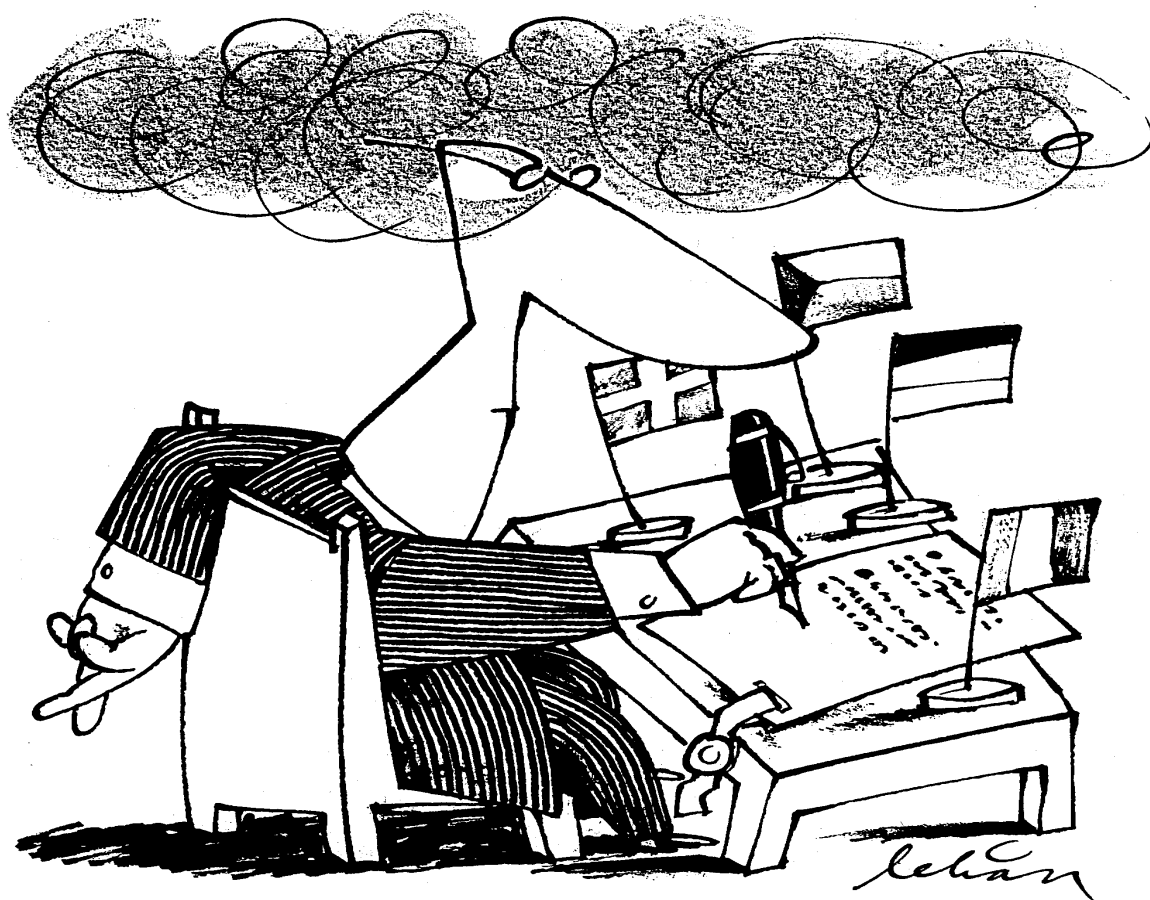


# Acid News



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AIR POLLUTION

## Exposing delinquents

TODAY THERE IS a whole row of agreements by which countries have undertaken to relieve the pressure on the environment in various ways. But although these agreements are usually legally binding, sanctions to force countries to live up to their commitments are for the most part lacking. Moreover it is often difficult to determine whether or not they have done so, because the reporting has either been poor or omitted.

For several years a special working group, the Implementation Committee, has been operating under the Convention on Long-Range Trans-boundary Air Pollution to check on whether the signatories

have been acting as they should. During the past year it has turned attention in particular to the protocol on VOCs (volatile organic compounds).

Twenty-six countries have signed that protocol, and all but five and the EU have ratified it. It is therefore binding only for the twenty-one that have ratified. According to the latest statistics only thirteen of these have lived up to their commitment to reduce emissions of VOCs. See table, p. 5.

Thus eight countries – almost 40 per cent of those that have ratified – are being remiss. Of these the worst was Norway, which has actually increased its emissions by 41 per

cent since 1991. The other seven – Finland, Italy, Luxembourg, Spain, Sweden, Liechtenstein, and Monaco – have certainly brought theirs down, but not enough.

The thirteen countries that had met the requirement to reduce their emissions of VOCs by 30 per cent between 1988 and 1999 were: Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, France, Germany, Hungary, the Netherlands, Slovakia, Switzerland, and the United Kingdom. Countries whose emissions were already low could, if they wished, sign with no other obligation than to freeze them.

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:

The Swedish NGO Secretariat on Acid Rain  
Box 7005, S-402 31 Göteborg, Sweden

Tel: +46-31-711 45 15. Fax: 711 46 20

E-mail: [info@acidrain.org](mailto:info@acidrain.org)

Internet: [www.acidrain.org](http://www.acidrain.org)

Editor: Christer Ågren ([cagren@acidrain.org](mailto:cagren@acidrain.org))

Printed by Williamssons Offset, Solna, on paper not bleached with chlorine.

ISSN 0281-5087

### THE SECRETARIAT

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

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

In furtherance of these aims, the secretariat operates by

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

### EDITORIAL

## Excuses won't do

IS THERE ANY EXCUSE for countries failing to carry out what they have committed themselves to do under international agreement?

According to the latest data on emissions, eight of the twenty-one countries that ratified the protocol of 1991 concerning volatile organic compounds (VOCs) have not fulfilled their commitment to reduce emissions. (See cover story.)

Although the situation had been known in all eight countries for at least a year, so far only four – Norway, Finland, Sweden and Italy – have come forward with explanations. As an excuse, Norway refers to "an unexpected increase" in the level of activity in the offshore loading and shipment of crude oil. Finland claims progress has been hindered by the unexpectedly slower replacement of old cars. Italy also blames transportation, saying there has been an unexpected increase in emissions from that sector.

The explanations all agree in putting the blame on unexpected developments. But can that really be accepted as an excuse?

Emission data is being produced annually in each country. From the pertinent data it can be seen, for instance, how quickly cars are being replaced, how transportation is increasing, and how oil output is changing. It should therefore have been easy for the countries that are now claiming to have been taken by surprise to see what was happening as long ago as the mid-nineties, and taken steps to ensure that the emission target would still be met.

Italy says that some measures, such as the forced scrapping of old cars, were set going in 1997. Norway refers to negotiations with the oil companies in 1998 and 1999. Finland recalls steps taken to reduce emissions from stationary sources, but doesn't say when they were taken. In all cases they were obviously either too late or inadequate, or both. Only Norway seems to have considered the potentials and costs of reducing emissions from the various sectors. But here again, no

dates were given for when the analyses were made.

Oddly, all three say, with evident self-congratulation, that they are adhering to the EU directives. One would wonder what they would be doing otherwise...

It is true that things can happen that are both unforeseeable and hard to counteract, thus forcing countries to default on their commitments. But that has not been so in any of the cases here in question. Norway seems to have allowed an increase in oil output, with consequently increased emissions, while well knowing that the cleaning technology would not be keeping pace. By submitting to increases in emissions from transportation, both Finland and Italy have failed to take the steps that would have helped them to live up to their commitments under the VOC protocol.

It is not only disturbing from the point of view of effects on health and the environment that measures to reduce emissions are being delayed. Confidence in international agreements will be shaken if more countries behave as some are now doing.

Most countries put great effort into the work on international agreements concerning the environment – in negotiating, as well as in reporting and achievement. Hitherto that last has been mainly a matter of mutual trust. But now Norway's, Finland's, and Italy's attitude in respect of the VOC protocol suggests that trust will not be enough. A more fully developed reporting system might help – provided that countries deliver. Unfortunately many are not meeting even the present modest requirements for reporting.

It is not right that countries that are not doing what they have agreed to do should be allowed to get away with poor excuses. The question is whether the time has now come for serious consideration of the possibility of imposing sanctions on breakers of international agreements.

CHRISTER ÅGREN

# To be sulphur-free before end of decade

LAST DECEMBER the EU environment ministers agreed that it should be mandatory for road vehicles to run on sulphur-free fuel from 2009. In a proposed directive<sup>1</sup> from the Commission it would have been 2011, while the Parliament wanted it to be 2008. Both Parliament and the ministers supported the Commission in proposing that sulphur-free fuels should be available in all the member countries from January 2005.

Here "sulphur-free" fuel is defined as that with a maximum sulphur content of 10 ppm (parts per million). For a year now the highest content permitted in the EU has been 150 and 350 ppm respectively for petrol and diesel, and from 2005 it will have to be no more than 50 ppm for both.

The date for making sulphur-free fuels compulsory would actually only apply for petrol. The intention is however that the Commission shall review the situation at the latest in 2005, the outcome of which is expected to be that the same date will apply for diesel as for petrol.

At its first reading of the direc-

tive, Parliament wanted to make the quality standards for road fuels apply also to non-road mobile machinery and tractors from 2005. At present they may be driven on light oils with a sulphur content of 2000 ppm, which will however have to be halved by 2008.

