross tonnage is required for the annex to come into force.

At the October meeting a further ten countries¹ reported that steps towards ratification were now in their

final stages, meaning that it could take place at the end of this year or certainly during the first half of 2003 – which would make it possible for Annex VI to come into force in 2004.

CHRISTER ÅGREN

¹ Belgium, Cyprus, Denmark, Finland, Germany, Greece, Luxembourg, the Netherlands, Panama, and Spain.

Merchant fleets of the world: the fifteen countries with the greatest percentage of total gross tonnage. Those in italics have ratified Annex VI.

Country	Per cent
Panama	20.5
<i>Liberia</i>	9.5
<i>Bahamas</i>	5.6
Malta	5.0
Greece	4.7
Cyprus	4.2
<i>Norway</i>	4.1
<i>Singapore</i>	3.9
China	3.0
Japan	2.7
USA	2.0
Russia	1.9
Hong-Kong	1.8
<i>Marshall Islands</i>	1.7
Italy	1.6

About IMO and MARPOL

The International Maritime Organization, IMO, is a United Nations body. The MARPOL convention for the control of pollution from shipping dates from 1973. Annex VI concerning air pollutants was adopted in 1997. For further description, see box on p.9.

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Estimates released by the EU Commission reveal great variations between member states, and especially high costs in cities.

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Implementation Committee reports that many nations are failing to comply with the protocols.

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Finland is well on the way to compliance with this directive on national ceilings to emissions.

Factsheet

The Intergovernmental Panel on Climate Change, IPCC, and its main conclusions is presented on pp. 11-14

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besides ferries it is mainly vessels carrying forest products – timber, pulp, and paper – that have been adapted to meet the requirements for emissions of nitrogen oxides. The greatest reduction comes from the use of catalyzers (selective catalytic reduction, SCR), by which 90-95 per cent of the emissions can be eliminated. Another method is the HAM (Humid Air Motor), which can control the formation of NO_x and reduce it by 70-80 per cent through the addition of water vapour to the engine's combustion air.

Most of the 70 or so vessels in the world presently equipped with catalyzers or comparable equipment for reducing emissions of NO_x are running in Swedish or Norwegian waters. Vessels certified for the lower Swedish charges have an average emission of about 3 grams of NO_x per kilowatt-hour which is more than 80 per cent lower than that from unequipped vessels, which average 17-20 g/kWh. Best performer is the Birka Princess, which with SCR emits no more than 0.5 g/kWh.

"The Swedish system has set a standard that has also been followed by the Åland islands, and it gave us an incentive to invest in the installation of catalyzers in our ships," commented Wiking Johansson, CEO of Birka Line Abp, which owns the Birka Princess, currently being used mainly for cruises around the Baltic, starting from Stockholm. The Birka Line also owns seven vessels for transporting forest products, three of which that are trading regularly between Sweden and various countries on the continent are equipped with catalyzers.

The forest products companies reacted quickly to the debate on shipping emissions. Assidomän was a frontrunner when it decided already in 1997 to have all its so-called system carriers run on bunker oil with a maximum of 1 per cent sulphur.

"No sooner had the press started to write about Assidomän's switching to low-sulphur oil than all the Swedish forest product companies did the same. They just could not go on using oil with a 3 per cent sulphur content," said Rolf Johannesson, managing director of SCA and chairman of the transportation committee of the Swedish forest industries.

All told, the Swedish forest prod-

Volvo started questioning. Demand from customers has forced the Wallenius Lines to improve their environmental performance.

uct companies have about twenty ships in regular traffic along the Swedish coast and down to the continent, and most of them already have, or soon will have, catalyzers. SCA for instance has already equipped one of its three ships, and intends to fit catalyzers on the others too. "The Swedish forest products industry has shown the way. It is now time

*It is now time
for others to follow
our example*

for others to follow our example," says Rolf Johannesson.

A Swedish shipowner with global interests, Wallenius OW Lines, is striving to reduce emissions from its vessels – forced as it happens by demands from customers. The company is mostly engaged in shipping cars and trucks to markets around the world. "As early as the mid-nineties Volvo started to question us about our emissions of pollutants," relates Per Croner, in charge of the environmental aspects of Wallenius

business. Its target for 2003 is not to use fuel oil with more than 1.5 per cent sulphur. One project was to run one of its ocean-going carriers, the MS Turandot, on marine diesel oil with no more than 1 per cent sulphur.

Diesel fuel costs 30-40 dollars more per ton than ordinary bunker oil, so that with each ship using some 50 tons every twenty-four hours, the difference is considerable. It turned out however after three years' trial that the cleaner fuel resulted in less wear on the machinery, with less need too for lubricating oil and less maintenance work. It also brought better working conditions for the crew. "Having now assessed the project, we find that the advantages of using diesel fuel can be costed at 20 dollars per ton," says Per Croner.

In order to bring down emissions of nitrogen oxides as well, Wallenius has modified the engines on 10 of its 19 vessels sailing under Swedish flag, thereby reducing them by 20-30 per cent, to about 13 grams per kilowatt-hour.

**BERIT BLOMQVIST
CHRISTER ÅGREN**

PHOTO: PORT OF GÖTEBORG

There will be a need to raise fares

A STUDY MADE by the Dutch research institute CE Delft for the German Federal Environment Agency (Umweltbundesamt) has shown that the effects of air transport on the environment would definitely diminish if the airlines and other operators were forced to accept their environmental costs.

The price of a 200-kilometre flight with an average aircraft would, according to CE Delft, have to go up by 25-30 per cent if the environmental costs were included. On the other hand the price increase would only have to be 5 per cent for a long trip with the most modern airplane. But both figures would be much higher if the climate effect of the planes' jet contrails were also taken into account.

For short flights the cost derives mainly from noise and the effect on air quality. On long ones the emis-

sions of gases affecting the climate may account for something like 90 per cent of the environmental costs.

To internalize these costs, the Umweltbundesamt is now proposing that aviation's tax advantages should be abolished and that environmentally differentiated takeoff and landing charges should be introduced. It also welcomes the new government's aim to put value-added tax on flights to EU destinations.

Deutsche Bahn, the German state railway company, which is feeling the effects of competition from low-fare operators, is threatening to sue the EU in the European Court of Justice on the grounds that the tax exemptions on aviation fuel run contrary to EU legislation in regard to competition.

Further information: There is an English summary of CE Delft's report on www.umweltbundesamt.de/aviation.pdf

BUILDINGS

Call for obligatory energy certification

A recently agreed EU directive will require an energy certificate for all buildings that are sold or rented out.

The new directive will require each member country to set binding targets for minimum energy efficiency, which shall apply to all new construction. The requirements must also be met when space of more than 1000 sq metres is renovated.

All buildings must, when put up, sold, or rented out, acquire a certificate from an independent expert, testifying to their energy performance and including recommendations for cost-effective improvements. Certificates will be valid for ten years.

Systems for energy certification

must be in place within three years, with an extension for a further three years for countries lacking qualified and/or accredited experts. The directive also requires regular inspections of boilers and air-conditioning systems above a certain size.

A compromise version of the directive from the Council of Ministers was passed by the EU parliament at a second reading on October 10, and final agreement by Council is expected this autumn.

According to the Commission as much as 40 per cent of the energy use in the EU takes place in buildings, with domestic space heating accounting for 57 per cent of that total, heating water for 25 per cent, and electrical appliances and lighting for 11 per cent.

Parliament wants more trading

At its first reading of the Commission's proposal for trading in CO₂ emissions, the EU Parliament voted to make it not only obligatory as from 2005, but also to include all the six greenhouse gases in the Kyoto protocol. The Parliament also wanted more sectors to be included in the scheme, and proposed that 15 per cent of the emission allowances should be put up for auction in each country instead of being allotted free of charge. The revenue should be recycled back to industry for environmental purposes.

The proposed directive is expected to be on the Council of Ministers agenda for December. Most of the countries are in favour of a mandatory scheme from 2005, but Germany and the UK have been arguing strongly for voluntary trading until 2008. The Parliament would be willing to accept some exceptions during the first three years, but it is a question whether that will be enough to satisfy the opposition.

Environment Daily. October 10, 2002.

Agreement on small petrol engines

The Council and Parliament are now agreed on the directive for limiting the emissions from non-road petrol-driven machines that was put forward by the Commission in December 2000. This follows the October acceptance by the ministers of the amendments arising from the Parliament's second reading.

This means that the initial set of emission limits will be applicable 18 months after the directive's coming into force, probably in autumn 2004. A second round of tighter limits will be introduced between 2004 and 2010, depending on engine type. Taking it thus in two steps will be instead of allowing manufacturers to bank and deal in emission allowances as in the system proposed by the Commission (see AN 1/01).

The engines covered by the directive – in lawnmowers, chain saws, hedge trimmers, etc. – are estimated to account for 10-15 per cent of the emissions of volatile organic compounds in the EU. The Commission is now working on a second revision of the directive to tighten the emission limits also for diesel-driven machines.

Environment Daily. October 21, 2002.

EU strategy proposed for the seas

ON OCTOBER 2 the EU Commission issued a so-called communication¹ on the one hand describing the current state of the environment in Europe's sea areas, and on the other singling out some of the objectives and measures that are expected to be included in the thematic Community strategy on the preservation and conservation of the marine environment, which is to be presented in 2004.

Among the objectives to which attention is drawn are those:

- ◆ to halt decline in biodiversity by 2010;
- ◆ to eliminate human-induced eutrophication problems, also by 2010;
- ◆ to eliminate all discharges of oil from ships and offshore installations by 2020;
- ◆ to progressively reduce emissions of hazardous substances to the marine environment, with the ultimate aim of reaching near-background concentrations for naturally occurring substances, and close-to-zero concentrations for manmade synthetic substances.

Under the heading of "policy actions," the Commission outlines twenty-three to those ends. Anti-eutrophication measures are for instance to include a comprehensive assessment of the state of marine eutrophication in 2006 with proposals for new, complementary instruments to help in cutting the emissions of nitrogen oxides from ships that are to materialize in the context of the strategy to reduce air pollution from sea-going vessels.

