

Acid News

NO. 2, JUNE 2005

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PARTICULATES

Levels far too high in many European cities

THANKS TO AN EU directive adopted in 1999 the severe health problems associated with particulates in the air have come to public attention in many European countries this spring.

On 1 January a new EU limit value came into force, setting a maximum average threshold of 50 micrograms of particulate matter (PM₁₀) per cubic metre of air over a 24-hour period, which cannot be exceeded more than 35 days over the course of a year, as well as a limit value of 40 µg/m³ for the annual average concentration (Directive 1999/30/EC).

By February several cities in northern Italy had already reached their 35th day of excessive levels, including Turin and Milan. On 12 March Budapest reached its 35th day. By the

end of March the limit was reached in the German cities of Munich and Stuttgart, which were soon joined by Berlin and Düsseldorf, and more recently by Leipzig, Hanover, Braunschweig, Dortmund, Dresden and Augsburg. The cities of Cottbus, Halle and Borna are not far behind.

In Sweden the limit was passed at the start of April in Stockholm and Gothenburg, and more cities are expected to experience problems later in the year. Exceedances are also reported at some stations in Belgium, for example Jemeppe and Engis, both in Wallonia.

At present it is not clear how many cities have already exceeded the particulate limit set by the directive,

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Acid News

A newsletter from the Swedish NGO Secretariat on Acid Rain, the primary aim of which is to provide information on air pollution and its effects on health and the environment.

Anyone interested in these matters 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 available 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 SWEDISH NGO SECRETARIAT ON ACID RAIN

The Secretariat has a board consisting of 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

- Keeps up observation of political trends and scientific developments.
- Acts as an information centre, primarily for European environmentalist organizations, but also for the media, authorities, and researchers.
- Produces information material.
- Supports environmentalist bodies in other countries in their work towards common ends.
- Participates in the lobbying and campaigning activities of European environmentalist organizations concerning European policy relating to air quality and climate change, as well as in meetings of the Convention on Long-range Transboundary Air Pollution and the UN Framework Convention on Climate Change.

Clean air – when and how?

You must breathe to live. Every day you inhale some 10,000 litres of air, and you expect – or even presume – that air to be clean air. But it is not. Actually, breathing may kill you.

A recent analysis for the Clean Air For Europe (CAFE) programme has shown that one type of air pollutant alone, namely fine particles, is responsible for nearly 350,000 premature deaths each year in the EU25. To this should be added a large number of morbidity effects that affect a much greater number of people.

Fine particles are covered by EU air quality legislation, and as from this year the air quality limit values for maximum allowed concentrations of this pollutant are not to be exceeded on more than a limited number of days anywhere in the Union.

In spite of the fact that this legislation was adopted by the member states six years ago and systems for pollutant monitoring have been in place for many years, it appears that many state and city officials are taken by surprise when their monitoring stations show frequently repeated exceedances.

When faced with these exceedances, the gut reaction of city officials is to call for national measures and that of state officials to call for EU-wide measures – in other words to hand over the responsibility to someone else, while in fact the seriousness of the problem clearly demands that measures be taken at all three levels.

It may however be of some interest to look at how this is being dealt with at EU level:

Improving air quality is listed as one of the priorities in the EU's Sixth Environment Action Programme, and in article 2 it is stated that the programme aims at *“contributing to a high level of quality of life and social well being for citizens by providing an environment where the level of pollution does not give rise to harmful effects on human health and the environment...”*

This aim is to be pursued by objectives and actions as outlined in article 7. Regarding air quality the

stated objective is to achieve *“levels of air quality that do not give rise to significant negative impacts on and risks to human health and the environment”*. Among the key measures listed are the development of a thematic strategy on air pollution, and the review and updating of air quality standards and national emission ceilings, with a view to achieving the long-term objective of not exceeding critical loads and levels.

Article 4 makes clear that thematic strategies should include an identification of the proposals that are required to reach the objectives, and the procedures foreseen for their adoption.

Apparently, the forthcoming thematic strategy on air pollution will be of significant importance as it is supposed to show not only what needs to be done, but also how, and by whom.

It is therefore unfortunate and paradoxical that after four years of work, the CAFE analysis of emission abatement measures is still largely restricted to traditional “end-of-pipe” technical solutions.

It is unfortunate because it hides the true potential for emission reductions, and results in gross overestimates of abatement costs. And it is paradoxical because we all know that our society's current addiction to fossil fuels is not sustainable.

Consequently, measures leading to structural changes in the sectors of energy, transport and agriculture need to be an integral part of a coherent air pollution strategy.

The gravity of the current air pollution situation – which apart from fine particles also includes several other pollutants and their impacts – calls for a strategy that establishes a very high level of ambition.