These demands were rejected by a majority in the Council, maintaining that they should be considered during a general review of fuel standards which is scheduled to start next year, while at the same time admitting the right of individual countries to set lower limits if they wished. Five countries – Sweden, Finland, Denmark, Germany, and Austria – handed in a declaration emphasizing especially the need of cleaner fuels for non-road equipment.

The directive will now go to Parliament for a second reading. Non-road limits are likely to remain a matter of contention, so that if Parliament refuses to give way, conciliation will probably be the only way out.

The reason for wanting to reduce sulphur content is twofold: on the one hand to aid the introduction of new engine types consuming less fuel, and on the other to cut emissions both from new and existing vehicles. Sulphur not only reduces the efficiency of the catalyzers that are now in use, but contributes to the formation of particles in the exhaust gases of new as well as old vehicles.

Although the greater amount of processing needed for the production of low-sulphur fuel will admittedly cause more carbon dioxide to be emitted at the refineries, that is considered to be well outweighed by lower emissions from vehicles with the new engine technology.

PER ELVINGSSON

<sup>1</sup> Proposal for a directive of the European Parliament and of the Council on the quality of petrol and diesel fuels and amending Directive 98/70/EC. COM(2001) 241. Presented in May 2001.

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Finnish VOC villain. Finland's failure to reduce emissions of VOCs as envisaged is blamed on economic recession causing replacement of older cars to be slower than expected.

## Exposing delinquents

*Continued from front page*

Bulgaria, Hungary, and Greece took advantage of this option.

The protocol also gave countries the possibility of reducing emissions within a certain defined area – a so-called TOMA – provided, they agreed to freeze them for the country as a whole. Norway chose this alternative, but failed in both respects.

By the time the Implementation Committee last met, in September 2001, it had received explanatory notes from three of the eight countries that had failed to meet their commitments; Norway, Finland, and Italy.

Norway attributed its failure mainly to the fact that its North Sea oil output had almost doubled between 1989 and 1999, and that technologies for reducing the emissions of VOCs from the offshore loading of crude oil had only very recently become commercially available (see AN 1/01, pp. 18-19). Oil production had been expected to remain more or less stable when Norway signed the

protocol, and the cleaning technology to come sooner. The note added however that emissions from mobile sources had declined by a third, while those from other sectors had either remained constant or increased only moderately. With the measures already taken, Norway should, it said, be in full compliance with the requirements of the protocol by 2005 or 2006.

Finland reported a reduction of 29 per cent between 1988 and 1999 in the emissions of VOCs from transportation. When signing the protocol it had expected it would be 42 per cent. It blamed the discrepancy

on the economic recession during the first half of the 90s, which caused the renewal of the country's car fleet to be slower than anticipated. More than usual emissions from cold starting were also blamed, as was an unexpectedly large expansion of waterborne traffic and the use of non-road mobile machinery. Finland nevertheless says it is now aiming at an overall reduction of 30 per cent "at the latest" by 2004 or 2005.

Italy excused itself by saying that while previous statistics had indicated a drop in emissions of 24 per cent, according to the latest ones it would be only 18 per cent. Like Finland it pointed to emissions from mobile sources as the great culprit – they having only fallen by 15 per cent, as against 25-35 per cent in other sectors. Emissions from two-stroke mopeds and motorcycles were said to be a disproportional part of the problem, having accounted for 16 per cent of all the emissions from transportation in 1999. Nevertheless, as a result of measures set going in 1997, Italy said it expected to hit the 30-per-cent target, if not by 2001, then at least by 2002.

The Implementation Committee was of the opinion that the wording of paragraph 2 of article 2 of the protocol was categorical in respect of each of these three countries. In other words, they had had no alternative but to take effective steps to meet the 30-per-cent target by 1999.

Following the Committee's line, the Executive Body of the convention expressed concern at the failure of these countries to fulfill their commitments under the protocol, urging them to do so as soon as pos-

## Scope of the convention

Among the forty-eight parties to the Convention on Long-Range Transboundary Air Pollution (CLTRAP) are not only all the countries of Europe but also the EU, Canada, and the USA.

Originating in November 1979 it came into effect in 1983 and has since been reinforced with a number of protocols – agreements for reducing the emissions of various pollutants. The Implementation Committee was set up in 1997 with the purpose of

periodically reviewing, among other things, compliance with the protocols. It has to report on its activities at least once a year to the Executive Body of the convention, and where necessary make recommendations.

More information can be found on the Convention's website: <http://www.unece.org/env/lrtap/>.

Country	Ratified	Emissions		Difference	Commitment	Passed
		base year	target year			
Austria	YES	378	231	- 39%	- 30%	YES
Belgium	YES	488	271	- 44%	- 30%	YES
Bulgaria	YES	309	118	- 62%	0	YES
Canada <sup>1</sup>	-	2964	2777	- 6%	0	YES
Czech Rep	YES	435	248	- 43%	- 30%	YES
Denmark	YES	197	128	- 35%	- 30%	YES
Estonia	YES	84	42	- 50%	- 30%	YES
EU	-	no data	no data	no data	N.A.	NO
Finland	YES	222	170	- 24%	- 30%	<b>NO</b>
France	YES	2707	1784	- 34%	- 30%	YES
Germany	YES	3255	1653	- 49%	- 30%	YES
Greece	-	334	397	+ 19%	0	NO
Hungary	YES	215	149	- 31%	0	YES
Italy	YES	2213	1671	- 24%	- 30%	<b>NO</b>
Liechtenstein	YES	1.5	1.3 <sup>2</sup>	- 13%	- 30%	<b>NO</b>
Luxembourg	YES	19	15	- 21%	- 30%	<b>NO</b>
Monaco	YES	0.7	0.6 <sup>3</sup>	- 15%	- 30%	<b>NO</b>
Netherlands	YES	538	282	- 48%	- 30%	YES
Norway <sup>1</sup>	YES	249	351	+ 41%	0	<b>NO</b>
Portugal	-	308	484	+ 57%	- 30%	NO
Slovakia	YES	148	79	- 47%	- 30%	YES
Spain	YES	2711	2515 <sup>4</sup>	- 7%	- 30%	<b>NO</b>
Sweden	YES	555	421	- 24%	- 30%	<b>NO</b>
Switzerland	YES	324	165	- 49%	- 30%	YES
UK	YES	2662	1744	- 34%	- 30%	YES
Ukraine	-	1604	665	- 59%	- 30%	YES
USA	-	23466	16461	- 30%	- 30%	YES

<sup>1</sup> Overall figures. TOMA data lacking, <sup>2</sup> Latest reported data, for 1994, <sup>3</sup> Latest reported data, for 1998, <sup>4</sup> Latest reported data, for 1996.

sible.

Subsequently Sweden has also sent in an explanation to the committee, but none have been forthcoming from Spain, Luxembourg, Liechtenstein, or Monaco.

Last year the committee also examined the matter of compliance with the obligation to report that is written into the protocols. More than a year ago the Executive Body had named four countries – France, Greece, Liechtenstein, and Luxembourg – as well as the EU as being repeatedly in remiss as regards reporting either their emissions data or their strategies and policies, or both. France and Greece have since provided more information, but the others have still done nothing.

While noting some general improvement in the reporting of emission data, the committee also emphasizes that a number of countries are still not doing so in time. Only

about 43 per cent have complied in this respect.

This year the committee intends to turn its attention to the protocol of 1994, the Oslo protocol, on sulphur.

It may be well to recall that there are no clauses either in the convention or its protocols establishing sanctions against countries that fail to meet their commitments. Transparency will thus be of importance in furthering compliance, since lack of information makes it difficult to apply pressure, say, in the traditional manner of “name and shame.”

CHRISTER ÅGREN

Much of the information in the article comes from “The fourth report of the Implementation Committee” (Document EB.AIR/2001/3).

## EU NEWS IN BRIEF

### VOCs in products: proposal underway

There is as yet no EU legislation concerning the VOC content of products such as paints and varnishes. Studies made by the Commission have shown however that the emissions of VOCs from such products, as well as from operations such as vehicle refinishing, could be cost-effectively reduced to the extent of about 300,000 tons annually. The Commission is therefore intending to put forward a proposal for a directive to limit their VOC content. A first draft was presented at a meeting with representatives of the member countries last November, and a final proposal is expected before the summer is over.

### NEC and LCP directives adopted

New directives for national emission ceilings and large combustion plants have now been officially adopted as an outcome of conciliation between the Council of Ministers and the European Parliament, with publication in the Official Journal on November 27. Designated 2001/81/EC (NEC) and 2001/80/EC (LCP), they can be obtained from [www.acidrain.org/policy.htm/EU](http://www.acidrain.org/policy.htm/EU).

### EU preparing strategy on ships' emissions

At a meeting with representatives of the EU member countries and so-called “stakeholders” on January 18, the Commission said it would be presenting a “Community Strategy on air pollution from seagoing ships” during the summer. Although its content in the way of actual measures is as yet undetermined, the Commission put forward a paper as basis for discussion, in which it named for instance the possibility of modifying the 1999/32/EEC directive on the sulphur content of liquid fuels so as to extend its scope to include heavy bunker fuel oils.

Among the other possibilities it suggested were the application of economic incentives and pressure on the IMO (International Maritime Organization) to engage more actively in dealing with the problem of ships' emissions.