After reviewing the existing EU, national, regional, and international policies, the Commission has come to the conclusion that there is currently no integrated EU policy for the protection of the marine environment, a lack which it intends to correct with its proposed thematic strategy for 2004.

¹ Towards a strategy to protect and conserve the marine environment. COM(2002)0539. <http://europa.eu.int/eur-lex/en>

VOLATILE ORGANIC COMPOUNDS

Refineries' emissions underestimated

New measuring technique not only raises emission figures enormously but also shows where emissions are actually taking place.

IT HAS BEEN FOUND that computing refineries' emissions of non-methane volatile organic compounds (NMVOCs) by modelling almost always results in gross underestimates.

At the end of the eighties the Gothenburg county council ordered measurements to be made in which the light types of hydrocarbons were to be singled out. Later measurements of all NMVOCs revealed that the emissions from one refinery alone amounted to 25,000 tons a year – vastly more than the theoretical assessment of 1000 tons. As a result of extensive abatement measures, the figure has now been brought down to 5000 tons, still far and away above that obtained from modelling.

The measuring technique, called DIAL, differential absorption lidar, has subsequently been used at all Swedish refineries as well as at Sweden's largest port, Gothenburg.

It has also been used in Belgium, where refineries in Flanders initially reported emissions of volatile organic substances totalling 14,000 tons at the end of the nineties. But it turned out that when estimated by the DIAL method, they were more than 18,000 tons a year, and that from only two refineries, answering for only a few per cent of the total of crude oil that was being processed in the area.

The DIAL method makes it possible on the one hand to get a proper

idea of where emissions are actually taking place, and on the other to find a basis for the most cost-effective measures for betterment. It has also revealed that the really big emissions normally come from storage – not, as modelling had indicated, from the refining process.

It is believed that big investments will now be necessary at the refineries – those in Belgium for instance being under pressure to bring their emissions of non-methane volatile organic compounds down to 9300 tons by 2010. The actual emissions from refining and storage are doubtless much more than has appeared from theoretical calculations in other countries too.

"The DIAL technique makes it possible to discover leaks with great accuracy, and so develop cost-effective means of dealing with them," says Lennart Frisch, now consultant and formerly environmental officer for the Gothenburg county council. "Since the end of the eighties the all-over emissions from Swedish refineries have come down by 50-80 per cent."

PER ELVINGSON

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Environmental considerations in order

Court rulings confirm that inclusion of environmental requirements is no contravention.

WHEN TAKING BIDS for public transportation services in 1997, the Helsinki municipality seized the opportunity to insinuate a proviso concerning nitrogen-oxide emissions from buses which in effect can only be met by vehicles running on natural gas.

The catch was that the only existent filling station for gas was located on premises owned by the municipality. One of the bidders brought a suit against the municipality, claiming the requirement to be too strict and favouring the municipality's own company.

When finally passing judgment this last September, the court ruled that the requirement did not contravene the principle that all bidders should be treated equally, and that it was in order for the municipality to set environmental requirements just as it had done.

But it added that the freedom to set requirements has limitations – they must be made known in advance and formulated in such a way as to be easy to evaluate and follow up. It also emphasized that they must consider only important aspects of the matter. In the case in point it is obvious that the main burden on the environment will come from vehicles in operation. A limit to the emissions of air pollutants was therefore in order.

The court also settled the question of whether there must be a direct

advantage to the party calling for bids. It decided there need not be. Since the procuring body is acting on behalf of the public, all that is necessary is that the requirements should benefit the public. They must, on the other hand, have a clear connection with the object of procurement.

In the Amsterdam treaty – the EU constitutional law – the principles of freedom of trade and respect for

*The ministers will
have to revise their
agreed wording*

the environment are made to weigh equally. The law on public procurement actually preceded the Amsterdam treaty, which may explain the previous uncertainty as to what should apply.

Last year there came another court ruling, which although not dealing with public procurement, nevertheless was of prime importance in clarifying the possibility of setting environmental requirements. In that particular case (C-379/98, Preussen-Elektra), the Prussian state laid down that a certain proportion of the electricity in the net must have come from renewable sources. The judgment of the Community court was

that although the law was of a discriminatory nature, it was allowable on account of its environmental advantages which, as a result of the Amsterdam treaty, had become just as important as freedom of trade – and that it was in any case a part of EU policy to promote renewable energy.

That court decision can well be interpreted as allowing for wider environmental considerations wherever the EU is pursuing an active policy for the protection of the environment. The case of the Finnish buses shows that especially strict requirements can be set in instances of public procurement if, as in Helsinki, there are existing environmental standards to observe.

Ministers responsible for EU's internal market reached agreement in May on a revision of the law on public procurement, and many had feared that attempts to eliminate the possibility of corruption would make it even harder for authorities to take environmental and social factors into consideration as well. It is now thought that in the light of the court's ruling the ministers will in any case have to revise their agreed wording.

FREDRIC LINDBERG
& MARIA LOSMAN

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Extending it to ships

Shipping interests putting forward their own proposals as alternatives to legislation.

THIS LAST YEAR two interested parties have each put forward proposals for reducing the emissions of air pollutants from international shipping through a system of allowance trading. The reason can be seen in the fact that ships' relative share of the emissions of sulphur has been steadily increasing (see AN 3/02, pp.8-9) and that the EU Commission has recently announced a strategy for reducing them.

The one proposal comes from the Swedish Shipowners' Association¹ in collaboration with PricewaterhouseCoopers (PwC). Put briefly, it amounts to this: all major land-based point sources of emissions – in effect those covered by the EU directive on Integrated Pollution Prevention and Control – should be subject to emission caps for sulphur and nitrogen oxides. When added up, the individual caps would constitute EU caps for SO₂ and NO_x for all sources included in the IPPC directive. These caps would be set for several years, during which they would be gradually lowered. Each individual source would be given an emission allowance and would be able either to purchase additional allowances or sell any surplus it had. Allowances could also be banked for future use.

According to the PwC/SSA proposal, sectors not covered by caps, primarily shipping, could participate in the trading scheme on a voluntary basis. By reducing emissions to levels below a baseline, such as in IMO MARPOL Annex VI (see box), ships could generate emission-reduction credits (ERCs) which they could sell to the capped emission sources on land. These credits would thus have the same function and value as emission allowances.

The other proposal, started at the initiative of BP Marine, has led to the formation of a cross-industry project called SEAA² (Shipping Emissions Abatement and Trading).² Among the industry groups that had provided funding for the project by September 2002 were, besides BP Ma-

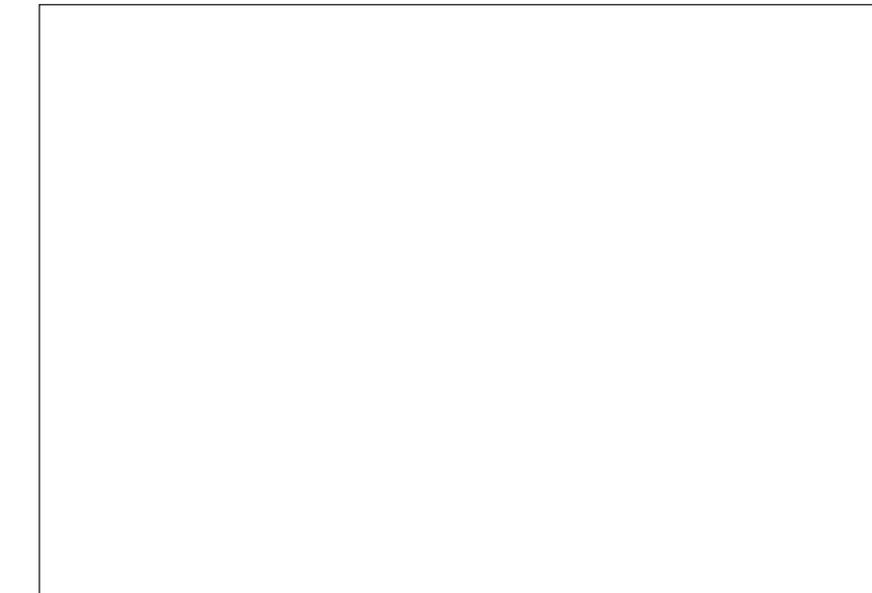


PHOTO: SWEDISH SHIPOWNERS' ASSOCIATION

Legislation to reduce our emissions? Let us trade allowances instead!

rine, BP Shipping, P&O, Shell Marine Products, and CEPASA. Supporting the project by participating in its Steering Committee are, in addition to the above, the International Bunker Industry Association, Concordia Maritime, the European Community Shipowners' Association, the International Chamber of Shipping, and Intertanko.

The SEAA² proposal outlines a scheme in which a cap would be set

*Proposals obviously
differ in several
basic aspects*

for the total of ships' emissions in the relevant sea area or areas. That cap would gradually be reduced, and each ship movement or activity would be assigned an emission allowance. The ship, or some person or body acting on its behalf, could then either

a) sell or bank any excess allowance (if emissions are low) or

b) if emissions are high, buy further allowance.

While it is intended that the trading scheme should initially apply to emissions of SO₂ in the North Sea and the Baltic, it could later be extended to cover also NO_x and particulates, as well as other sea areas.

These proposals obviously differ in several basic aspects. First and foremost, SEAA² wants the ceiling, as well as allowance trading, to be confined to the shipping sector, while PwC would have the ceiling apply to emissions from land-based sources only, and let ships' participation in allowance trading be voluntary.

The PwC proposal would mean in practice that the capped land-based sources would be obliged to gradually reduce their emissions still further (or buy allowances or ERCs) and accept the accompanying costs. When buying ERCs, land-based sources would in effect pay for ships' emission reductions.

That opens the way for many questions. How, for instance, is the cap for land-based emission sources to be set? What changes might be needed in the IPPC directive? Is there a risk of merely shifting the bulk of emissions from sea to land? How is the conflict with the EU aim of in-

ternalizing the external costs of all modes of transportation to be resolved? And so on. There is no answer to any of these questions in any of the published documents.