It is not acceptable that even after 2020, air pollution will still cause several tens of thousands of premature deaths among EU citizens, and that millions of hectares of sensitive ecosystems will still be exposed to pollutant depositions in excess of their critical loads.

CHRISTER ÅGREN



The congestion charging system in London is attracting growing interest as more and more cities realize the difficulties of meeting EU limit values for particulates.

Continued from front page

but measurements from previous years suggest that the problem is widespread:

□ In Thessaloniki, Greece, the limit value was exceeded on 219 days during 2003. The situation was also bad in Heraclion (184 days), Patra (173), and Athens (165).

□ In the Czech Republic 25 measurement stations recorded more than 100 days of exceedances in 2003. In the cities of Cesky Tesin and Havirov, both close to the Slovakian/Polish border, limits were exceeded on 215 and 212 days respectively, even though only the background concentrations were measured.

□ In Portugal the threshold was exceeded on more than 100 days in 2003 at 14 measurement stations, with the highest figure in Lisbon, 189 days.

□ More than 100 days of exceedances were also recorded in 2003 in many other cities in Europe, including Krakow (224), Gliwice (191), Nicosia (176), Brussels (136), Vilnius (119), Riga (105), and Paris (103).

□ In Madrid the environmentalist organization Ecologistas en Acción reports that the $50\mu\text{g}/\text{m}^3$ limit was exceeded on 59 days last year.

□ In Austria a long list of cities experienced far too many days of exceedance in 2003, according to the country's environmental authority. The highest exceedances were measured in large cities, such as Graz, Linz and Vienna, but also in many smaller towns. The latter cases are said to be due to geographical circumstances that promote the build-up of high

concentrations (inversion), particularly in winter. Austria has also recorded exceedances in rural regions in the north east of the country, reportedly due to transboundary transport of PM_{10} from neighbouring countries.

□ The Hungarian capital of Budapest suffers heavy traffic and high levels of PM_{10} . According to the environmental organization Clean Air Action Group, data from 2004 shows extensive problems. At one measurement station the limit value was exceeded on 142 days. In 2004 the limit value

*Member states must
draw up pollution-
reduction plans*

was also exceeded on more than 100 days in the city of Miskolc.

In Germany the exceedances have been first page news during the spring. Much of the debate has been about diesel vehicles and traffic regulation. Road transport is not the biggest source of particulate emissions at national level, but at the sites where exceedances have occurred, such as street canyons in bigger cities, the contribution is often considerable or even dominant.

Several German cities have already or will soon introduce restrictions on trucks and diesel cars using local roads in an effort to combat rising air pollution. In Düsseldorf, for example, there are plans to ban trucks

from certain streets, and, if the problem persists, to make much of the city centre a no-drive zone for all vehicles without particle filters.

The city of Berlin was taken to court by a student who lives on a high-emission street. His lawsuit was supported by the Deutsche Umwelthilfe (DUH) in a bid to ensure that it respects the EU limits. Although Berlin has developed a plan to bring down particulate levels, the measures do not take effect until 2008. The lawsuit was an attempt to force Berlin to establish a ban on diesel-powered vehicles that are not fitted with filters by 2006. Late in April however an administrative court threw out the injunction.

The proportion of diesel cars in Germany has risen sharply in recent years and these now account for roughly half of new car sales. German car manufacturers have been slow to introduce particle filters as standard equipment, and it has taken a long time to introduce planned tax incentives for particle filters. The legislation is now approved at the federal level, but needs to be confirmed by each state to enter into force.

Under Italian law, city mayors can be held liable for health-threatening environmental damage. In at least a dozen cities, including Verona, Venedig, Padua and Treviso, driving bans have already been imposed on Sundays in order to reduce air pollution. In Padua and Bologna environmentalist NGOs have taken their city mayors to court for not taking sufficient action.

At the end of March the Italian government presented a five-year plan aimed at improving the country's air quality, but this immediately received sharp criticism. The initiative changes the focus of the current law, which is based on sanctioning companies found polluting the air. Instead, the new law relies on the use of incentives aimed at encouraging polluters to invest in clean technologies.