The discussion paper is available at the Commission's website: [http://www.europa.eu.int/comm/environment/air/future\\_transport.htm](http://www.europa.eu.int/comm/environment/air/future_transport.htm)



## Air-quality directive delayed

At a meeting with the steering group of CAFE, the Clean Air For Europe program, in December, the Commission reported that it was delaying proposal of a fourth daughter directive on air quality - which is to set the maximum concentrations of polyaromatic hydrocarbons (PAH), cadmium, arsenic, and nickel in the air, to be achieved by 2010. It had been expected that the Commission would be presenting its proposal towards the end of the year. The need to make a new cost-benefit analysis was given as explanation of the delay.



Cause of conflict.

## Disagreement over motorcycle emissions

At the second reading of the proposed directive on emissions from motorcycles, the European Parliament stuck to its demand for a tightening of the requirements. Although it contained binding requirements for 2003, the proposal, which was an amendment of 97/24/EC, also contained permissive (or "voluntary") limit values for 2006 - which had "been approved" by the Council of Ministers in their Common Position. But Parliament wanted them to be binding. The parties also disagreed as to the type of test procedure that was to be used. Conciliation will probably be the only way out.

# Unclear why some have done better than others

While financial support may be especially important, success is said to lie in combination of measures.

ALTHOUGH SOME OF the EU member countries have been notably successful of late in increasing their production of energy from renewable sources, it is not altogether clear how they have managed it. According to the European Environment Agency (EEA), the more successful ones have used a mix of measures.

In its report<sup>1</sup> on the matter, the agency focuses primarily on the extent to which each country has been able to expand its use of various technologies for the production of renewable energy - from solar photovoltaic panels, solar thermal heating, wind, and biomass in the form of wood and farm crops - between 1993 and 1999.

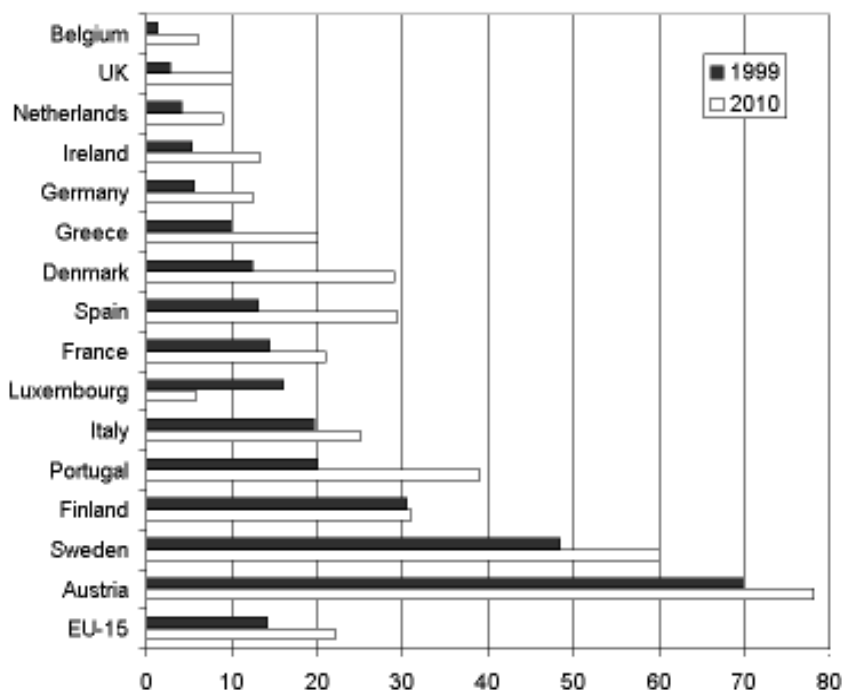
Some successes have been picked

out on the basis of two criteria: the countries' energy supply from any of the above sources must have increased more than the EU average during the period, while at the same time answering for 10 per cent of the total EU increase.

Both criteria could be met only by a few countries using a few technologies. In the case of Austria it was done by district heating using biomass and solar thermal means; in Germany by photovoltaics, solar thermal, and wind energy; in Spain by photovoltaics and wind, and by district heating with biomass in Sweden.

Where marked expansion has taken place, it has been due, according to the EEA, to long-established policies for the promotion of renew-

Electricity produced from renewable sources in 1999 and indicative targets for 2010 (per cent). Sources: Data for 1999 from Eurostat, 2010 targets from the directive.





Long-established policies for the promotion of energy from renewables have been the key to the successful development of solar photovoltaic production in Germany and Spain.

ables which have included financial support, good access to the grid for electricity generated from renewables, taxes penalizing the use of fossil fuel or lower taxes on the purchase of renewables, assistance in administration, priority to research and development, and education and information campaigns.

The EEA concludes by saying that the key to success lies in the combined effect of support measures rather than in any single factor, and

that the successful combinations of technologies etc. will vary. Financial support is however often of great importance.

PER ELVINGSON

<sup>1</sup> **Renewable energies: success stories.** Environmental Issue Report No. 27. Published by European Environment Agency, Kongens Nytorv 6, DK-1050 Copenhagen K, Denmark. Available in pdf format at [http://reports.eea.eu.int/environmental\\_issue\\_report\\_2001\\_27/en/](http://reports.eea.eu.int/environmental_issue_report_2001_27/en/)

## The directive on renewable energy

The directive<sup>1</sup> on renewable energy that was adopted last September sets two goals for the EU as a whole: by 2010 12 per cent of the Union's total energy must be coming from renewable sources, as well as 22.1 per cent of the electricity. There are also indicative (non-binding) targets for each member's production of electricity from renewables (see chart). Within one year of the directive's coming into force, and every five years thereafter, governments are required to set their own targets, yet with regard to those in the directive.

Governments will also, within two years of the directive's coming into force, have to introduce a system for the certification of electricity from

renewable sources. This is expected to be greatly instrumental in promoting the growth of a pan-European market for green power.

Besides enjoining the member governments to reduce regulatory and other barriers to greater production of electricity from renewable sources, it adds that they must ensure that there will be no discriminating conditions for new producers to connect to the grid. The directive must have been passed into national law within two years of its coming into force.

<sup>1</sup> Directive of the European Parliament and of the Council on the promotion of electricity from renewable energy sources in the internal electricity market (2001/77/EC).

### EU NEWS IN BRIEF

## Ozone directive agreed

A compromise was reached on November 22, in regard to the proposal for a directive on ozone in ambient air, as a result of conciliation between Council and Parliament. The directive sets long-term objectives, target values, and alert and information thresholds for ozone.

There are two long-term objectives applying to the protection of human health and protection of vegetation. For attainment of the former the concentration is set at 120 micrograms per cubic metre (mg/m<sup>3</sup>) as an 8-hour mean, and at the critical level for the latter. Although there is no firm deadline for attainment, 2020 is given as a "benchmark."

The target values (to be attained by 2010) are also divided into two categories. That for the protection of human health will again be 120 mg/m<sup>3</sup>, except that it may be exceeded on a maximum of 25 days a year. The member countries are bound to take measures to ensure attainment of the target values "save where not achievable through proportionate measures."

The compromise directive text is available on the Parliament's website; [http://www.europarl.eu.int/home/default\\_en.htm](http://www.europarl.eu.int/home/default_en.htm). See under "activities" and then "conciliation."

## No agreement on sixth environment action plan

A number of proposals for tightening the Commission's sixth environment action plan that had been put forward by the Environment Committee of the European Parliament were voted down at a second reading in January. Disagreement remains however between the parliament and the Council on a number of points.

For one thing parliament is insisting that the so-called thematic strategies proposed in the plan be subject to the co-decision procedure, and that they be ready within three years. The Commission favours a simpler procedure which would give parliament less influence, as well as allowing five years for preparation of the strategies.

Parliament also wants a clearer acceptance of environmental taxes, preferably at EU level, on the part of the member countries.

The proposed changes are also available on the parliament's website.



## Denmark stops all funding of renewable energy

The new liberal-conservative government in Denmark is proposing in its budget for 2002 to put a stop to all funding of renewable energy projects from 2002 onwards. All national programs for solar thermal, biogas, biomass, hydrogen, photovoltaic, wave energy, etc., are to be dropped and all R&D programs as well as the financial support and the committees, government agencies, etc., that have been crucial to the development of renewable energy in the past 20 years will be immediately cancelled or dissolved. The money so saved is to be diverted to hospitals and care of the elderly.

Plans for the large-scale development of offshore wind-power had already been stopped, relieving the power companies of their obligation to continue with offshore projects, as well as cutting off public funding and guaranteed tariffs for such projects.

Source: Folkecenter for Renewable Energy.



PHOTO: H-G OED/BMU

## Germany investing greatly in windpower

The German government has announced plans for a massive increase in wind generation capacity over the next 25 years. This should, according to environment minister Jurgen Trittin, result in reducing the country's emissions of carbon dioxide by 10 per cent from their 1998 level.

The new strategy envisages the gradual setting up of offshore windparks in the Baltic and North Sea, to attain a total installed capacity of 20,000-25,000 MW by 2030. Those turbines would supply 15 per cent of the demand for electricity as it was in 1998, and landbased windparks another 10 per cent.

Source: Environment Daily, <http://www.bmu.de/presse/2002/pm015.php>.



Poland has ideas for another energy future.

POLAND

# Obstacles in the way of renewable energy

Imported natural gas and overcapacity in the electricity supply may be hindrances to the implementation of Poland's energy plans.