The SEAAAT proposal would appear to be simpler both in its structural and political aspects – although setting emission ceilings for shipping in any specified sea area will be far from uncomplicated. For one thing, PwC maintains that the Convention On the Law of the Sea (UNCLOS) prevents the setting of binding caps for international shipping. Despite the political feasibility of its scheme being totally dependent on the ability to set a cap, SEAAAT has so far given no indication as to how such a cap should be set.

While PwC clearly states that its trading scheme should be seen as a complement to regulation, it is not clear whether SEAAAT wants its scheme to be either a complement to EU legislation (such as on maximum sulphur content) or an alternative to such legislation. It does however want any legislation on the sulphur content of marine fuels to be sufficiently flexible to allow sea-water scrubbing to be used as an alternative means of reducing the emissions of sulphur from ships. This might indicate that regulations on the sulphur content of marine fuels would be acceptable to SEAAAT, provided they contain provisions similar to those in MARPOL Annex VI, allowing the equivalent emission reductions to be achieved by technical means as an alternative.

Since the SEAAAT proposal aims first and foremost at reducing SO₂ emissions, and is limited to trading between ships, its viability depends very much on sea-water scrubbing

being allowed as a lower-cost alternative for emission abatement (the only other option for ships being to use low-sulphur fuels). To date there is however very little documented evidence on the efficacy of sea-water scrubbing. One device that is being tested aboard a Canadian icebreaker, called Ecosilencer, is claimed by the maker to achieve an SO₂ reduction efficiency of about 95 per cent. Without sea-water scrubbing the scope for SO₂ emissions trading would, under the SEAAAT concept, obviously be extremely limited, since there

*Both projects
recognize that
much remains*

would be little if any difference in the marginal costs for reduction, the only option being to use low-sulphur fuel. It might however be workable for reducing NO_x, since there are many means, with varying degrees of efficiency and marginal cost, for lowering the emissions of that pollutant from ships.

Both projects recognize that much remains to be done before a practical and politically acceptable system can be developed for trading in ships' emissions. Provided economic support can be found, PwC will spend about a year on "clarification" (Phase 1) of the project. The suggested budget for the ten sub-projects of that phase is estimated to lie between 330,000 and 595,000 euros. Phase 2 would then involve design and development, and Phase 3 implementation. The necessary funding is ex-

pected to come primarily from stakeholders – shipowners, shipowners' associations, and other interested businesses.

The SEAAAT scheme is already an established project, with sponsors and supporters from a number of shipping and oil companies as well as shipping interest groups. Its short-term objectives, as stated in the autumn of 2002, are to lobby the CEC, IMO and other relevant parties in order to keep the door open for adoption of "non-fuel abatement technologies and emissions trading," and to "gain active support from stakeholders in order to establish a Sponsoring Board and funding, establish a steering committee, and gain approval for a plan and approach for future activities." The budget for the first stage of the project (June to October 2002) was proposed to be US\$360,000.

In the next stage, SEAAAT will aim at developing a system for the allocation of emission ceilings, at gaining acceptance of trading from the EU and maritime institutions, and promoting emission abatement by technical means. Development of the actual rules for trading is regarded as a matter for the longer term.

This autumn talks have been going on with the aim either of coalescing the two projects or at least establishing close cooperation – on the one hand to avoid duplication, on the other to pave the way for political acceptance and support for an allowance-trading system as a means of reducing the emissions of air pollutants from shipping.

Neither PwC nor SEAAAT have given any clear timetable to indicate when they believe the proposed trading schemes could become operational. During the preparatory meetings the interested parties gave signs however that they envisaged a fairly long-drawn-out process, with little likelihood of any functioning system being in place before 2010.

CHRISTER ÅGREN

IMO MARPOL Annex VI

International talks on the controlling of ships' emissions had started within the UN shipping organization IMO at the end of the eighties, with the outcome that in 1997 the organization adopted Annex VI as a complement to the MARPOL convention. The limits that the annex sets for the sulphur content of bunker oil (4.5 per cent) and emissions of NO_x (17 g/kWh) are however so weak as to be hardly likely

to lead to any appreciable reduction of emissions. The annex does nevertheless set a limit of 1.5 per cent in the bunker oil of ships sailing in Sulphur Emission Control Areas (SECAS), which should mean reductions in two such areas, the Baltic and North Seas. It still remains however for Annex VI to be ratified by a sufficient number of countries for it to come into force (see p.3).

¹ The proposal is presented in the document **Emissions Trading Scheme SO₂ & NO_x**, dated March 22, 2002, and has been submitted as the SSA's response to the Commission's discussion paper from January 2002 on a Community strategy on air pollution from ships. The text is available at: www.europa.eu.int/comm/environment/air/consultation_responses/swedishshipowners_response.pdf

² For more information, see www.SEAAAT.org

Fewer deaths after ban on coal

A BAN ON COAL BURNING had an almost immediate effect on people's health in Dublin, reports the British medical journal *The Lancet*.¹

The quality of the air in the Irish capital had been steadily worsening during the 1980s as a result of ever more households abandoning oil in favour of bituminous coal for domestic heating.

But after the use of coal had been forbidden in 1990, air quality improved faster and more dramatically than anyone had envisaged. The concentrations of particles, measured as black smoke, dropped straight away by as much as 70 per cent in the winter when the ban was imposed.

Previously black-smoke levels had averaged about 80 micrograms per cubic metre in winter in Dublin. After the ban they plummeted to 20 micrograms.

The improvement in air quality was accompanied by a drop in mortality from heart and lung diseases, say the researchers who had examined the death records for the six years before and after introduction of the ban. They found that deaths from respiratory diseases dropped by 15 per cent, and from cardiovascular disease by 10 per cent.

The researchers – among whom was Harvard professor Douglas W. Dockery – say these health benefits, which were measurable within the first year of the ban, were substantially greater than previous short-term studies had predicted.

Source: **Environment News Service** (ens-news.com) October 22, 2002.

¹ **Effect of air-pollution control on death rates in Dublin, Ireland: an intervention study.** By Luke Clancy, Pat Goodman, Hamish Sinclair, Douglas W Dockery. *The Lancet*, Vol. 360, October 19, 2002. Can be read at www.thelancet.com.

Causing many thousand deaths every year

DATA ON THE concentrations of particles in the air of twenty-six cities in twelve European countries has now been assembled in a uniform manner within APHEIS,¹ Air Pollution and Health: A European Information System, part funded by the EU.

Nineteen² of the cities have used PM₁₀ as the measure and the concentrations vary from 14 micrograms per cubic metre as a yearly average in the cleanest – Stockholm and Gothenburg – to 74 µg/m³ in the dirtiest, Bucharest.

In a number of cities, among which were Cracow, Rome, and Seville, concentrations of PM₁₀ were exceeding the EU limit of 40 µg/m³ yearly average that will be coming into effect in 2005. With the exception of Stockholm, Gothenburg, Lille, and Toulouse, all were overstepping the preliminarily stricter limit of 20 µg/m³ for which 2010 is scheduled to be the starting year. Many cities will also be having difficulty in meeting the future EU standard for a 24-hour average value for PM₁₀.

Among the cities that had not used PM₁₀ as a measure, but had chosen instead black smoke, far the worst was Athens.

By using known connections between particle concentrations and effects on health, the APHEIS researchers were able to quantify yearly deaths in the cities in question. As regards the nineteen cities using PM₁₀ as the measure, with a total population of 32 million, it appeared that:

◆ If the yearly average value were to drop to 40 µg/m³ (EU standard for 2005) in all cities, altogether 2653 premature deaths a year could be prevented, or 9 per 100,000 inhabitants.

◆ If the stricter limit of 20 µg/m³ (proposed EU standard 2010) were met in the same cities, the premature deaths that could be avoided would amount to 11,855 a year or 43 per 100,000 of population.

◆ Reducing the levels by just 5 µg/m³ would prevent 5547 premature deaths annually (19 per 100,000 inhabitants) in all the cities, even those with the lowest pollution levels.

If black smoke is used as the measure, as it was in 15 cities with a total population of 25 million, the dose-response connection in cases of long-term exposure is more uncertain. However about 577 premature deaths could be prevented annually, or 3 per 100,000, if short-term exposure to outdoor concentrations of black smoke were reduced by 5 µg/m³.

Two outstanding conclusions are that:

◆ Even a small and achievable reduction in air-pollution levels, such as 5 µg/m³, would have a beneficial effect on health, and thus justify taking preventive action in all cases, no matter what levels any city had.

◆ Although the general risk of death from air pollution is less than that from smoking, it is nevertheless real and worth taking steps against, especially as exposure is involuntary and affects the whole population.

In continuation more cities will be involved, with improved methods of calculation and research given a wider scope. It is intended for instance to calculate the years of life lost, or reduction in life expectancy, in order to estimate the effects on health of long-term exposure to air pollution, and to collaborate with economists in calculating the costs to society in the cities participating in the program.

PER ELVINGSON

¹ **A Health Impact Assessment of Air Pollution in 26 European Cities.** Can be downloaded from www.apheis.net. APHEIS is financed by the EU in collaboration with participating countries.

² Bordeaux, Bucharest, Budapest, Celje, Cracow, Gothenburg, Lille, Ljubljana, London, Lyon, Madrid, Marseille, Paris, Rome, Seville, Stockholm, Strasbourg, Tel Aviv, and Toulouse.



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CLIMATE CHANGE



The Intergovernmental Panel on Climate Change, IPCC

The IPCC's Third Assessment Report provides the best scientific information to date as to how the emissions of greenhouse gases are affecting our climate. Here is a brief description of the IPCC and its most recent findings.

Recognizing the problem of a potential global climate change, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change, IPCC, in 1988.

The role of the IPCC is to assess the scientific, technical and socio-economic information relevant for the understanding of the risk of human-induced change. It does not carry out research nor does it monitor climate-related data or other relevant parameters. It bases its assessment mainly on peer-reviewed and published scientific and technical literature.