In the Swedish capital of Stockholm the measured levels of PM_{10} are high, among the highest in Europe, but exhaust fumes from traffic are less of a problem here. The main problem is caused instead by somewhat larger particles that are abraded from the road surface by studded tyres during winter (primarily November–April). The high levels of particles have been known about for a long time, but neither the City of Stock-

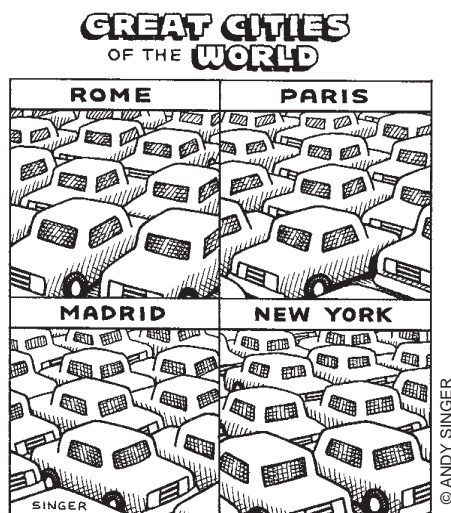
holm nor the government has taken any action. Stockholm is hoping the government will pass legislation to impose charges for using studded tyres, but the government believes the city should start taking other measures, such as improving road sweeping and informing people about the drawbacks of studded tyres.

In the Spanish capital of Madrid, the City Council is obliged to draw up an air quality improvement plan to reduce air pollution levels below the set limits, but has so far failed to do so. At present the focus is not on limiting traffic, in fact major investments are planned to extend the ring roads. Ecologistas en Acción is currently working on a legal complaint against the City Council of Madrid.

Under the EU air-quality directive, the member states must draw up pollution-reduction plans for areas with high concentrations of particles to reduce the concentrations and to achieve the limit values by the set dates. These programmes must be made directly available to the public, and must also be sent to the Commission. According to the data from 2001, eleven member states should have submitted plans and programmes by 31 December 2003. On 8 July last year the Commission sent first written warnings to nine of them – Austria, France, Germany, Ireland, Italy, Luxembourg, Portugal, Spain and the United Kingdom – for failing to submit such plans.

The extensive problems encountered in meeting EU standards for particulates have also sparked demands to revise the regulations. The Dutch environment minister, Pieter van Geel, has called for a change to the directive so that it does not apply to air pollution originating from foreign and non-anthropogenic sources. According to van Geel, a large proportion of the measured levels in the Netherlands comes from natural sources, such as salt and sand in ocean air, and from sources in Belgium and Germany.

One side effect the directive has had in the Netherlands is to make it difficult to win approval for construction or infrastructure projects that could add to the level of particles in the air. In April the Council of State, the Netherlands' highest administrative court, ruled to block eleven large projects since September 2004 based on arguments that these would be



detrimental to air quality. Similar legislation exists in Sweden.

Nevertheless, the EU Commission has no plans to soften the limit values according to a statement from

*The Commission
has to act if citizens
make complaints*

the industry commissioner, Günter Verheugen, on German television in March. Commissioner Verheugen did however promise that the Commission won't start talking about treaty breaches straight away. "We'll look at the experience of the first year and then we'll have to decide," he told German television.

Action by the Commission is therefore unlikely until there has been an assessment of the overall situation in the member states. By now the Commission has received plans and programmes for the years 2001 and 2002, which it will start evaluating this year.

Legally speaking, the member states only have to inform the Commission of this year's exceedances by September next year, and report on the reasons for each recorded exceedance. However, the Commission has to act if citizens or environmental organizations made complaints. In those cases where individual citizens or NGOs lodge complaints with the Commission, the steps set out in infringement procedures can be initiated immediately against the member state in question.

In many countries citizens and environmental organizations have announced they will take the relevant administrations to the national courts. Such court cases have been announced or are on the way in the Netherlands, Germany, Belgium, Italy, Austria, Spain and Hungary.

As the debate rages, many are now looking to London, which introduced a congestion charge in 2003. The charging system has reduced traffic by around 15 per cent and has been judged a success (see p. 14). A similar system will be trialled in Stockholm from 3 January 2006.

PER ELVINGSON

Sources: T&E Bulletin, April 2005. **Environment Daily**, 21 February, 26 and 28 April 2005. **Car Lines 2005-2**. **Planet Ark**, 14 February, 1 April 2005. **Financial Times**, 2 April 2005. **Der Spiegel**, 4 and 6 April 2005. **Clean Air Action Group**, Hungary, www.levago.hu. **Ecologistas en Acción**, Spain, www.ecologistasenaccion.org. **Umweltbundesamt Austria**, www.umweltbundesamt.at. Figures for exceedances 2003 have been taken from **AirBase**, <http://air-climate.eionet.eu.int/databases/airbase/airview>.

The Commission's review of directive 1999/30/EC, issued in January 2005: COM(2004) 845 final. See the **Commission's website**: <http://europa.eu.int/comm/environment/air/ambient.htm>.

Check your own city!