One of the aims of Polish energy policy is to try and ensure, besides a safe supply for the country generally, environmentally friendly power and heat at a competitive cost. Legislation passed in 1997 should make it possible to include the extra cost of producing energy from renewable sources in the regular tariffs for electricity. It also makes it obligatory for suppliers to make room for renewable energy in their plans for development. Furthermore, a decree from the ministry of economy, which came into effect in 2001, requires distributors to buy a certain per cent of their electricity and heat from renewable sources.

The intention is that by 2010 at least 7.5 per cent of the country's

total energy supply shall be coming from such sources. It is estimated that the needed investment will amount to 3-4 billion euros. The aim for 2020 is to increase the proportion to 14 percent. Answerable for achievement of the whole program is a special authority, the Baltic Renewable Energy Centre (BREC).

A big increase in windpower capacity can, in the view of a number of observers, be expected in Poland – raising it from 7.5 MW today to 500 in 2005 – although biomass constitutes a still greater resource, 7 million hectares of farmland being potentially available for economically viable production.

Another big resource is straw, of which 20 million tons could be had



each year. By way of comparison, Denmark, which is a leader in the use of biomass, burns one million tons a year.

There are at present only two small energy plantations in Poland, but a larger area is planned, which with its 500 hectares will be the biggest in Europe.

There are several funds for developing renewable energy. A national one for environmental protection generally and water conservation in particular makes grants and loans on advantageous terms, especially for biomass and windpower projects.

The Ecofund, created by the conversion of Poland's debt to six countries, including Sweden and Norway, has 8 million euros a year available for renewable energy projects. It has for instance provided some of the finance for the construction of Poland's largest windfarm (capacity 18 MW).

There is in addition a heat-modernization fund making investments in energy efficiency and renewables, as well as the Environmental Bank (BOS) which makes money available on favourable terms for environmentally friendly production of energy.

There are however several hindrances to an increased use of renewables in Poland – the main one being a 30-35 per cent overcapacity in the electricity supply, which hardly encourages the construction of new plants for renewables.

Renewables are also faced with competition from natural gas. Contracts for an increased supply have just been signed with Russia and Norway, and the prevailing system of taxation makes natural gas relatively cheap in comparison with green energy.

A further hindrance to the building of new plants is the fact that many of the companies with coal-fired plants have long-term contracts with the national grid, in some cases extending as far as 2020. The grid may in other words have no choice but to go on buying from them for the next two decades. The political will to increase the use of renewable energy is thus hobbled in several ways.

MAGNUS ANDERSSON

ITALY

## Cleaner fuels for vehicles to fore in anti-smog plan

The Italian environment minister, Altero Matteoli, has launched a plan of action against smog which aims at tackling urban air pollution at source and bringing the country rapidly into line with the EU directive of 1999 on fine particulates. Action was needed to improve air quality "without periodically paralyzing cities," he said.

The government acted after smog had reached emergency levels in urban areas in many parts of the country. The use of private vehicles was banned in tens of cities, bringing activity in Lombardy, Italy's industrial powerhouse, to a standstill. It was the same in Florence and Turin.

Key elements of the plan are the development of cleaner fuels both for public and private vehicles and incentives for converting uncatalyzed vehicles to run on liquified petroleum gas and buses on methane. There will be new park-and-ride schemes and more backing for car sharing. Coal-fired boilers will be banned.

A joint accord pledging 578 million

euros to support the advent of cleaner vehicles has been signed by the environment ministry, the largest carmaker Fiat, and the national petrol producers' association.

All cities with over 150,000 inhabitants will be offering incentives aimed at getting some 300,000 vehicles running on liquified petroleum gas or bifuels onto the roads by 2005.

A main aim of all these moves is to bring down the ambient levels of fine particles (PM<sub>10</sub>) to within the legal limits set in the EU directive of 1999 that was passed under the framework directive on air quality in 1996. These limits are already in force and will be tightened each year up to 2005. Although legal, they are frequently being exceeded in many Italian cities.

Source: Environment Daily 1144. January 25, 2002.



Downtown Milan - or maybe not - before implementation of the new Italian anti-smog plan.

# Emissions do not come only from farming

Although farming is still far and away the largest source of ammonia emissions in Europe, there are others that may have been underestimated.

IF THEY ARE TO FOLLOW the directive on national ceilings for emissions of air pollutants, the EU member countries will have to have brought their combined total for ammonia down to 3,110,000 tons by 2010.

The emissions of ammonia come mainly from animal husbandry and the handling of manure in farming; in most countries it is as much as 80-90 per cent. Since however information is poor in regard to current emissions – especially from non-agricultural sources – it is difficult to foresee their future size and decide on the necessary action for curbing them.

As a means of rectifying this lack, in Britain a firm of consultants has made estimates<sup>1</sup> for the Department for Environment, Food and Rural Affairs of the emissions today and 30 years hence – primarily for the UK but also roughly for the whole of the EU area.

In the case of the UK, emissions of ammonia from non-agricultural sources turned out to be running at 63,000 tons a year, a figure that might be reduced to 51,000 tons by 2010 as a result of current policy, or to 37,000 tons if no consideration is taken of natural emissions. It may be noted that the overall emissions in Britain in 1999 amounted to 348,000 tons.

In 2010 the chief non-farm source would be the country's 900,000 horses, from which would come 13,000 tons of ammonia a year, followed by the disposal and treatment of sewage sludge, giving rise to 7,000, and transportation to 4,500 tons. A good deal will also come from small-scale combustion, with the domestic burning of wood, coal, and anthracite contributing another 2,200 tons. Further sizable sources are biomass burning and the production of artificial fertilizer as well as other industrial processes and the



PHOTO: FREEFOTO.COM

Don't blame it all on us....

household use of detergents.

During the next ten years most of the estimated reduction from non-agricultural sources will be due to improvements in petrol-driven vehicles. Because their catalysts were not operating under ideal conditions, the first cars that were so

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*If estimates are correct,  
it will be more difficult  
to meet emission ceilings*

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equipped let out quite a lot of ammonia. But new exhaust standards (Euro II and following) have brought much better regulation of the fuel-air mixture and so better functioning of the catalysts. Despite the expected increase in traffic, the emissions of ammonia should drop from the present 12,500 tons to 4,500 tons in 2010 and 2,200 in 2020. More recent research, however, suggests that this decline may be compromised to some extent by the introduction of low-sulphur petrol, thus

creating a need for further investigation.

Emissions are also expected to come down as a result of less dumping of organic waste and stricter control of industrial processes following the EU directive on integrated pollution prevention and control (IPPC). Further reductions would result if measures should be taken to curb the emissions of particles and aromatic hydrocarbons from residential combustion.

The consultants say there will be little possibility during the next ten years of reducing emissions from non-agricultural sources more than is likely as a result of measures already decided upon. The maximum that is technically feasible will be no more than 4,000 tons. The most cost-effective measure would be to fit scrubbers in some industries. In that case the per-ton cost of abatement would be between £120 and £360.

In working out figures for the EU as a whole, the trend in the UK was assumed to be generally applicable. The consultants point out that the

methods used are approximate, and intended primarily to encourage further debate. By this reckoning the emissions of ammonia from non-agricultural sources would amount in 2010 to 561,000 tons (with natural emissions omitted). For most sectors there would be no change from the present situation, except for emissions from transportation, which are expected to fall by a factor of three. The total reduction during the period would be 10 per cent.

As in the case of the UK, horses would be the main source, giving rise to 213,000 tons of ammonia in 2010, out of the aforesaid total for the EU of 561,000 tons. Second would be the burning of wood in households: 157,000 tons. The production and disposal of sewage sludge would produce 66,000 tons, and transportation 28,000, in 2010.

If the consultants' estimates are correct, it will be more difficult than expected for the member countries to meet the national emission ceilings they have agreed to in the EU directive. The consultants' figures for emissions of ammonia from non-agricultural sources are far higher than others have estimated. It ap-

pears for example in the RAINS model, developed at the International Institute for Applied Systems Analysis, IIASA, that they would be no more than 271,100 tons by 2010. (See table below.) Previous RAINS estimates that were used to prepare the scenarios for the negotiations of the Gothenburg Protocol put them even lower.

Possible reasons for these discrepancies are being considered following a meeting of the UN ECE's Ammonia Expert Group in Bologna last November. Initial analysis shows that the most of the difference between the AET and the RAINS figures is due to different estimates of the emissions from residential wood combustion and horses – apparently on account of the estimates of wood consumption and the number of horses rather than emission factors.

PER ELVINGSON

<sup>1</sup> **Controlling Ammonia from Non-Agricultural Sources.** By AEA Technology, UK, April 2001. Report AEAT/ENV/R/0565. Available in pdf format at [www.aeat.co.uk/netcen/airqual/reports/strategicpolicy/NH3-abatement.pdf](http://www.aeat.co.uk/netcen/airqual/reports/strategicpolicy/NH3-abatement.pdf)

#### EU countries emissions of ammonia in 2010. Thousand tons per annum.

Following the first two columns showing the estimated emissions from non-agricultural sources according to RAINS and AEA Technology, and the third with the total from all sources according to RAINS, comes the fourth with the non-agricultural estimates of AEAT added to the agricultural ones of RAINS. The fifth column shows each country's ceiling for ammonia under the EU directive. This table has been updated to reflect some developments that have taken place since the AEA Technology report was completed.