The IPCC has three Working Groups and a Task Force:

- ◆ Working Group I assesses the scientific aspects of the climate system and climate change.
- ◆ Working Group II addresses the vulnerability of socio-economic and natural systems to climate change, the negative and positive consequences of climate change, and options for adapting to it.
- ◆ Working Group III assesses options for limiting greenhouse-gas emissions and otherwise mitigating climate change.
- ◆ The Task Force on National Greenhouse Gas Inventories is responsible for the IPCC National Greenhouse Gas Inventories Programme.

The IPCC completed its First Assessment Report in 1990. The Report played an important role in the establishing of the Intergovernmental Negotiating Committee for a UN Framework Convention on Climate Change by the UN General Assembly. The Convention was adopted in Rio de Janeiro in 1992.

The Second Assessment Report, Climate Change 1995, provided key input to the negotiations that led to the adoption of the Kyoto Protocol in 1997.

The Third Assessment Report (TAR) was adopted in September 2001. Some 2000 scientists representing a variety of disciplines the world over took part in this assessment, and the results were further reviewed both from the political and scientific aspect by representatives of the participating countries. This is the most all-embracing assessment of research that has ever been made.

A Fourth Assessment Report is scheduled to be ready by 2007.

The IPCC also prepares Special Reports and Technical Papers on topics where independent scientific information and advice is deemed necessary (see Publications, p.14). It also supports the climate convention through its work on methodologies for National Greenhouse Gas Inventories.

Global temperature could rise by 6 degrees in next hundred years

Report from Working Group I to the IPCC's Third Assessment Report

A much-quoted sentence in the second assessment report (1995) from the IPCC says: "The balance of our evidence suggests a discernible human influence on global climate."

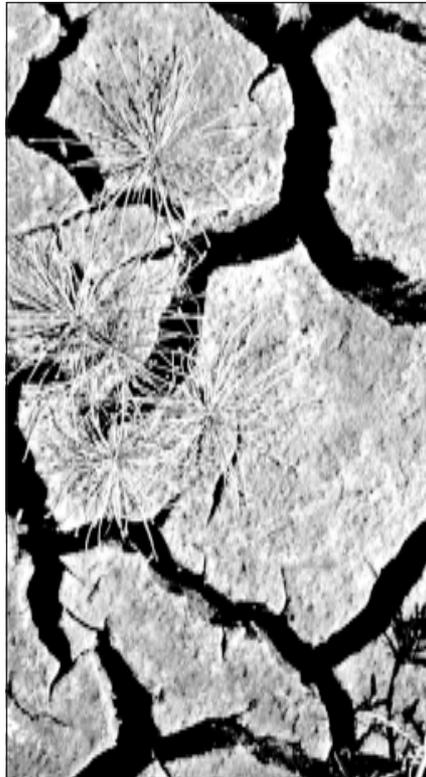
Knowledge has subsequently accumulated in a variety of respects, concerning both natural and man-induced effects. Although some uncertainty still remains, there is now a much greater consonance between measured effects and those obtained by modelling. In the third assessment report (2001) the IPCC researchers draw the following conclusion:

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

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

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

The fact that a higher temperature rise is said to be on the way compared to earlier estimates – according to the second assessment report a rise of 1.0-3.5 °C would be likely – does not mean that the emissions of greenhouse gases are now expected to be higher. The main explanation for the now higher figures is that the emissions of sulphur dioxide are expected to be lower worldwide. The concentrations of sulphate particles will consequently be lower, and their cooling-off



While rainfall is expected to increase generally, drought may worsen in Africa and central Asia.

effect reduced (the particles reflect back incoming solar radiation).

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

It should be noted that there will not be an even warming-up everywhere. The temperature will be more likely to increase over land than over the sea, with the greatest increases in winter tempera-

tures in the far north – especially in the northern parts of North America and northeastern and central Asia, where the global mean warming is likely to be exceeded by more than 40 per cent.

Fears are often expressed as to what will happen to the big ocean currents that carry heat from lower latitudes out towards the poles when the climate becomes warmer. According to the IPCC, most of its modelling points towards a falling away of heat transports northwards – and yet to a net warming-up in Europe, due to the increased concentrations of greenhouse gases in the atmosphere generally.

No complete cut-off of the thermohaline circulation is envisaged before 2100. The IPCC nevertheless warns that beyond 2100 this heat transport could completely, and possibly irreversibly, shut down in either hemisphere, if the increase in greenhouse-gas concentrations in the atmosphere is large enough and continues long enough.

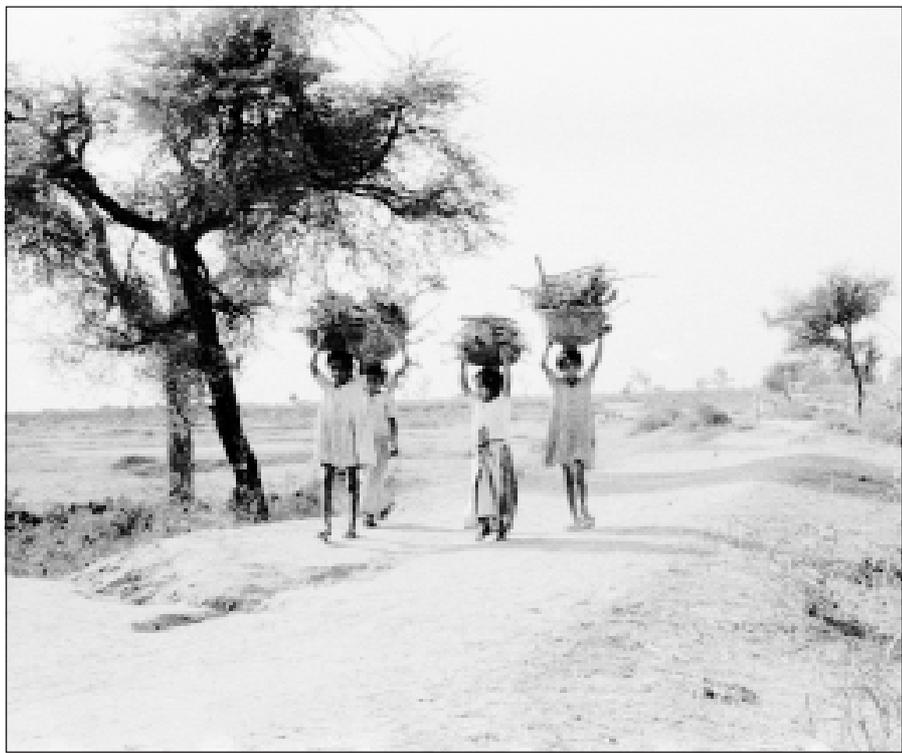
The rise of 9-88 centimetres that is projected to take place in sea level between 1990 and 2100 is somewhat less than previously anticipated. But here, too, the IPCC issues a warning. The sea level will continue to rise for centuries after the temperature had become stabilized.

If the temperature rise over Greenland should be 5.5°C, and remain so for a thousand years, it could lead to a general rise in sea level of another three metres. The same might happen in the case of the West Antarctic ice sheet, although the data for that is more uncertain.

Source: **Climate Change 2001: The Scientific Basis**. Contribution of Working Group I to the IPCC's Third Assessment Report.

Atmospheric concentrations of three main greenhouse gases.

	Pre-industrial (yr 1750)	Present (yr 2000)	Change
Carbon dioxide (ppm)	280	368	+31%
Methane (ppb)	700	1750	+150%
Nitrous oxide (ppb)	270	316	+17%



Poorest countries will suffer most

Report by Working Group II to the Third Assessment Report.

Far more people will be hurt than are likely to be favoured even by a slight increase in average global temperature. And the higher the rise, the more serious will be the effects, both for humans and nature.

It emerges clearly from the report that the poorest countries will be the most hard hit when the temperature rises. This is partly because their economies are largely dependent on activities, such as agriculture, that are sensitive to climate change. Moreover they have only small means of adapting themselves to changes such as rising sea levels or missing rainfall. They are also lacking in resources for the kind of preventive health care that might reduce the risk of outbreaks of climate-related diseases such as malaria.

The report includes a whole catalogue of possible threats to humans and ecosystems in various parts of the world, as well as making an attempt at determining the probability that any specific degree of global warming will cause certain effects. The scientists warn however that most of their work has been concentrated on the changes that are likely to take place at the lower end of the ex-

pected increase in temperature.

Ecosystems. Even the warming that is judged to have taken place during the last century (+0,6°C) constitutes a threat to the most sensitive systems. These include

coral reefs, atolls, mangrove swamps, boreal and tropical forests, polar and alpine ecosystems, prairie wetlands, and remnant native grasslands. The greater any coming temperature rise will be, the more ecosystems and species will be at risk.

Extreme weather events. The temperature rise already recorded is deemed responsible for an increase in the frequency of heat waves, droughts, floodings, etc. Hundreds of millions of people can be affected by floodings a result of a combination of rising sea level with more violent storms. And the more the temperature rises, the greater will be the effect in these respects too.

The spread of effects. Whereas a marked warming up is likely to have an adverse effect in most parts of the world, a small increase will be bad for some parts but will actually favour others. Generally speaking, however, more people will be harmed than benefited, even by a small increase in temperature.

Large-scale changes in the climate system. The risk of large-scale and possibly irreversible changes – say, in the transport of warmth northwards by the Gulf Stream – is judged to be “very low” if there is little warming up. It will however increase in step with any rise in temperature. But no threshold can yet be determined above which transport would cease completely.

Source: Climate Change 2001: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the IPCC’s Third Assessment Report.

Effects expected in Europe

The capacity to adapt is generally high as regards human systems in Europe. They are however more vulnerable in the southern and arctic regions.

In summer the water supply and soil humidity are likely to be affected in those parts of Europe that are already subject to recurrent drought. An increase in the precipitation is however expected both in the north and the south in winter.

Half of the alpine glaciers as well as great expanses of permafrost may vanish in the course of the present century.

There will be a great increase in flooding, both from rivers and the sea, over large parts of Europe. Problems with ero-

sion and loss of wetlands along the seashore will increase as a consequence of the predicted rise in sea level.

Agriculture will benefit in northern Europe but suffer in the south. Biotic zones will move to higher ground as well as northwards. Some species will be threatened by loss of habitat.