The European Topic Centre on Air and Climate Change has created an application named AirView (Air quality Visualisation instrument for Europe on the web). AirView allows you to query the database "AirBase" and visualise the data in the form of maps, graphs or tables. Data up to 2003 are included. For further details, see <http://air-climate.eionet.eu.int/databases/airbase/airview>

At least Germany, Belgium and Hungary have national online databases where you can check the situation each day and also the accumulated number of exceedances during the year:

Germany: www.env-it.de/luftdaten/trsyear.fwd

Belgium: www.ircline.be (choose language, then Air quality, Particulate matter).

Hungary: www.kvvm.hu/szakmai/nmc/map.php?id=Budapest

Cleaner air increases your life expectancy

If agreed legislation is implemented it should increase average life expectancy in the EU – and save billions of euro each year.

AIR POLLUTION in the form of particulate matter (PM) claims an average of 8.6 months from the life of every person in the EU. The Germans lose even more: 10.2 months of life in the year 2000.

This is according to a report presented by the WHO Regional Office for Europe at a press conference in Berlin on 14 April.

An EU directive sets down limit values for PM₁₀ of 50 µg/m³ for the 24-hour average and 40 µg/m³ for the annual average.

With effect from 2005 the 24-hour average value should not be exceeded more than 35 times a year, a limit that had already been exceeded in many European cities by spring this year (see front page article).

By 2010 the reduction in health

damage through implementation of current emission reduction legislation in the EU is expected to save 2.3 months of life for the EU population and 2.7 months of life for the population of Germany.

This is the equivalent of preventing 80,000 premature deaths each year and saving over one million years of life in the EU, compared with the situation in 2000.

Reducing long-term PM concentrations and exposure would also bring important financial savings. WHO puts the financial benefits of decreased mortality at between 58 and 161 billion euro per year, plus 29 billion euro for reduced diseases. The corresponding figures for Germany are 13–34 billion euro and 6 billion euro per year, respectively.

Small but harmful to health

Evidence indicates that particulate matter (PM) in the air increases deaths from cardiovascular and respiratory diseases. Even a short-term rise in PM concentrations increases the risk of emergency hospital admissions for cardiovascular and respiratory causes.

PM comprises tiny particles, varying in size, composition and origin. Inhaled, the coarse fraction (PM₁₀ – particles with a diameter smaller than 10 µm) may reach the upper part of the airways and lungs. What are called fine particles (PM_{2.5} – with a diameter smaller than 2.5 µm) are more dangerous, as they penetrate more deeply into the lungs and may reach the alveolar region.

Studies have been unable to identify a threshold concentration below which ambient PM has no effect on health. Although the reduction of PM levels to the EU limit values for 2005 will benefit health, it will not eliminate all significant health effects of

PM exposure. It is cost-effective to reduce PM pollution more than expected under the current legislation.

Transport and use of fossil fuels in households are the major contributors to PM air pollution. In particular, diesel combustion contributes a third of total emissions of PM_{2.5}.

Owing to the transboundary movement of PM, a substantial part of concentrations in a country originates in emissions from other countries. For example, it has been estimated that, on average, 41 per cent of PM_{2.5} concentrations in Germany is of domestic origin. The rest is due to transboundary air pollution: for example, 14 per cent is emitted in France. On the other hand, German emissions contribute to PM_{2.5} in other countries: for example, 21 per cent of the total in Denmark and 20 per cent in the Czech Republic.

Source: WHO fact sheet, www.who.dk/document/mediacentre/fs0405e.pdf.

Health risks could be underestimated

THE CALCULATED NUMBER of deaths caused by particulate matter (PM) in the air could be greatly underestimated, according to a group of Swedish researchers.

In the case of Sweden they took commonly used risk coefficients for PM₁₀ and PM_{2.5} and calculated that current concentrations of long-range transported anthropogenic particles give rise to around 3,500 premature deaths each year, with a reduction in average life expectancy of around seven months.

The significance of local sources is more difficult to estimate, according to the researchers, partly due to large variations in concentrations and exposure. Nevertheless, their estimates indicate that about 1,800 deaths are brought forward each year, with a life-span reduction of about two to three months.

When considering these figures it should, however, be remembered that parts of the population are probably exposed to much higher levels of the particles that several studies have shown to cause the most harm, namely those from combustion processes. This applies, for instance, to people who live near busy roads.

The researchers report that current models indicate that long-range transported sulphate-rich particles are the main reason for the harmful health effects of particles in most countries, which means that abatement strategies tend to focus primarily on these.

But at the same time recent studies indicate that engine exhaust particles may have a stronger health effect than anticipated when using the common risk coefficients for PM.

Further reading: Comparative Health Impact Assessment of Local and Regional Particulate Air Pollutants in Scandinavia. Bertil Forsberg et al. *Ambio* Vol. 34, No.1, 2005, pp. 11–19.