	Non-agricult. RAINS	Non-agricult. AEAT	Total RAINS model	Non-agricult. AEAT + agricult. RAINS	Ceiling EU NEC directive
Austria	9.9	23.6	69.7	83.4	66.0
Belgium	5.5	8.0	97.1	99.6	74.0
Denmark	2.6	8.4	73.4	79.2	69.0
Finland	4.5	24.9	34.1	54.5	31.0
France	43.6	103.0	790.8	850.2	780.0
Germany	34.5	106.7	588.9	666.1	550.0
Greece	5.6	21.5	76.6	92.5	73.0
Ireland	8.9	7.2	131.1	129.4	116.0
Italy	42.7	90.2	442.6	490.1	419.0
Luxembourg	1.9	0.6	8.6	7.3	7.0
Netherlands	12.7	14.4	144.0	145.7	128.0
Portugal	15.6	24.1	74.5	83.0	90.0
Spain	26.7	64.0	390.2	427.5	353.0
Sweden	11.6	27.2	65.8	81.4	57.0
UK	45.0	36.8	302.3	294.1	297.0
<b>TOTAL</b>	<b>271</b>	<b>560</b>	<b>3290</b>	<b>3584</b>	<b>3110</b>

## NEWS IN BRIEF

### Wind power up 31 per cent in 2001

Preliminary data show worldwide capacity for the generation of electricity from wind to have increased from 17,000 MW in 2000 to an estimated 23,300 MW last year – a dramatic one-year advance of 31 per cent.

Germany now leads the world with 8000MW almost a third of the total. The United States, which launched a modern windpower industry in California in 1980, comes second with 4150 MW, and Spain third, with 3300MW. Denmark, fourth with a total capacity of 2500MW, now gets 18 per cent of its electricity from this source.

Two-thirds of the capacity that was added in 2001 was concentrated to the top three countries – Germany adding 1890 MW, the US 1600, and Spain 1065 MW. The growth in US generating capacity was 63 per cent.

Source: World Watch Institute, <http://www.earth-policy.org/Updates/Update5.htm>

### Ireland to build world's largest offshore windfarm

The placing of two hundred wind turbines in a new development off Ireland's east coast has just been approved, making this the largest windpower project to date in the world. In signing the Fore-shore Lease, the Irish Marine and Natural Resources Minister, Frank Fahey, gave the go-ahead for construction and operation of the 520MW windfarm in an area of the Irish Sea known as the Arklow Bank.

### Lung functioning improved by cleaner air

A long-term study of 110 children made at the University of Southern California School of Medicine showed that those who move from polluted areas to places with cleaner air end up with better functioning lungs. As a group, those that had moved to areas with less particulate matter in the air actually showed an increase in growth of lung function. Others who had moved to places where there was more particulate matter suffered a slowdown in its growth.

Source: Environment News Service (ENS). December 20, 2001.



# Commission wants to see an increase in the use of biofuels

Proposals include legislative measures that would bring almost a fivefold increase in the production of biofuels by 2005.



PHOTO: FREEFOTO.COM

20 per cent of petrol and diesel fuel sold in the EU should be replaced by using surplus farmland for the production of alternatives.

IN A COMMUNICATION<sup>1</sup> sent out last November, the Commission proposed that before the end of 2005 at least 2 per cent of the fuels sold in the EU for road transportation should be biofuels, with the further aim of increasing the share of alternative fuels to 20 per cent by 2020. Rules are proposed to make it easier for the member countries to allow tax reliefs for achievement of these aims. The environmental effects of the Commission's proposals are how-ever questioned.

The Commission gives two reasons for wanting to see an increase in the use of biofuels. On the one hand it is a matter of security of supply. Road transportation in the EU is almost entirely dependent on imported oil. And then there is the need to cut down the emissions of carbon dioxide. A further reason for the Commission to make these proposals is the overproduction in EU

agriculture, from which there is strong pressure to find relief.

After examining the various possible alternatives to petrol and diesel, the Commission has picked out three that could each within 20

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## *Improving fuel efficiency of individual vehicles of prime importance*

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years gain a share of at least 5 per cent of the market for motor fuel in the EU. These are biofuels, natural gas, and hydrogen.

Hope for progress in the short and medium term is pinned mainly on biofuels which with current subsidies could largely be made from agricultural products. Vegetable oil, mainly from rapeseed, can replace diesel, while ethanol, which can be

made from wheat and other cereals, could replace petrol.

The Commission estimates that biofuels could replace 8 per cent of the fossil kind if 10 per cent of the EU farmland were used to grow the raw materials. The introduction would be facilitated by the fact that biofuel can be used to replace up to 10 per cent of the petrol and diesel in the tank without impairing engine performance. In the overall view, however, biofuels are not completely neutral as regards emissions of carbon dioxide – half of the gain can be lost because of the fossil energy that has to be used in their production, according to the Commission.

Natural gas, which is a fossil fuel, consisting of methane, has only small advantages over petrol and diesel from the environmental point of view. But it can reduce dependence on oil. As in the case of biofuels,



its use could start quite soon, although the distribution network would have to be expanded and vehicles adapted.

Methane obtained from the fermentation of organic matter is called biogas. It has the advantage of being renewable and making no net addition to the carbon dioxide in the atmosphere. The same distribution system and vehicles could be used as for natural gas. But despite its probably large potential, it is only briefly mentioned in the communication.

No widespread use of hydrogen can be expected until cars with fuel cells are available. Despite extensive development work, there are still technical and economic problems to solve. Since hydrogen is only an energy carrier, the effects on the environment will depend on the way it is produced.

There are two explicit proposals for legislative measures in the communication.

- The member countries shall, before the end of 2005, ensure that biofuels will account for at least 2 per cent, calculated in energy content, of all petrol and diesel sold for transportation, and increase the proportion by 0.75 per cent every year up to 2010.<sup>2</sup> That would entail almost a five-fold increase in the production of biofuels by 2005, but it is up to the member countries to choose ways of doing it.
- Changes in the rules so as to make it easier for those countries that so wish to subsidize the use of biofuels through tax reliefs.<sup>3</sup> Subsidies now require specific authorization from the Council.

The Commission emphasizes time and again that improving the fuel efficiency of individual vehicles will be of prime importance in the effort to reduce the use of fossil fuels in transportation, and that such improvement must go hand-in-hand with the introduction of biofuels.

It admits that the changeover to biofuels will be expensive if the sole aim is to reduce the emissions of carbon dioxide. Elimination of each ton of CO<sub>2</sub> will cost 100-150 euros, as against less than 20 euros for a whole row of measures identified in the Commission's European Climate Change Programme, which would, taken all together, enable the

EU to meet its commitments under the Kyoto protocol twice over.

Speaking in favour of biofuels are the possibilities they give of lessening the dependence on oil, diversifying employment in agri-culture, and creating 45,000-75,000 new jobs, many of which would be in rural areas.

While farm organizations have given a broad welcome to the Commission's proposals, environmentalists are divided in their opinion. Some have criticized the proposals as being too blunt-edged, ineffective, and mainly improvised to favour an industrialized agriculture that is already heavily subsidized and unsustainable from the environmental point of view. But in other quarters they are considered to be a useful first step on the way to a reconstruction of the transportation sector which in any case will have to come sooner or later.

PER ELVINGSON

<sup>1</sup> Communication on alternative fuels for road transportation and on a set of measures to promote the use of biofuels. COM(2001)547.

<sup>2</sup> Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of biofuels for transport.

<sup>3</sup> Proposal for a Council Directive amending Directive 92/81/EEC with regard to the possibility of applying a reduced rate of excise duty on certain mineral oils containing biofuels and on biofuels.

## Biofuel production in the EU

### Year 2000 (tons).

<b>Biodiesel</b>	
France	328,600
Germany	246,000
Italy	78,000
Austria	27,600
Belgium	20,000
<b>Total</b>	<b>700,200</b>
<b>Ethanols</b>	
France	91,000
Spain	80,000
Sweden	20,000
<b>Total</b>	<b>191,000</b>

Source: Europe Environment 596, September 25, 2001.

## NEWS IN BRIEF

### Weak requirements for pleasure craft

Tests made by the Swedish Society for Nature Conservation have shown the requirements of a proposed EU directive to limit the emissions from pleasure craft to be distinctly moderate. It turned out that among the seven engines tested, whereas the largest two-stroke ones would need to have their emissions reduced by 50 per cent if they were to meet the requirements most of the others would do so without any alteration. The weak requirements are surprising in view of the fact that emissions from these engines have been shown to cause deformities and greatly increased mortality in fish fry.

Source: Sveriges Natur. No. 5 2001.

### Air pollution increases risk of birth defects

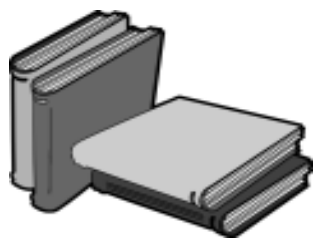
Exposure to two common air pollutants may increase the chances of women giving birth to children with certain heart defects, according to a study made at the University of California, Los Angeles, that has been published in the American Journal of Epidemiology, January 1.

Pregnant women in parts of the Los Angeles area where there were higher levels of ozone and carbon monoxide were found to be as much as three times as likely to give birth to children with serious heart defects. The risk increased among women who had been exposed to elevated amounts of the pollutants during their second month of pregnancy, a period when the child's heart and other organs start developing.