High temperatures and heatwaves may affect traditional summer tourist destinations, and less reliable snow conditions may spoil winter tourism.

Source: Climate Change 2001: Impacts, Adaptation and Vulnerability. IPCC Working Group II.

Climate change can be slowed

Report by Working Group III to the Third Assessment Report

Ways of curbing the increase of the greenhouse effect were dealt with by IPCC's Working Group III.

The technical possibilities of reducing emissions have, in the view of the scientists involved in the project, increased markedly since the last report in 1995.

Among the advances especially mentioned are developments in wind turbines, fuel cells, and underground storage of carbon dioxide, as well as the rapid elimination of industrial by-product gases.

The authors are of the opinion that it will be fully possible to bring down the emissions of greenhouse gases to levels

below the present ones, and at no great cost.

In fact half of the measures would be profitable, but are being stopped by all kinds of hindrances, ranging from consumers' lack of interest to distorting subsidies and taxation.

The possibilities and costs vary considerably however from one country to another.

Source: Climate Change 2001: Mitigation. Contribution of Working Group III to the IPCC's Third Assessment Report.



Looking to the future

While the IPCC is silent as to the extent to which the emissions of greenhouse gases will have to be reduced if the aims of the climate convention are to be fulfilled, it does illustrate through a number of scenarios what emission levels will be needed for stabilizing the concentrations of these gases at various levels in the atmosphere.

They all show that to stabilize concentrations at a certain level, the emissions of carbon dioxide will have to be brought down in the next couple of hundred years to a fraction of what they are now – no matter what level is sought. Higher emissions might however be tolerated in the short term if higher concentrations are considered acceptable for the future.

To attain a relatively low concentration of carbon dioxide (450 ppm) it will be necessary to start reducing emissions

globally almost at once. By 2100 they should have come down to some 2 billion tons of carbon per annum and then halved again in the following centuries. Today global emissions amount to about 8 billion tons a year.

A level of 450 ppm is estimated to lead to an equilibrium temperature increase, albeit after many centuries, of 1.5 to 3.9°C above 1990 levels. According to estimates by environmentalist organizations, such a rise would constitute a great risk of serious changes in the world's ecosystems and a severe threat to a large part of the earth's population.

Further information: IPCC Third Assessment Report 2001. Climate Action Network 2002: "Preventing dangerous climate change", available from www.climatenetwork.org.

Recent IPCC publications

All the following titles are published by the Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU, England. Internet: www.cambridge.org/ipcc.

Extensive summaries are available in several languages in pdf format from www.ipcc.ch/pub/reports.htm.

IPCC Third Assessment Report: Climate Change 2001

Available in four separate volumes:

Climate Change 2001: Synthesis Report. Contains the Synthesis Report itself, the Summaries for Policymakers and Technical Summaries of the three Working Group volumes, and supporting Annexes. 398 pp.

Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report. 944 pp.

Climate Change 2001: Impacts, Adaptation & Vulnerability. Contribution of Working Group II to the Third Assessment Report. 1000 pp.

Climate Change 2001: Mitigation. Contribution of Working Group III to the Third Assessment Report. 700 pp.

IPCC Special Reports and technical papers, examples:

- ◆ Climate change and biodiversity. 2002.
- ◆ Methodological and Technological Issues in Technology Transfer. 2000.
- ◆ Emissions Scenarios. 2000.
- ◆ Land Use, Land-Use Change, and Forestry. 2000.
- ◆ Aviation and the Global Atmosphere. 1999.

Estimating costs of pollutants

Gains from reduction greatest in densely populated countries, costs extra high in cities.

THERE HAVE JUST COME new figures from the Commission showing what the costs of several air pollutants are to society in terms of money, through damage to people's health, buildings, and farm crops. They update and collate statistics arising from the EU ExternE program.

Although the Commission has had the study¹ made largely in aid of the work on proposals for infrastructure charging, the figures can be used in many ways, such as for quantifying the benefits generated by limits on pollution in current and future EU directives, or as data for emissions charging.

They cover these types of damage:

- ◆ Acute (short-term) effects of fine particles, SO₂, and ozone on mortality and morbidity.
 - ◆ Chronic (long-term) effects of fine particles on mortality and morbidity.
 - ◆ Effects of SO₂ and acidity on materials used in buildings and other structures of no significant cultural value.
 - ◆ Effects of ozone on arable crops.
- It should be noted that for lack of

information – as regards for instance exposure-response functions and estimates of economic values – some types of damage have been omitted. Among them are effects on ecosystems, cultural heritage, and visibility.

In terms of prices in 2000, the average damage caused generally in the EU by one ton of pollutant emitted over rural areas is put at 14,000 euros if the pollutant is fine particles (PM_{2.5}), 5200 if it is SO₂, 4200 for NO_x, and 2100 euros for volatile organic compounds (VOCs). These being average figures, they mask however the great variations between member states, as can be seen from Table 1.

Seeing that the estimates concern mainly damage to health, it is hardly surprising that the greatest gains from every ton of pollutant reduced should be in relatively densely populated countries such as Belgium, France, the Netherlands, and Germany.

The costs will moreover be extra high when fine particles and SO₂ are emitted in cities, since more people

will then be exposed. In a town of 100,000 inhabitants, for instance, they are estimated to amount to 33,000 euros per ton of fine particles emitted, and 6000 euros for SO₂. This is damage over and above that for the whole country. The larger the city, too, the higher the cost will be per ton of emitted pollutant.

The gain from reducing emissions from ships, which has also been calculated, turns out to vary from one sea area to another (see Table 2). It is suggested that whereas national rural data should be used for emissions from ships close to shore (say in coastal trading), emissions from ships in port should be treated as of urban origin, with the size of the port city also taken into account.

CHRISTER ÅGREN

¹ BeTa (Benefits table database): Estimates of the marginal external costs of air pollution in Europe. Version E1.02a. Created for the European Commission DG Environment by netcen. Can be downloaded from: <http://europa.eu.int/comm/environment/enveco/studies2.htm>

Table 1. Estimated costs of damage from emissions in rural areas. Unit: euro per ton of pollutant emitted.

	SO ₂	NO _x	PM _{2.5}	VOCs
Austria	7200	6800	14000	1400
Belgium	7900	4700	22000	3000
Denmark	3300	3300	5400	7200
Finland	970	1500	1400	490
France	7400	8200	15000	2000
Germany	6100	4100	16000	2800
Greece	4100	6000	7800	930
Ireland	2600	2800	4100	1300
Italy	5000	7100	12000	2800
Netherlands	7000	4000	18000	2400
Portugal	3000	4100	5800	1500
Spain	3700	4700	7900	880
Sweden	1700	2600	1700	680
UK	4500	2600	9700	1900
Average EU15	5200	4200	14000	2100

Table 2. Estimated costs of damage from emissions at sea. Unit per ton of pollutant emitted.

	SO ₂	NO _x	PM _{2.5}	VOCs
Baltic Sea	1600	2100	2500	1000
North Sea	4300	3100	9600	2600
English Channel	5900	5400	12000	1900
Eastern Atlantic	4500	4800	9100	1500
Mediterranean	4700	6200	10000	1700

Will be aiming at greatly reduced emissions of greenhouse gases

Agreement between Social Democrats and Die Grüne means that Germany is bent on maintaining its leadership in matters concerning the climate.

IN THE MATTER of the climate, Germany intends to remain in the lead among nations. Here follows some of the central extracts from the agreement between the coalition parties settled in October:

Germany will be proposing that the EU declare itself ready to have reduced its emissions of greenhouse gases by 30 per cent in 2020 (from 1990 levels) as agreed for the second round of the Kyoto protocol.

For its part Germany will be aiming at a 40-per-cent reduction by 2020 – provided that the EU adopts the 30-per-cent target.

Emissions trading

It will also be supporting the need to introduce a system of emissions trading in Europe. It will moreover be urging the following as directions for EU policy:

- ◆ The measures adopted since 1990 for the reduction of greenhouse gases must be observed when allotting emission allowances.
- ◆ The emission allowances should be allotted free of charge and be compatible with the flexible mechanisms of the Kyoto protocol.

Ecotaxes

It is suggested that in 2004 the price of oil, the state of the economy, the competitiveness of German business, and the public mood are to be re-examined, in view of the emissions of greenhouse gases, to see whether environmental taxation can be further developed.

Moreover, during the next few years the incentives to the development of renewable energy will be



system is to be followed up by making train travel increasingly attractive – especially for families with children – through a 7-per-cent reduction of VAT on rail tickets.

Strongly supported by the coalition government are also emission charges for flights on European routes and a further differentiation of start and landing fees based on emissions of air pollutants.

raised to 200 million euros in 2004 and 220 million in 2005. Further:

- ◆ The freeing of flights to other EU countries from VAT will be dropped.
- ◆ The exemptions given to producers in respect of environmental taxes will be cut down.

The success of the new rail fare

Energy efficiency and renewables

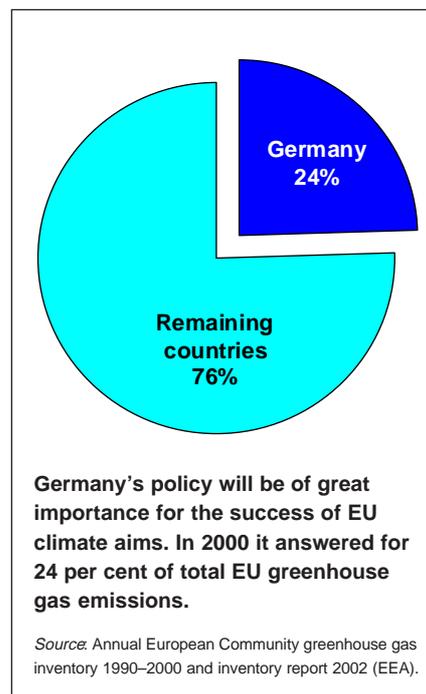
Measures are to be taken to have doubled the proportion of renewables in the generation of electricity and the consumption of prime energy at the latest by 2010 (from base-year 2000 levels).