Note: For comparison, recent analysis for the Clean Air For Europe programme estimated the number of premature deaths in Sweden due to anthropogenic PM_{2.5} to be about 3,300 for the year 2000, and the loss in statistical life expectancy to be 3.5 months.



Particle filter made
by ArvinMeritor.

Growing support for stricter requirements

Concern about the effect of particles on human health is leading to changes in consumer behaviour. According to a report in the *Welt am Sonntag* newspaper, a significant number of German customers are deciding to wait to buy a new car until particle filters are fitted as standard, or they are buying cars with filters from non-German makers such as Peugeot or Citroën.

Such consumer response and the speed with which the tolerance threshold for excessive days is being reached may add to pressure to take a stricter line on fine particles in the coming emission standards for new diesel cars.

The Commission has suggested that the so-called Euro 5 limit for particles will be no lower than 2.5 mg/km, but T&E, the European Federation for Transport and Environment, says 1 mg is not unrealistic. Europe's top environmental science committee, Scher, has supported the call for 2.5 mg, even though it says research into the impact of particles on health is still inconclusive.

The Euro 5 proposals have however been delayed and will not be published before the Commission's summer break.

Source: T&E Bulletin, April 2005.

Relaxed rules a threat to public health

More than 152 million Americans live in counties where they are exposed to unhealthy levels of air pollution, according to the annual *State of the Air* report from the American Lung Association. The report warns that continued threats to relax federal rules for corporate polluters will jeopardize public health.

The report ranks the cities and counties with the dirtiest air, and provides county-level report cards on the two most pervasive air pollutants: particle pollution and ozone.

Further information: www.lungusa.org.

Diesel fumes shorten the lives of 20,000 Americans

MORE THAN 20,000 Americans die prematurely each year from breathing toxic diesel fumes, according to a study presented by the US-based NGO Clean Air Task Force.

The study finds that diesel exhaust fumes pose a cancer risk that, on a national basis, is 350 times higher than the Environmental Protection Agency's acceptable risk level and 7.5 times greater than the combined total cancer risk from all other air toxics.

The study also finds that diesel pollution causes some 27,000 non-fatal heart attacks and 410,000 cases of asthma each year – and health damages from diesel fumes will total around \$139 billion by 2010.

The calculations take into account recent EPA regulations, which will require dramatic reductions in emissions from new diesel vehicles starting in 2007. The rules lower the sulphur content of diesel fuel by around 99 per cent and force new engines

to meet much stricter pollution standards.

But the regulations do not cover existing diesel engines and only call for voluntary retrofit programmes. The report says this means some 13 million diesel engines currently in use will not be required to cut pollution – it estimates the lifespan of a typical diesel engine is 30 years.

The study finds that up to 90 per cent of the premature deaths could be avoided by applying currently available control technologies. The Clean Air Task Force recommends faster and more widespread retrofitting, cleaner fuel strategies and early retirement of engines that cannot be fitted with emission controls.

Further information: www.catf.us/goto/dieselhealth. Here you can find the study, *Diesel and Health in America: The Lingering Threat*. The website also provides data on the health impacts of diesel classified by metropolitan area, county and state.

Traffic fumes greatly increase risk of heart attack

SWEDISH RESEARCHERS can now show a direct link between air pollution and acute cardiac failure.

A study carried out in Stockholm shows that a person who has lived by a busy street for 30 years has a 50 per cent higher risk of dying from an acute myocardial infarction than someone who has lived in the countryside. The link has been highlighted by correlating air pollution levels at every address in the city with the home addresses of a group of Stockholm residents who died as a result of myocardial infarction.

Tom Bellander, associate professor at Stockholm County Council's unit for occupational and environmental medicine, has two theories for the existence of the link. The first

is that air pollution contributes to low-level lung irritation, which in turn causes circulatory problems. The second is that air pollutants irritate nerve endings in the airways, which leads directly to heart arrhythmia.

The study is part of a doctoral thesis by Mats Rosenlund at the Institute of Environmental Medicine, Karolinska Institutet, Stockholm. It is based on a study of 2,246 people who suffered myocardial infarctions and a control group of 3,206 people.

Source: Dagens Nyheter 19 April 2005. An abstract of the thesis "Environmental factors in cardiovascular disease" (which also considers aircraft noise) can be found at <http://diss.kib.ki.se/2005/91-7140-292-6/>

Agreement on new directive

Compromise deal seen as a first step towards tighter requirements in the future.

AN AGREEMENT on a compromise deal on new marine fuel quality legislation was reached by the European Parliament and the Council in early April, and was confirmed by the Parliament in a plenary vote held on 13 April.