"The greater a woman's exposure to one of these two pollutants in the critical second month of pregnancy, the greater the chance that her child would have one of these serious cardiac birth defects," says Beate Bitz, a UCLA epidemiologist who headed the study.

"There has been a big reduction in the levels of criteria air pollutants like ozone and carbon monoxide over the years," Bitz adds. "But there still may be air toxics and fine particles or other secondary pollutants that occur alongside carbon monoxide and ozone, but which we don't measure routinely or know about, and these things may pose health risks we don't yet understand."

Source: UCLA press release at <http://www.ucla.edu/Templates/NewsItem3.html>



## Recent publications

### **The Urban Atmosphere and Its Effects (2000)**

Edited by P Brimblecombe and R L Maynard. First part of a series of state-of-the-art reviews of key problems in air pollution science. This volume gives a general survey. The others (see below) are more specialized.

Air Pollution Reviews – Vol. 1. 388 pp. £38.00. Published by Imperial College Press and distributed by World Scientific Publishing Co, 57 Sheldon Street, Covent Garden, London WC2H 9HE, England. [www.worldscientific.com](http://www.worldscientific.com).

### **The Effects of Air Pollution on the Built Environment (2001)**

Edited by P Brimblecombe. Air Pollution Reviews – Vol. 2. 180 pp. £26.00. Available from World Scientific Publishing Co., address as above.

### **Air Pollution Impacts on Crops and Forests (2002)**

Edited by M Ashmore, L Emberson and F Murray. Air Pollution Reviews – Vol. 3. 300 pp. £46.00. Available from World Scientific Publishing Co., address as above.

### **Air Pollution and Health (2002)**

By J Ayres, R Maynard and R Richards. Air Pollution Reviews – Vol. 4. 250 pp. £37.00. Available from World Scientific Publishing Co., address as above.

### **Transboundary Air Pollution: Acidification, Eutrophication and Ground-Level Ozone in the UK (2002)**

A detailed description of these problems in the UK, including emissions, concentrations, and depositions of the major pollutants and effects on soils, freshwaters and vegetation.

Can be obtained from Mhairi Coyle, Centre for Ecology and Hydrology, Edinburgh Research Station, Bush Estate, Penicuik, Midlothian EH26 0QB, UK. Also available in electronic format at [www.nbu.ac.uk/negtap/](http://www.nbu.ac.uk/negtap/)

# Energy taxes appear to be effective

Sweden's emissions of carbon dioxide would have been higher without energy taxes.

SWEDEN WAS ONE of the first countries to tax carbon dioxide and this is evidently having an effect. Without a tax emissions would, according to a new estimate, have been 10 per cent higher today.

This figure has come as the result of using a computer model, named MARKAL, to determine the effect of the tax on carbon dioxide as well as other taxes on energy. The program was run in two stages, one with taxes as they were in 1990, the other with what was called "current instruments" (taxes, etc.). All other factors were the same in both cases.

The big difference between the two scenarios was that "current instruments" included not only the tax on carbon dioxide but also a somewhat lowered tax on energy, VAT on energy, subsidies to wind-power, a tax on sulphur emissions as well as a charge on emissions of nitrogen oxides from combustion plants.

The changes, which had mostly been made in 1991-92, resulted in price increases for fossil fuels. Included in "current instruments" is also a system of certificates for renewable energy, which has been decided in principle in parliament and is scheduled to come into operation 2003, and is expected to stimulate the production of electricity from renewable sources.

The measures included in the sec-

ond scenario show clear results. Not only do the figures for carbon dioxide now turn out to be 10 per cent lower – in round figures 5 million tons compared with what they would have been if nothing had been done – but will continue to fall, according to these estimates, by 15 per cent in 2010 and 20 per cent in 2020 (10 and 15 million tons lower) under the depicted policy. See chart.

"The tax changes have had a clear effect, although we do not say they would have been the most cost-effective way of reducing the emissions of carbon dioxide. That is something we have not considered in this study," says Håkan Sköldb-berg of Profu consultants, who made the calculations. He also points to limitations in the model. It takes no account, for instance, of the effect of price changes on the demand for energy.

"The new taxes have in any case meant higher prices for energy," he notes. "If the situation had remained as it was in 1990, we should have had cheaper energy today and probably greater consumption. We have probably underestimated the effects in the second scenario."

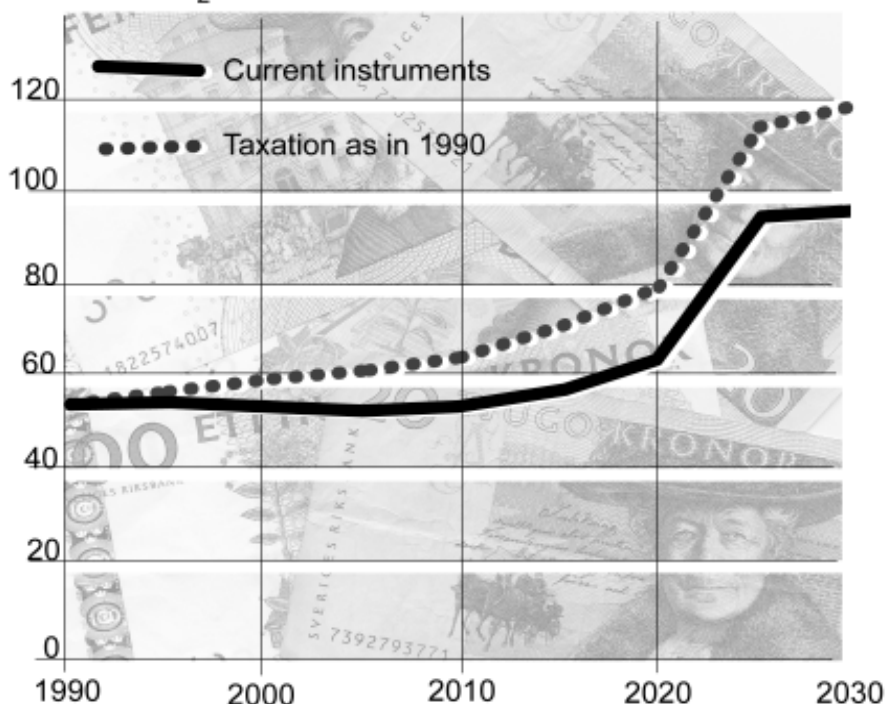
The question is then how the Swedish energy system would be affected through application of the "current instruments" scenario.

Most striking is the powerful boost it would give to the use of

## How the model works

The MARKAL model has been developed internationally through IEA, the International Energy Agency, and has found use in numerous countries. It is intended to calculate developments in an energy system from input data such as the availability of biomass, windpower potential, future oil prices, and taxation levels. By varying the inputs, scenarios can be developed which will be most cost-effective in different circumstances. A limitation is that energy demand is an input that don't change as a result of changed energy prices in the various scenarios.

Mill. tons CO<sub>2</sub>/yr



If taxes on energy are raised and given a more marked connection with carbon dioxide, emissions will decline. The curves show the calculated trend in Swedish emissions as they would be with current taxation and if there had been no change since 1990.

bioenergy. That would increase even with 1990 taxes, although much more slowly. The difference would be most marked for district heating.

If certificates for renewable energy should enter the picture, as seems likely, the developments in the use of bio energy in district heating, wind and small-scale hydropower would be greater and occur earlier. Under the 1990 scenario there would be almost no expansion of wind power.

At present almost half of the country's electricity comes from nuclear plants, and most of the remainder from hydroelectric generation. Today fossil fuels are hardly being used at all for electricity generating.

In both of the MARKAL scenarios the country's nuclear plants are assumed to have a lifespan of 40 years, which would mean that electricity from those sources will start to drop off after 2010 and be down to zero in 2025. The decline would be fastest after 2020.

After that year the diminishing availability of nuclear power would, according to the model, have to be compensated by increased production from condensing plants, which would mostly be fired with coal – the use of which is actually favoured under the Swedish system of taxation, where electricity production is exempted from the carbon dioxide and

energy taxes.

Transportation would remain largely dependent on fossil fuels in both scenarios. The competitiveness for alternatives would however be somewhat improved by the increases in the taxes on petrol and diesel fuel, but not sufficiently to have any real effect.

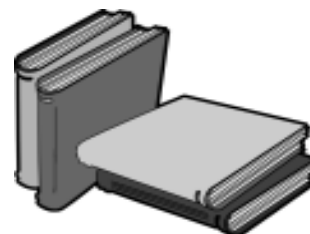
In 2010 the net import of electricity would be about 4TWh according to both scenarios. At worst that amount would have been produced in coal-fired condensing plants, giving rise to the emission of 3.5 million tons of carbon dioxide a year, equal to about 5 per cent of the Swedish emissions.

In Sköldbberg's opinion Sweden has already gone far in cutting down emissions of carbon dioxide.

"In comparing the outcome of the two scenarios, it is well to bear in mind that 1990 taxation has already had a clear effect in reducing the use of fossil fuels. If they were not being taxed, emissions would have been still greater."

PER ELVINGSON

The study, called *Beräkningar med MARKAL* is only available in Swedish. ER 14:2001. Published by the Swedish National Energy Administration, Box 310, SE-631 04 Eskilstuna. Website: [www.stem.se](http://www.stem.se). See also the Profu website: [www.profu.se](http://www.profu.se).