The government will also be pushing for the development of combined heat-and-power and hydrogen cells in accordance with legislation passed during the previous session, and be collaborating with industry to these ends.

Offshore wind farms are planned to add at least 500 MW to capacity by 2006 and 3000 MW by 2010. Heating from renewable sources is to be encouraged, the aim among others being to have doubled the installed area of solar panels during the coming four years.

The German environmentalist organization GermanWatch was not satisfied: “Apart from some new ideas concerning long-term climate policy, the agreement has yielded only a patchwork of minor measures for saving the climate.”

Source: KlimaKompakt No. 22 / October 2002 (www.germanwatch.org/rio)



Local program not working

An evaluation by the US Environmental Protection Agency has shown that a local cap-and-trade program set going in California for controlling the emissions of sulphur and nitrogen oxides is performing below expectations.

The Regional Clean Air Incentives Market program (RECLAIM) was adopted by the South Coast Air Quality Management District in 1993. It has more than 350 participants in its NO_x market, and about 40 for SO₂.

"The program has produced far less emission reductions than were either projected for [it] or could have been expected from the system it replaced," was the EPA's conclusion. It replaced a so-called-command-and-control system in which industries either had to meet emissions caps or face fines.

Like most of the new trading programs, RECLAIM cannot rely on market incentives, but will require additional government involvement to avoid industry manipulation, the EPA found.

Source: Environment News Service (ens-news.com), November 13, 2002. The EPA's evaluation of the RECLAIM program is available at: www.epa.gov/region09/air/reclaim/

.. but emissions are declining nationally

The annual evaluation of the Acid Rain Program¹ that has just been published by the EPA shows that the emissions of sulphur and nitrogen oxides from the designated plants are continuing to decline. The emissions of sulphur dioxide from power plants in 2001 were 10.6 million tons, a full one-third reduction from 1990 emissions and down from 17.3 million tons in 1980. Emissions of nitrogen oxides from power plants also continued a downward trend of 4.1 million tons in 2001, a 25 per cent decline from 1990 emissions levels. The trading component of the SO₂ program has significantly lowered the costs of compliance and has not resulted in any significant geographic shifts in emissions, according to the report.

¹ EPA's Acid Rain Program 2001 Progress Report is available online at: www.epa.gov/airmarkets/cmprpt/arp01/index.html along with extensive information on emissions data, allowance transfers, air quality data and atmospheric deposition data.

UNITED STATES

Open market trading scheme criticized

THERE ARE GRAVE imperfections in the system for open-market trading that the US Environmental Protection Agency is trying to introduce, according to a recent report from the agency's own Office of Inspector General (IG).

Contrary to traditional "cap and trade" programs, open-market trading allows polluters to trade emission credits between sectors and time periods without limit. Electric utilities could for instance continue smokestack emissions in return for a promise to carry out a drive to remove old, highly polluting cars from the road. Trading is not limited, either, to one pollutant: different kinds of pollutants can be exchanged for each other.

The idea with open-market trading is to increase flexibility and make it easier for stationary sources to fulfill the requirements of the Clean Air Act. But the way the system is fashioned makes it impossible to foresee its effects on the environment.

It lacks namely a mechanism to ensure that trades between sectors will be of like value – in other words,

that apples will really be exchanged for apples and not for "a promise of a future guava," as one critic expressed it. Another weakness is that it will be allowable to sell left-over credits from, say, a shut-down plant.

The IG's scrutiny was made at the joint request of the New Jersey chapter of the Sierra Club and Public Employees for Environmental Responsibility (PEER), but the agency's response suggests that it has no intention of taking any notice.

"The EPA will ignore this report just as they have ignored four previous IG reports and numerous pleas from their own specialists," said Jeff Ruch, PEER's executive director. "Until these problems are addressed, EPA's trading plans will remain a dangerous scam that threatens to undermine real progress towards clean air."

PER ELVINGSON

Further information: PEER has set forth its criticism of open-market trading in a white paper entitled **Trading Thin Air**, available at www.peer.org/publications/wp_trading.html. PEER is a national alliance of local state and federal resource professionals working to protect the environment.

LRTAP CONVENTION

Many countries are failing to comply with the protocols

IT WOULD APPEAR from the last review made by the Implementation Committee¹ that several countries are sometimes failing badly to comply with the protocols under the Convention on Long-range Transboundary Air Pollution. This failure concerns not only the obligatory emission targets (especially those in the 1988 protocol for NO_x and that of 1991 for VOCs – volatile organic compounds) but also the obligation to report.

During the year the committee examined the following eight countries for non-compliance with emission targets.

FINLAND. It was noted in the previous review that Finland had failed to reduce its emissions of VOCs, as

required, by 30 per cent between 1988 and 1999.² It had however, according to the latest data, managed to reduce them by 26 per cent during the period of the last review, and

Failure concerns not only targets but also the obligation to report

is expected to have got them down by 30 per cent in the course of this year.

GREECE. The latest reported data shows emissions of NO_x to have been higher in recent years than they were

in 1987, the base year for the protocol. In 2000 they ran up to 320,000 tons as against 285,000 tons in 1987. The committee expressed deep concern at the prospect of Greece failing to comply even by 2010, by which time it will have been in non-compliance for thirteen years, and at its not having indicated a year by which it expects to achieve compliance.

ITALY. As in the case of Finland, it was noted in the previous review that Italy had failed to make the 30-per-cent reduction for VOCs – having brought emissions down by no more than 18 per cent from 1990, the base year for the protocol, to the target year 1999. The latest data do however show that there had been a 26-per-cent reduction by 2000, and that

the 30-per-cent goal should have been reached this year.

IRELAND. Emission data shows the country's emissions of NO_x to have been above the 115,000-ton level for the base year 1987 during all five years from 1996 to 2000. In that last year they amounted to 125,000 tons. By way of explanation, reference was made to the country's extraordinary economic growth during the nineties. Proposed measures should however make compliance possible at the latest by 2004.

LUXEMBOURG. Both in 1999 and 2000 emissions of VOCs were, according to the latest figures, only 21 per cent below those in Luxembourg's base year (1990) instead of the required 30 per cent.

NORWAY. As both Finland and Italy have done, Norway produced further information last year in regard to compliance with the VOC protocol. The implementation committee found it worrying that in 2000 emissions had been 45 per cent over the required level, and that Norway did not expect to achieve compliance before 2006. It further noted that there was no evidence of any concrete steps having been taken to shorten the delay.

SPAIN. Emissions of NO_x were reported to have been above the level of the base year (1987) in all seven years from 1994 to 2000. In that last year they ran to 1,419,000 tons, 26 per cent higher than in the base year, when they were 1,121,000 tons. The committee expressed concern at Spain not having indicated a year by which it expected to have achieved compliance, and at the trend showing the country to be moving steadily away from it. Moreover, it was not complying with the VOC protocol either. Far from achieving the required 30-per-cent reduction, it had allowed emissions to be even higher than those of the base-year figure of 1,526,000 tons both in 1999 and 2000.

SWEDEN. According to the latest data, by 1999 emissions of VOCs had only been brought down by 22 per cent from the 555,000 tons of the base year (1988), and in 2000 by 25 per cent. A large uncertainty was reported to remain in regard to the data itself, of which a thorough overhaul was however said to be under way. But no date could yet be specified by which Sweden could be expected to be in compliance.

As to the obligation to report, the committee noted that as a result of the previous year's exhortations from the Executive Body of the convention, several countries had responded by sending information. Despite a general improvement there are however still some notable failures, Luxembourg and Ukraine being pointed out as being consistently in non-compliance. Some kinds of emissions data are still missing from Belgium, Croatia, the Netherlands, Italy, and the European Community.

Parties to the convention are also required to report strategies and policies for abating air pollution generally, and eleven were found to be still not complying.

From an in-depth review of the extent of compliance with the 1994 Sulphur Protocol the committee concluded from the data received that nineteen of the twenty-five parties seemed to have met their obligations for the year 2000. Three – Canada, Croatia, and Italy – had not submit-

ted the necessary data for evaluation, while in the case of three others – Belgium, Hungary, and Monaco – the protocol was not yet in force that year.

After trying to review compliance with other obligations, such as to set standards for emissions and fuels, the committee had to admit that the reporting from more than half of the twenty-five parties to the protocol was so inadequate as to prevent any conclusions being drawn. The report, with its conclusions and recommendations, will be considered by the Executive Body of the Convention at its coming meeting in Geneva on December 10-13.

CHRISTER ÅGREN

¹ The fifth report of the Implementation Committee (EB.AIR/2002/2 and Add.1). Can be downloaded from: <http://www.unece.org/env/eb/welcome.html>

² The extent of compliance with the VOC protocol of 1991 was reported in more detail in Acid News 1/02, and that of the sulphur protocol in AN 3/02.

HEMISPHERIC POLLUTION

Sources are all around

Throughout the northern hemisphere emissions are creating pollution at levels above what they will have to be if the objectives for air quality are to be attained. Ozone and particles are cases in point.

SO FAR air quality has been mainly regarded as a local or regional problem. But research has now shown there to be an extensive transporting of pollutants across the whole northern hemisphere – of mercury and persistent organic substances as well as ozone and particles.

In the case of ozone, hemispheric pollution adds to the local background kind when summer smog with high levels of ozone hits Europe, and significant part of it may have come from sources in Asia and North America. Similarly, European emissions can add to excessive levels in Siberia. Emissions from Asia, North America, and Europe have increased the hemispheric burden of ozone by at least 50 per cent since

the start of the industrial revolution, according to leading scientists from all three continents, meeting in Germany this last October. Among the organizers of that conference was the Convention on Long-range Transboundary Air Pollution.

"These conclusions confirm the need to continue addressing air pollution at an international level within the framework of the Convention, and to take an even broader hemispheric perspective in developing cost-effective strategies to tackle the problem," averred Kaj Bärlund, UNECE Environment Director.

Further information: www.unece.org/press/pr2002/02env09e.htm

Bad environment may become worse

Unsafe levels of at least one pollutant in most cities, only four meet guidelines.