Although failing to secure the Parliament's main demands, i.e. to extend the 1.5-per-cent sulphur limit to cover all EU sea areas, and to establish a second phase lowering of the sulphur limit to 0.5 per cent, the agreement contains commitments that these issues will be dealt with in the context of a review foreseen for 2008.

The parliament's rapporteur, Finnish Green Satu Hassi said: "As a part of the agreement, the Commission publicly declared its commitment to examine proposals to further reduce the sulphur content of marine fuels to 0.5 per cent, as well as to extend sulphur control areas to other EU seas. The Parliament intends to hold Commissioner Dimas to this promise."

The European Commission welcomed the second-reading vote by the Parliament, and Environment Commissioner Stavros Dimas said: "I am very pleased with this agreement. But I do believe that EU countries can and must do more to build on today's success. We really need to work globally to reduce pollution from international shipping – but 17 EU countries have still not ratified the 1997



International Maritime Organization (IMO) Convention on Air Pollution."

According to the Commission, the new measures will have significant human health benefits. They will reduce the incidence of asthma, bronchitis and heart failure, and lead to annual benefits of at least 2,000 fewer life years lost through long-term ex-

"This is a wasted chance for cleaner air in Europe"

posure, 750 fewer deaths from short-term exposure, and 300 fewer hospital admissions for respiratory illness in the EU in year 2006. They will also help reduce acidification, which continues to damage forest and freshwater ecosystems in northern Europe.

The main provisions of the agreement are:

□ a 1.5 per cent sulphur limit for fuels used by all ships in the Baltic

Sea (from 19 May 2006) and the North Sea, including the English Channel (from autumn 2007);

□ a 1.5 per cent sulphur limit for fuels used by passenger ferries on regular services between EU ports (from 19 May 2006);

□ a 0.1 per cent sulphur limit on fuels used by inland vessels and by sea-going ships at berth in EU ports (from 1 January 2010).

The first provision – the 1.5 per cent sulphur limit for the Baltic and the North Sea – is in effect a confirmation of already agreed commitments under the IMO's MARPOL Annex VI, which entered into force on 19 May 2005 (see box below).

The Parliament has also tightened requirements on the availability of low-sulphur fuel and the use of abatement technology, and introduced an incentive for ships in port to plug in to clean shore-side electricity.

Environmental organizations however expressed disappointment:

"This is a wasted chance for cleaner air in Europe," said Kerstin Meyer, air pollution policy officer at EEB, the European Environmental Bureau.

"Ship emissions could be reduced much further at very low cost. It is irresponsible that member states' governments and the Commission blocked initiatives towards a more ambitious directive. Currently there are discussions in many member states about how to meet the EU limit values for air quality. But at the same time member states' governments obstructed further measures, when there was a real chance to improve air quality."

The Parliament's rapporteur, Satu Hassi, concluded:

"This directive is a first step. Even after its implementation, the SO₂ emissions from shipping in European seas are set to exceed all EU25 land-based SO₂ emissions."

The new directive is expected to enter into force within a few months, and will have to be transposed into national law one year later.

CHRISTER ÅGREN

Sulphur Emission Control Areas

In 1997, the IMO MARPOL Convention was extended by an air pollution protocol (called Annex VI), which among other things includes the possibility of establishing so-called Sulphur Emission Control Areas (SECAs) in which the maximum allowed sulphur content of marine fuels should be 1.5 per cent, as compared to the current global average of about 2.7 per cent.

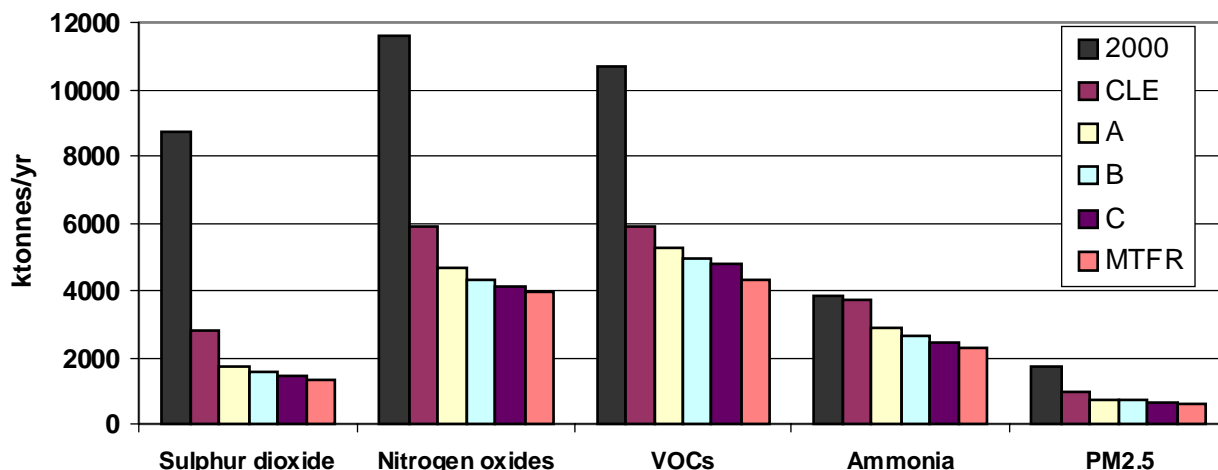
At the date of signing Annex VI, the Baltic Sea was adopted as a SECA, and consequently the 1.5 per cent limit will