## Recent publications

### OECD Environmental Outlook (2001)

An analysis of the forces driving environmental change, the recent and projected pressures on the environment, and the resulting changes in the state of the environment to 2020.

326 pp. Published by OECD, 2, rue André-Pascal, 75775 Paris Cedex 16, France. Also available at [www.oecd.org](http://www.oecd.org).

### HEI Perspectives

Periodical assembling information on various subjects from the Health Effects Institute in the US. That of the June issue was airborne particles and health. Other pollutants are being dealt with in later issues.

Health Effects Institute, 955 Massachusetts Avenue, Cambridge MA, 02139, USA. Internet: [www.healtheffects.org](http://www.healtheffects.org).

### Transport and Environment (2001)

Book giving technological and spatial aspects of transport in relation to environmental degradation, together with analysis of sustainable transport policy. 320 pp. £65.00. Published by Edward Elgar Publishing Ltd. [www.e-elgar.co.uk](http://www.e-elgar.co.uk).

### Reporting on environmental measures: Are we being effective? (2001)

Is EU environmental legislation doing what it was designed to do? Because badly expressed requirements for reporting, little is known of the effects. Here the EU Environment Agency has analysed the deficiencies of the present system and adumbrated proposals for a simpler and more practical method of reporting.

Environmental Issue Report No. 25. Published by European Environment Agency, Kongens Nytorv 6, DK-1050 København K, Denmark. Available in pdf format at [www.eea.eu.int](http://www.eea.eu.int).

# Ships can be worse polluters than trucks

For lack of emission standards, the air pollution from shipping is in some cases much greater than from road transportation.

TRANSPORTATION BY SEA is on the whole energy-effective. But it is in some respects more polluting than road transport – the reason being largely the absence of any legal requirements on marine transportation to check its polluting effects.

Although comparison of modes is difficult, a computer model for doing so, which has proved acceptable both in transportation circles and among government authorities, has been available in Sweden for some years.

That model shows marine transportation, despite its energy efficiency, to be a doubtful choice – that is, if ships are run on standard fuel and have no cleaning of their exhaust gases. But ships' environmental performance can be improved, as has been shown after the introduction of the system of differentiated

fairway and harbour dues in Swedish ports that favours cleaner vessels.

## Carbon dioxide

Ships are better than trucks as regards emissions of this green-house gas. Trucks let out roughly two or three times as much, per ton-kilometre, as ships.

## Sulphur dioxide

Here emissions mainly depend on the sulphur content of the fuel.

The highest permissible content in the diesel oil for trucks has been gradually brought down by legislation. As from January 2000 it was lowered in the EU from 2000 to 350 ppm, and in 2005 it will be further reduced to 50 ppm. In the table it is assumed to be 300 ppm.

The environmental classification

of diesel oil that has been in operation in Sweden for the last ten years has brought the average sulphur content of the fuel sold in the country down to about 5 ppm, and a limit of 10 ppm is now being debated in the EU (see article on p. 3).

By tradition and for the sake of economy ships are usually run on heavy oil (bunker oil). Since there are no environmental requirements on such oil, ships have become a sort of dumping ground for various residue products of refining, often with a high sulphur content. The average in European waters, which is that used in the table, is 2.6 per cent, a monstrous 26,000 ppm.

But fuel with a much lower sulphur content is also available. Under Sweden's system of differentiated dues that has been in operation since 1998, to be eligible for reduced charges when entering Swedish ports, cargo ships must guarantee a maximum of 1-per-cent sulphur in their fuel oil, and ferries 0.5 per cent (10,000 and 5000 ppm). Ships can also run on gas oil with an even lower sulphur content (present EU maximum 0.2 per cent, to be reduced to 0.1 per cent in 2008).

As can be seen from the table, a ship will let out 30 to 50 times more sulphur per ton-kilometre than a truck, in terms of today's average vehicle and fuel. When diesel becomes even cleaner in 2005, the difference will increase to 150-300 times. It remains greatly to trucks advantage even if ships are run on oil with a maximum sulphur content of 1 per cent.

## Nitrogen oxides

Thanks to legislation, trucks have become very much cleaner during the last decade. For one thing emis-

## Some comparisons

Emissions from trucks on long hauls with different Euro standards for emissions and from cargo vessels of various sizes. Figures in grams per ton-kilometre. Source: [www.ntm.a.se](http://www.ntm.a.se).

	CO <sub>2</sub>	SO <sub>2</sub>	NO <sub>x</sub>	HC
<b>Heavy truck with trailer:</b>				
before 1990	50	0.0093	1.00	0.120
Euro 0 (1990)	50	0.0093	0.85	0.040
Euro 1 (1993)	50	0.0093	0.52	0.035
Euro 2 (1996)	50	0.0093	0.44	0.025
Euro 3 (2000)	50	0.0093	0.31	0.025
<b>Cargo vessel:</b>				
large (>8000 dwt)	15	0.26	0.43	0.017
medium size (2000-8000 dwt)	21	0.36	0.54	0.015
small (<2000 dwt)	30	0.51	0.72	0.016
RoRo (2-30 dwt)	24	0.42	0.66	0.029

Emissions are average in each case. Trucks: Max. overall weight 40 tons, loading 70 per cent, operating on diesel with a sulphur content of 300 ppm. Cargo vessels: bunker oil with an average sulphur content of 2.6 per cent, no cleaning of nitrogen oxides.





PHOTO: GÖTEBORGS HAMN

Some of them are better than trucks only with engines off...

sions of nitrogen oxides have come down to a third of what they were in the beginning of the 1990s.

With a few exceptions, nothing like the same thing has happened in the case of shipping. Ships release twice as much  $\text{NO}_x$  per ton-kilometre as the latest truck models today, and the difference is going to increase. In 2005 the emission standards for trucks in the EU will be cut from the present 5.0 g/kWh to 3.5, and in 2008 to 2.0 g/kWh.

With modified engines and equipment for cleaning the exhaust gases, a few vessels have however become cleaner. Selective catalytic cleaning (SCR) enables the emissions of nitrogen oxides to be brought down to a tenth (or even less) of what they would otherwise be.

At present there is no legislation to enforce a reduction of  $\text{NO}_x$  at sea – although some ferries and cargo ships have been adapted so as to take advantage of reduced charges for cleaner vessels in Swedish waters.

PER ELVINGSON

**Note.** The emission data used in the article have come from a computer model developed by *Nätverket för transporter och miljö* (Network for Transport and the Environment) with 120 companies and organizations in the transport sector as members. The model also takes in freight by air and rail.

## Catalytic cleaning reduces nitrogen oxides by 90 %

Large vessels are outstanding as sources of emissions, often being comparable to a power plant on land – and there is no legislation to control them.

In Sweden the National Maritime Administration has assembled data on a number of vessels that have been equipped for SCR, selective catalytic cleaning of the exhaust gases, in order to be eligible for lower fairway and harbour dues.

Some examples are given in the table below. Emissions under 2 g/kWh qualify for full rebates.

The Swedish system is revenue neutral. Dirty vessels pay more, clean ones get rebates. It started in 1998 following an agreement between the Maritime Administration, the shipowners' association, and the port authorities.

Vessel	Type	Installed engine power, kW	Emissions, g/kWh		Emissions, tons/yr		Reduction
			without SCR	with SCR	without SCR	with SCR	
Gotland	Passenger	29685	14.5	0.80	1885	104	<b>94%</b>
Stena Jutlandica	Passenger	32880	14.5	1.30	2088	187	<b>91%</b>
Birka Princess	Passenger	23055	14.5	0.54	1464	54	<b>96%</b>
Cellus	General cargo	4619	14.5	1.30	409	37	<b>91%</b>
Spaarnborg	RoRo	12890	14.5	2.50	819	141	<b>82%</b>

NOx emissions from Swedish vessels with and without selective catalytic cleaning (SCR).

# Reduction beyond expectations

Thirty years ago a halving of the emissions of sulphur dioxide was something that was considered almost utopian. But the actual reduction has turned out to be even greater than thought possible at that time.

AS EARLY AS 1972 it could be shown from a case study made in Sweden for the UN conference on the environment, which took place in Stockholm that year, that by far the greater part of the sulphur that was being deposited over Sweden came from emissions in other countries. Its effects on health and materials, as well as on forest soils and surface waters, were set forth in detail. Rough cost-benefit analyses, based on three alternative scenarios, were also made. These showed that even with the most far-reaching scenario, the gain as a result of reduced damage from sulphur would easily be as great as the cost of bringing down the emissions.

The scenarios assumed that between 1965 and 2000, emissions would have changed as follows:

1. Increased by 6 times in Sweden, and 4 times in the rest of Europe.
2. Unchanged in Europe, increased by 50 per cent in Sweden.
3. A reduction of 50 per cent everywhere.

The first scenario, assuming a continuation of current trends and no steps being taken to reverse them, was considered exaggerated, and the situation arising from the second to call for quite strong measures.

Scenario 3 set the sights very high. It would mean, assuming a continued increase in the use of energy, that only 10 per cent of the sulphur in fossil fuels could be allowed to slip out into the atmosphere. Nevertheless the authors of the study maintained that there could be no alternative but to carry out the measures demanded for this third scenario.

In the early seventies, the emissions of sulphur dioxide in Central and Eastern as well as northern Europe were estimated to have totalled some 24 million tons early.

Later studies showed however that total European emissions in the second half of the sixties must have been more like 50 million tons. The total continued to increase, so that in the later seventies it was amounting to something between 55 and 60 million tons.