POLICEMEN directing traffic in Beijing are living dangerously. Given the concentrations of pollutants in the air at the city crossways, they are estimated to have an average lifespan of only 40 years.

This is just a small detail in the mountain of facts in a report¹ made by the Stockholm Environment Institute for UNDP, the United Nation's Development Programme.

According to a ranking made by the World Bank, sixteen of the twenty cities with the worst air pollution in the world are Chinese. The concentrations of total suspended particles (TSP) are on an average 10-20 times higher than, say, in London or Brussels.

As a measure of air quality the Chinese use an air pollution index, API, which is a compound of the concentrations of sulphur dioxide, nitrogen oxides and TSP.

The State Standards system is based on the API, with Grades I and II being considered suitable for long-term living conditions, Grade III acceptable for short-term exposures, while Grades IV and V are unsuitable for humans.

Of the 335 Chinese cities regularly monitored, only 33 per cent met either Grades I or II in 1999, with over 40 per cent falling into Grades IV and V (see Figure 1). Hence almost half of Chinese cities monitored – with a total population of 270 million – are unsafe by Chinese API standards.

The percentage would certainly rise if the figures for each pollutant were known, and most Chinese cities experience unsafe levels of at least one pollutant. For example, using a different measuring system, only four cities – Haikou and Sanya (Hainan), Xiamen (Fujian) and Beihai (Guangxi) – met the WHO guidelines for air quality.

Although the concentrations of small particles (PM₁₀ and PM_{2.5}) are not regularly measured in China, monitoring campaigns in Beijing have revealed episodes with very

high levels of PM_{2.5}, especially during periods of smog accumulation in summer.

Attempts at quantifying the effects of air pollution on health have ended in widely varying results. One of those mentioned in the SEI report,

*Acidification has been
a known problem
in China for decades*

referring to the year 2000, put the number of premature deaths due to air pollution at 600,000, cases of chronic bronchitis at 5.5 million, and respiratory illnesses 20 million. If the quality of the air were to be really brought up to Chinese standards, some 178,000 deaths, or 7 per cent of all deaths in urban areas, could be avoided each year. Each year, too, 7.4 million working days are being

lost on account of health problems related to air pollution.

Acidification has been a known problem in China for decades. In the 1980s, areas affected by acidification extended over large parts of Guangdong, Guangxi, Sichuan, and Guizhou. By the 1990s, the area had grown considerably, and included large parts of Hunan, Jianxi, Fujian, Shanghai and Shandong provinces. By 2000, nearly one-third of China was affected.

The consequences of acid deposition are exceedingly costly, one estimate putting the economic cost at 110 billion yuan in 1995, or almost 2 per cent of the GDP. Among the effects are damage to agricultural crops and forests, reduction in food production, destruction of lake ecosystems, and damage to buildings. Guangxi province is estimated to experience a 5-10 per cent general reduction in food crops, and since 1980, 85 per cent of the pine stands in forest areas have been affected, with the death

Figure 1. Ambient air quality in Chinese cities.

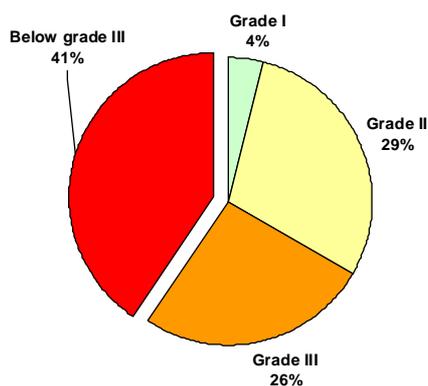
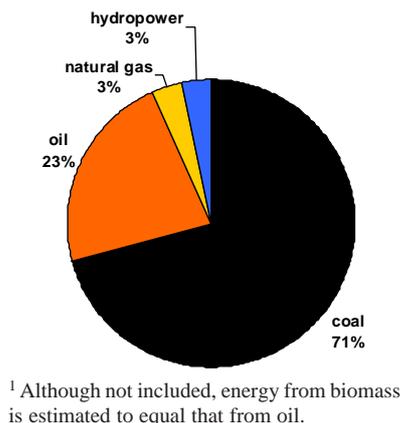


Figure 2. Primary energy use by source 1998.¹



¹ Although not included, energy from biomass is estimated to equal that from oil.

rate reaching 35 per cent.

The emissions of air pollutants are intimately connected with the use of energy. Although starting to decline, they still remain high from combustion in power plants, industries and households. With the gradual, ongoing modernization of Chinese cities, fuels have shifted from coal to coal gas or even natural gas, residential boilers have been upgraded, and cooking on open fires in street stalls is prohibited, while cooking with gas is encouraged. Coal still remains however the dominant source of energy, accounting for 70 per cent of primary energy use (Figure 2).

Road traffic is also adding greatly to pollution and the use of energy. Since 1980 the number of vehicles has been growing at a rate of 20 per cent annually in many urban areas. It is estimated that there are currently about 20 million motor vehicles in China, and the figure is expected to reach upwards of 50 million by 2010. During the 1990s, the transport sector's share of energy use nearly doubled. Oil is expected to be the fastest growing form of primary energy used in China, propelled by this surge in transport.

To date the Chinese authorities have shown very little interest in developing alternatives in transportation, possible because the car is regarded as such an important symbol for economic development and success. Only in one respect have they imposed any environmental requirement at the national level, by forbidding the sale of leaded petrol. A ban on old vehicles has been introduced locally in Beijing, where taxis and buses running on liquid

petroleum gas are also the order of the day. It is however obvious that if transportation should approach western European or North American levels, even large investments in the cleanest technologies will not suffice to resolve the problems for the environment.

Although the use of energy is still low in China – being only about half

The report presents two scenarios for future developments in China

the world average and a mere tenth of the US level – demand is steadily increasing, with some forecasts indicating a quintuple rise up to 2050. If anything like that amount were to be generated in the same way as today, the effects on environment and health would be disastrous. The SEI does note however that there is a huge unused potential for improvement in China.

Although China has reduced the energy needed to produce 1 US dollar of GDP by more than half since the economic reforms set off, energy efficiency is still only one-quarter of the performance in industrialized countries. Therefore, energy generation need only increase by half in order to satisfy a six times higher demand by mid-century should China manage to reach the energy efficiency standards of industrialized countries.

As to the way energy is generated there is also considerable room for

improvements. The crucial point is the government capacity to promote the development of sustainable energy. With economic restructuring a major force for change, and environmental protection policies increasingly integrated with energy policies, momentum is nevertheless increasing to improve energy efficiency and promote renewable sources of energy.

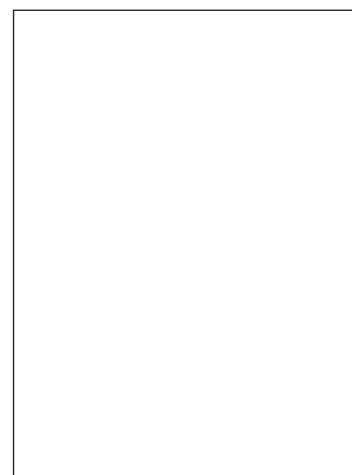
The report, which deals with much else besides air pollution, presents two scenarios for future developments in China.

In the one, with market control where short-term interests are allowed to profit at the expense of long-term sustainability, society becomes even more inegalitarian and environmental problems mount catastrophically.

In the other scenario, considered fully possible by the authors of the report, who call it “the green reform path,” ever greater importance is attached to the efforts of non-governmental organizations and to a greater engagement of ordinary citizens in work for the environment, coupled with respect for traditional Chinese values instead of a western way of life all taken up with consumption.

PER ELVINGSON

¹ **China Human Development Report 2002 - Making Green Development a Choice.** Printed copies can be ordered from Academic & Trade Unit, Oxford University Press (China) Ltd., 18th Floor, Warwick House East, Taikoo Place, 979 King's Road, Quarry Bay, Hong Kong. 150 pp. US\$ 22.50. The report can also be downloaded in pdf format free of charge from www.undp.se/download.asp?Attachment_id=5849&Name=CHDR+2002.pdf



Concentrations still too high

Recent publications

Ammonia in the UK (2002)

A summary of recent British research, explains why ammonia is a cause for concern and what could be done to tackle the problem.

90 pp. Free of charge. Obtainable from AEQ Division, Defra, 4/D11 Ashdown House, 123 Victoria Street, London, SW1E 6DE, England. Can also be downloaded from www.defra.gov.uk/environment/airquality/ammonia/index.htm

CO₂ Emissions from Fuels Combustion: 1971–2000 (2002)

Contains comprehensive and detailed statistics of CO₂ emissions associated with energy practices around the world. The volume features country tables for more than 130 countries, and summary tables for key regional and political groupings.

540 pp. US\$150 or 165 euro. ISBN 92-64-09794-5. Can be ordered from IEA Books, 9, rue de la Fédération 75739 Paris Cedex 15, France. E-mail: books@iea.org, Internet: www.iea.org/books.

Dealing with Climate Change: Policies and Measures in IEA Member Countries (2002)

Countries are working to tackle their greenhouse gas emissions. But how are national climate strategies developing? This publication provides a comprehensive listing of new or modified policies taken or planned by IEA member countries in 2001 in order to reduce damage to the climate system.

151 pp. US\$100 or 110 euro. ISBN 92-64-19841-5. Can be ordered from IEA, address as above.

Beyond Kyoto: Energy Dynamics and Climate Stabilisation (2002)

A study from the International Energy Agency suggesting how negotiators might address the long-term objective of the climate convention, to stabilize concentrations of greenhouse gases in the atmosphere, with due regard for uncertainties and the cost.

162 pp. US\$75 or 82 euro. ISBN 92-64-19838-5. Can be ordered from IEA, address as above.

The concentrations of ground-level ozone were again high in Europe this last summer, according to the EEA, the European Environment Agency. Background concentrations appear to be increasing, although peak levels were lower during that period.

Under an EU directive of 1992 the member countries are obliged to measure the concentrations of ground-level ozone and report them to the Commission. The directive also contains the proviso that if certain threshold values are exceeded in a country, the public has to be warned or informed.