start to apply for this sea area as from 19 May 2006, i.e. one year after the entry into force of Annex VI. It is also expected that the North Sea (including the English Channel) will be formally adopted as a SECA later this year.

The recent entry into force of Annex VI means it is now open for revision and strengthening, but so far only eight of the EU's 25 member states have ratified the annex. Those eight are: Cyprus, Denmark, Finland, Germany, Greece, Spain, Sweden and the UK.

Policy scenarios for air quality

New “multi-effect” scenarios reflecting various levels of ambition have been produced for the forthcoming EU Thematic Strategy on Air Pollution.



Emissions in EU25 in the base year 2000 and five scenarios for 2020: CLE is based on full implementation of current EU legislation; scenarios A, B and C are policy scenarios reflecting various level of ambition; and MTRF illustrates implementation of so-called maximum technically feasible reductions (MTRF).

AT A MEETING with the member states and other stakeholders in mid-April, the Commission’s consultant IIASA presented its draft final report¹ for the forthcoming thematic strategy on air pollution. The date for the Commission’s adoption of the strategy, which was earlier announced for presentation in May, is now scheduled for end of June.

As part of the EU’s Clean Air For Europe (CAFE) programme², various scenarios for future emissions and their environmental impacts have been investigated. For this purpose CAFE employed the RAINS computer model for integrated assessment, developed by IIASA.

Most recently, IIASA has investigated three so-called multi-effect scenarios, all of which aim to achieve interim environmental targets – set at various levels of ambition – at the least cost for the EU25 as a whole.

The term “multi-effect” comes from the fact that several environmental end points are being simultaneously addressed, namely:

- health impacts of fine particles (PM_{2.5});
- eutrophication (excess nitrogen deposition);
- acidification (excess acid deposition); and,
- ozone damage to health and vegetation.

- acidification (excess acid deposition); and,
- ozone damage to health and vegetation.

The three final policy scenarios were arrived at through a series of model iterations. In the first step, the RAINS model was used to identify the cost implications of gradually increased levels of ambition for environmental protection. This was done independently for each of the end points. For practical reasons, the analysis was limited to the range of emission levels that exists between the “current legislation” scenario, CLE (also called the baseline scenario), and the “maximum technically feasible reductions” scenario, MTRF.

Three “target levels”, reflecting various levels of ambition, were chosen for each of the environmental end points. Then three so-called joint op-

timization runs were performed, in which the three target levels for each of the four environmental end points were combined. These scenarios can be said to reflect a lower (A), a medium (B), and a higher (C) overall level of ambition. In all three cases, a choice was made to allocate most resources to reduce the damage to human health from fine particles.

The outcomes of the three multi-effect scenarios could be compared to those of the main baseline scenario (CLE), which includes full implementation of current EU air quality legislation, and to those of the so-called maximum technically feasible reductions (MTRF) scenario, in which full implementation of currently available technical emission control measures is assumed. (These were presented in Acid News 4/04 and 1/05.)

Besides providing country-by-

Estimated incremental costs for emission control, i.e. costs on top of those already committed to under existing air quality legislation (billion euro/year).

	Mobile	Stationary sources			
	New EU standards	Scenario A	Scenario B	Scenario C	MTRF
Sum EU25	1.9	4.1	8.8	13	38

country figures on the resulting emission levels of the five air pollutants (SO₂, NO_x, VOCs, NH₃, and PM_{2.5}) under the three policy scenarios, the report from IIASA also include estimates of the resulting health and environmental impacts in each member state, as well as estimates of the costs associated with the additional emission reductions.

For the EU as a whole, the additional annual costs range between 4 and 13 billion euro for the year 2020 (see Table). This is in addition to the cost of new emission standards for road vehicles, which are estimated at about 1.9 billion euro. When the costs for additional measures for stationary and mobile sources are combined it gives total costs for the three scenarios of around 13, 24, and 33 euro per person in 2020.