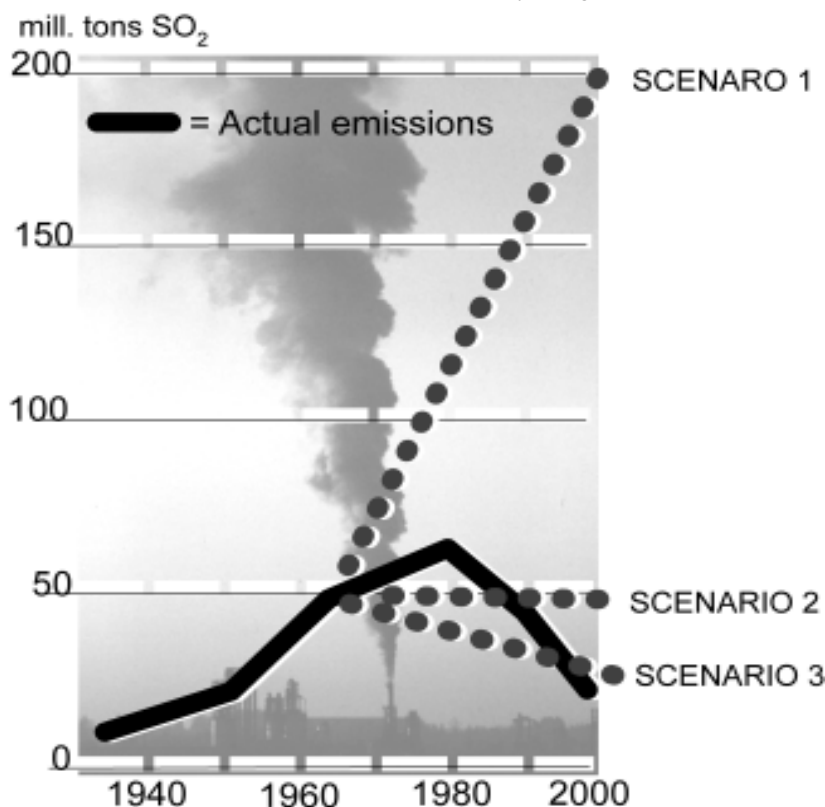
According to the latest statistics, for 1999, European emissions of sulphur dioxide then amounted to about 18 million tons, with a further 3 million tons from ships plying in international trade in European waters – in any case down by 60 per cent since 1965. Thus the target that was regarded as almost utopian in the seventies has been exceeded by far.

But to prevent further damage from acidification, and hasten recovery in the affected areas, the emissions of sulphur will have to come down still further. And to really put an end to acidification, there must also be a further cutting down of the emissions of airborne nitrogen compounds (nitrogen oxides and ammonia), and that has been taking place much more slowly than it has for sulphur.

CHRISTER AGREN

## Air pollution across national boundaries:

The impact on the environment of sulphur in air and precipitation (1971). Sweden's case study for the United Nations conference on the human environment. Published jointly by the Swedish Ministry for Foreign Affairs and Ministry of Agriculture.



The chart shows the outcome of three scenarios for European emissions of SO<sub>2</sub> between 1965 and 2000 as presented at the 1972 UN Conference on the human environment. The solid curve represents actual levels from 1935 to 2000. The halving of emissions between 1965 and 2000 – which in 1972 seemed almost impossible of attainment – has in fact occurred with a good margin.

# Now a catalyzer for diesel vehicles

TOYOTA, the Japanese carmaker, says it has developed a catalyzer that should solve the worst problems of diesel-driven vehicles from the point of view of the environment: their excessive emissions of particles and nitrogen oxides.

Diesels are more energy-efficient than petrol engines, which makes them more attractive in view of the pressure on carmakers to reduce their vehicles' emissions of carbon dioxide. Their disadvantage, in the environmental aspect, has however long been their great emissions of nitrogen oxides and fine particles, which have been difficult to deal with.

The PSA conglomerate, maker of Peugeot and Citroën cars, already has a filter on the market which will effectively catch even the smallest particles. It is however relatively expensive to use, and needs an additive of cerium to the fuel. And it does nothing to stop nitrogen oxides.

The new Toyota catalyzer – called DPNR, Diesel Particulate and NOx Reduction System – consists of a porous ceramic filter with surfaces coated with the catalytic metal platinum. It is a development of the catalyzer for converting nitrogen oxides that is used for cars with lean-burn engines.

In this new one the nitrogen oxides are caught and split into nitrogen and oxygen, with the further result that the particles are consumed, too, by the free oxygen. During low or moderate acceleration the particles also become oxidized by the excess oxygen in the exhaust gases.

According to Toyota, this will bring down the emissions of NOx to less than 0.08 g/km, which will be the EU limit in 2005 for petrol-driven vehicles (diesels will be allowed to let out three times as much).

The emissions of particles are said to be less than 5 mg/km, which is what the PSA filter also achieves. The EU allowance for 2005 will be

five times as much. No other diesels on market can come anywhere near the Toyota figure.

In the Toyota system the engine must be of the direct-injection, so-called common-rail type, which is now becoming much commoner. The need for close engine control means however that the system cannot be retrofitted on older vehicles. To prevent premature ageing of the catalyzer, too, the fuel must have a low (max. 50 ppm) sulphur content. Although such fuel will not be obligatory in the EU before 2005, it is already available in several countries.

Toyota is intending to test the catalyzer, which is protected by 150 patents, before letting it out onto the market. The cost will be about the same as for an ordinary type. The system will also be opportune for heavy vehicles when EU exhaust standards become tightened in 2005 and 2008.

PER ELVINGSON

*Sources: Automotive Engineering International Online, [www.sae.org/automag/techbriefs/01-2001/techb3.htm](http://www.sae.org/automag/techbriefs/01-2001/techb3.htm). Ny Teknik, September 9, 2001.*



PHOTO: HG OED/BMU



## Coming events

**Clean Air For Europe (CAFE)** Steering Group Meeting. Brussels, Belgium. April 15-16. Internet: [www.europa.eu.int/comm/environment/air/cafe\\_steering\\_group.htm](http://www.europa.eu.int/comm/environment/air/cafe_steering_group.htm)

**Climate Change: Science, Impacts and Policy Responses.** London, UK. April 15-19. Five days professional training programme at the Imperial College. *Information:* Ulrika Wernmark, e-mail: [u.wernmark@ic.ac.uk](mailto:u.wernmark@ic.ac.uk). Internet: [www.adic.ac.uk/cpd](http://www.adic.ac.uk/cpd)

**Air Pollution: Integrating Exposure and Effects.** Seattle, USA. April 28-30. *Information:* Gail Hamblett, Health Effects Institute, e-mail: [ghamblett@healtheffects.org](mailto:ghamblett@healtheffects.org). Internet: [www.health-effects.org](http://www.health-effects.org)

**Seventh International Highway & Urban Pollution Symposium.** Barcelona, Spain. May 20-23, 2002. *Information:* [www.mdx.ac.uk/www/uprc/hway-sym7.htm](http://www.mdx.ac.uk/www/uprc/hway-sym7.htm)

**2nd International Conference on Improving Electricity Efficiency in Commercial Buildings.** Nice, France. May 27-29, 2002. *Information:* ADEME, 500, route des Lucioles, F-06560 Valbonne, France. Internet: <http://ieecbr15.online.fr>

**5th European Conference on Energy-Efficient Lighting.** Nice, France, May 29-31, 2002. *Information:* ADEME, address as above.

**Framework Convention on Climate Change.** 17th meeting of Subsidiary Bodies. Bonn, Germany. June 3-14. Preparation of COP 8. Internet: <http://unfccc.int/>

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

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

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

*Continued on following page*





NEW PAMPHLET:

# The problem of air pollution from ships

The EMISSIONS OF AIR pollutants from ships in the seas surrounding Europe were estimated to have been 2.8 million tons of sulphur dioxide and 4 million tons of nitrogen oxides in 1990.

After the fifteen EU member countries have fulfilled their commitments in accordance with the directive on national emission ceilings, by 2010 shipping emissions will be equivalent to at least three-quarters of the EU total for sulphur and two-thirds of that for nitrogen oxides.

There are however technical means by which these emissions could be reduced by as much as 80-90 per cent, and very cost-effectively compared with what would have to be done to achieve similar results ashore.

An examination of the problems that are involved and the technical and political possibilities for solving them is given in a new 8-page pamphlet, published jointly by the Swedish NGO Secretariat on Acid Rain, the European

Federation for Transport and Environment, and the European Environmental Bureau.

Single copies of the pamphlet can be had from the Secretariat (free of charge within Europe). Please call for quotation if more copies are required. This, and other publications by the Secretariat, can be downloaded at no cost from: [www.acidrain.org](http://www.acidrain.org). Select "Publications."



Continued from previous page:

## Coming events

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

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

**EMEP Steering Body of the LRTAP Convention.** Geneva, Switzerland. September 2-4. Internet: [www.unece.org/env/lrtap/](http://www.unece.org/env/lrtap/)

**Clean Air For Europe (CAFE) Steering Group Meeting.** Brussels, Belgium. September 11-12. Internet: [www.europa.eu.int/comm/environment/air/cafe\\_steering\\_group.htm](http://www.europa.eu.int/comm/environment/air/cafe_steering_group.htm)

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

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

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