Besides the EU members, ten other countries sent in data in 2002, and altogether 1718 monitoring stations were then considered to be operating in all the reporting countries.

During the summer of 2002, the threshold value for warning the public (when the one-hour average exceeds 360 $\mu\text{g}/\text{m}^3$) was exceeded in France (at one station), in Italy (one), and Spain (at three stations), all in June. The highest concentration was that recorded at Puertollano in Spain: 391 $\mu\text{g}/\text{m}^3$.

The threshold value for informing the public (180 $\mu\text{g}/\text{m}^3$ as one-hour average) was reported to have been overstepped in eleven of the member countries as well as in six others – with about 33 per cent of the monitoring stations reporting such occurrences.

Throughout the five months of monitoring this threshold was passed in France, Greece, Italy, and Spain. The concentrations when it was overstepped were highest in southern France, the Po valley and central Italy. The value was exceeded during four consecutive months in Austria, Germany, and Switzerland, and in three in the Netherlands and the Czech Republic.

Ten countries – Ireland, Norway, Denmark, Sweden, Finland, Estonia, Latvia, Lithuania, Bulgaria, and Romania – reported no overstepping of the threshold for public information, and this was the sixth consecu-

tive year in which Ireland and Finland could report no exceeding of that limit.

It is difficult, with the relatively short series of uniform measurements that is available (they were started in consequence of the directive in 1994) to say anything with certainty about the long-term trends, since the concentrations vary quite a lot from year to year, depending on the weather.

The decline in peak concentrations that nevertheless seems to be occurring may be explained by the lowering of the emissions of precursors (nitrogen oxides and volatile organic compounds) in Europe during the nineties. It seems on the other hand that the average (background) level is increasing, possibly because of incoming transports both of ozone and its precursors from other parts of the northern hemisphere.

The present ozone directive is due to be replaced in September 2003 by the third daughter directive to the Air Quality Framework Directive (96/62/EG), when the rules for reporting will be altered. For one thing there will be a new “alert” threshold of 240 $\mu\text{g}/\text{m}^3$. This year that threshold was passed in 7 per cent of the cases where overstepping of the public information threshold was reported. Henceforth, whenever the alert threshold is passed, governments will have to set going plans for achieving an immediate reduction of concentrations “where feasible.”

PER ELVINGSON

Air Pollution by Ozone in Europe in Summer 2002. Published by EEA, available at http://reports.eea.eu.int/topic_report_2002_6/en/topic_2002_06.pdf.

Greek energy policy raises concerns

The only way to get the better of the ever increasing emissions of carbon dioxide in Greece will, in the view of IEA, the international energy agency which has just examined the matter, be to improve the efficiency and reduce the use of energy. According to the EU's internal distribution of obligations under the Kyoto protocol, Greece will be allowed to increase its emissions by 25 per cent during the period from 1990 to 2008-12. But in 2000 they were already 23.3 per cent higher than in 1990, and seem likely to go on increasing.

While noting some bright spots, the IEA still maintains that "efforts need to be strengthened". Although Greece has made progress in diversifying its fuel mix, high CO₂-emitting lignite still accounts for 64 per cent of the electricity supply. More work is urged in promoting renewables, the proportion of which in the energy supply was only 5.2 per cent in 2000.

Environment Daily. October 11, 2002.

Italy looks abroad to achieve Kyoto cuts

Italy is to reduce its emissions of greenhouse gases by adopting measures with "the lowest net cost and the highest efficiency," according to the government's strategy presented in October. In practice it will mean extensive use of the Kyoto protocol's flexible mechanisms. Emissions trading and joint projects with other countries are expected to provide half of the required emissions cuts.

Hailed by industry, the strategy has been heavily criticized by Italian environmentalists. Legambiente for instance attacked it for failing to boost renewable energy and for making no effort to address the effect of transport on climate.

Under EU's internal distribution of Kyoto commitments, Italy will have to reduce its emissions by 6.5 per cent between 1990 and 2008-2012. From 1990 to 2000 the increase was 3.9 per cent.

Environment Daily. October 9, 2002.

All in one place

A mass of European environmental data can be found on a new information portal on the Internet, created by United Nations Environment Programme, UNEP. Web address: <http://europe.unep.net>

FINLAND

Attaining ceilings

AT THE END of September Finland made known its program for meeting the requirements of the EU directive on national emission ceilings for certain atmospheric pollutants.¹ This directive, which was adopted last year, is the most important for improving the quality of the air in Europe. It sets binding ceilings for four pollutants – SO₂, NO_x, VOCs and ammonia – which have to be met by 2010.

The program defines targets and measures for reducing emissions in the energy, transportation, agricultural, and industrial sectors. Attaining the ceilings will mean cutting the emissions of SO₂ by 57 per cent (from 1990 levels), those of NO_x by 41 per cent, VOCs by 42 per cent, and ammonia by 18 per cent. See table.

It is thought that in Finland's case the ceilings can be attained without any need for further measures to cut emissions. Decisions already taken, coupled with the effects of EU legislation, should suffice. Confirmation that Finland is already well on the way to compliance in this respect comes from its emission data for the

year 2000. This applies especially to SO₂, where emissions are already far below the ceiling for 2010. Lower margins for the other pollutants suggest however that it may nevertheless be necessary in their case to take further measures.

Finland appears to be the first of the EU countries to set out a program for accomplishment of the NEC directive. As far as is known, too, it is the only one to have done so by the set date, October 1, 2002.

CHRISTER ÅGREN

¹ According to Article 6 of the EU directive on national emission ceilings for certain atmospheric pollutants (2001/81/EC), member states should, at the latest by October 1, 2002, each have drawn up programs showing how they are planning to meet the emission ceilings for SO₂, NO_x, VOCs, and NH₃ set out in the directive for 2010. The programs are to include information as to the policies and measures that have either been adopted or are envisaged, as well as quantified estimates of their effect on the emissions of these pollutants by 2010. Member states shall moreover make their programs available to all, including environmentalist organizations.

Emissions in Finland 1990 and 2000 and emissions ceilings for 2010 of the NEC directive (ktons).

	1990	2000	NEC 2010	change 1990-2000	change 1990-2010
Sulphur dioxide	260	74	110	72%	57%
Nitrogen oxides	287	209	170	26%	41%
VOCs	224	161	130	28%	42%
Ammonia	38	33	31	13%	18%

Plus and minus

Which way are we going? In the Vital Signs yearbook you can see in tables and graphs what is happening to the environment the world over. The 2002 edition features more than 50 indicators of long-term trends. Here are a few examples.



Carbon emissions. Global emissions of carbon from fossil fuel combustion increased 1.1 per cent in 2001, to a new high of 6.55 billion tons.

Annual emissions have more than quadrupled since 1950, contributing to the rising threat to global climate.

Compact fluorescent lamps. Sales grew 15 per cent in 2001, and have grown 13-fold since 1988. CFLs last ten times longer and use a quarter of the electricity of incandescent bulbs. Currently installed lamps save the equivalent of 40 coal-fired power plants.

Automobile production. Production declined slightly in 2001, to 40 million units, but remains at near-peak levels; the passenger car fleet has grown to some 555 million. Having stagnated since the early 1980s, limited fuel efficiency gains have been made in Europe and Japan, but not in the United States.



Wind power. Generating capacity jumped 38 per cent in 2001, and has grown 20-fold since the mid-1980s. Wind power is the fastest growing energy source in the world.

Solar power. Solar cell production grew 36 per cent in 2001, to more than 390 megawatts – seven times the annual global production of the early 1990s. Solar cells could become a significant power source worldwide within the next three decades.



Appliance efficiency. Energy and water efficiency standards and labelling programs now exist in 43 countries. These programs reduced the average energy use of refrigerators and freezers in the European Union by 27 per cent from 1992 to 1999.

Bicycle production. Production is rising again, to 101 million units in 2000; sales of electric bicycles jumped 27 per cent in 2001, to 0.6 million.



Urban sprawl. In many car-dependent cities, the amount of land covered by metropolitan areas is growing faster than the population. Sprawl contributes to higher road deaths and exacerbates air pollution and global climate change.

Vital Signs 2002: The Trends That Are Shaping Our World. Published by the Worldwatch Institute. 215 pp. \$14.95. ISBN 0-393-32315-3. Internet: www.worldwatch.org/pubs/vs/2002/

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Linkages and synergies of regional and global emission control. Laxenburg, Austria. January 27-29, 2003. Workshop of the UNECE Task Force on Integrated Assessment Modelling. *Information:* www.iiasa.ac.at/rains or e-mail Markus Amann at iiasa.ac.at.

Clean Air For Europe (CAFE) Steering Group Meeting. Brussels, Belgium. February 17, 2003.

World Sustainable Energy Day 2003. Wels, Austria. March 5-7, 2003. Yearly conference on sustainable energy, where the winning projects of the Energy Globe Award will be presented. *Information:* O.Ö. Energiesparverband, Landstrasse 45, 4020 Linz, Austria. E-mail: office@esv.or.at. Internet: www.esv.or.at/

Air Pollution Abatement Planning in Europe. Berlin, Germany. April 1-3, 2003. International workshop on the implementation of EU air quality directives, organized by the German Federal Environment Ministry. *Information:* Karlheinz Lange, karlheinz.lange@bmu.bund.de

Air Pollutant Control "Mega" Symposium. Washington, DC, USA. May 19-22, 2003. *Info:* www.awma.org/events/conf/Mega2003/default.asp

First World Environmental Education Congress. Porto de Honra, Portugal, May 20-24, 2003. *Information:* WEEC, Rua 15, 349, 4500 Espinho, Portugal, internet: www.1weec.net

7th European Conference on Mobility Management. Karlstad, Sweden, May 21-23, 2003. *Information:* European Platform on Mobility Management, www.epomm.org.

Clean Air For Europe (CAFE) Steering Group Meeting. Brussels, Belgium. June 2-3, 2003.

Air quality – assessment and policy at local, regional and global scales. IUAPPA 14th International Conference. Dubrovnik, Croatia. October 6-10, 2003. *Information:* www.imi.hr/cappa2003.html