Using the pollution levels for the year 2000, it is estimated that anthropogenic PM_{2.5} will result in an aver-

age shortening of life expectancy by more than eight months. As a result of current legislation, this figure comes down to about 5.5 months by 2020. The three policy scenarios would further reduce this figure: A to 4.4, B to 4.1, and C to 4.0 months. There is however a significant variation between member states, and under current legislation even by 2020 some countries (notably Belgium and the Netherlands) will still have life expectancy losses of between eight and nine months.

The analysis of environmental impact includes ozone damage to vegetation, and acidification and eutrophication of various types of sensitive ecosystems. As regards the latter, the share of ecosystems exposed to excess nitrogen depositions was 57 per cent in 2000. By 2020, current legislation is expected to bring this down to 46 per cent, while the three policy scenarios would result in a further

lowering to 33, 29, and 27 per cent, respectively.

Following the analysis of the various CAFE scenarios, the Commission will adopt and present its Thematic Strategy on Air Pollution, which is expected to list a number of specific proposals for further action to improve air quality in the EU. A proposal to revise the air quality framework directive and the three so-called daughter directives containing minimum requirements for air quality is expected to be presented in parallel with the strategy.

CHRISTER ÅGREN

¹ The report "A final set of scenarios for the Clean Air For Europe (CAFE) programme" (April 2005), as well as previous CAFE reports by the International Institute for Applied Systems Analysis (IIASA), are available at www.iiasa.ac.at/rains/index.html

² More information on the CAFE programme can be found at <http://europa.eu.int/comm/environment/air/cafe/index.htm>

New figures on benefits from emission reductions

THE COST-BENEFIT ANALYSIS (CBA) of the CAFE baseline emission scenarios was finalised in April, and figures for the estimated health damage costs of air pollution turned out to be higher than the preliminary estimates which were reported in AN 1/05.

In summary, in the year 2000 air pollution was responsible for nearly 370,000 premature deaths in the 25 member countries of the EU. Overall, the concentrations of fine particles have a much more important effect than ozone with respect to mortality – the former being responsible for 348,000 and the latter for 21,000 premature deaths.

The total monetary damage from health impacts for the baseline scenario, i.e. the benefits from current policies through to 2020, has been estimated. The values are presented as an annual impact in million euro for the EU25, and summarized in the table.

Significant reductions in concentrations and impacts are expected over the period 2000 to 2020, especially regarding fine particles. The annual health benefits of implementing current legislation up to 2020 are valued at between 87 and 181 billion

euro for the year 2020. This translates to an estimated annual average benefit across the EU of 191–397 euro per person.

Moreover, two additional types of air pollution impact have been quantified in economic terms, namely the effects of ozone on crop yield and the damage to modern buildings. For the year 2000, this damage was valued at 2.8 and 1.1 billion euro, respectively.

For the purpose of the forthcoming

thematic strategy on air pollution, the CAFE cost-benefit analysis will be used to assess the marginal changes in costs and benefits between various emission scenarios.

CHRISTER ÅGREN

¹ CAFE CBA Baseline Analysis 2000 to 2020 – Service contract for carrying out cost-benefit analysis of air quality related issues, in particular under the Clean Air For Europe (CAFE) programme (April 2005). By AEA Technology, UK.

Implementing current EU legislation: Health damage due to air pollution in 2000 and in 2020 in EU25 (billion euro).

	2000		2020		Difference	
	Low estimate	High estimate	Low estimate	High estimate	Low estimate	High estimate
O ₃ mortality	1.1	2.5	1.1	2.4	0	0.1
O ₃ morbidity	6.3	6.3	4.2	4.2	2.1	2.1
PM mortality	190.2	702.8	129.5	548.2	60.7	154.6
PM morbidity	78.3	78.3	54.1	54.1	24.2	24.2
Total	275.8	789.9	188.8	608.9	87.0	181.0

Note: The results are based on 1997 meteorological data, and are comparable with the preliminary RAINS baseline scenario results. For acute mortality (O₃), two alternative values are presented, based on a range reflecting the median and mean values. For chronic mortality (PM), two alternative values are presented, based on value of life years lost (VOLY) and numbers of premature deaths, the latter using the mean value of a statistical life (VSL) value.

CARS 21

By the start of summer the European Commission's High Level Group "CARS 21" will propose measures to improve global competitiveness for the European automotive industry in the 21st century.

A number of environmental organizations have got together and drawn up joint recommendations to the group.¹ They report, for example, that stricter environmental rules should not be seen as an obstacle to the competitiveness of the industry – in fact a list of examples shows on the contrary that it is a way of improving competitiveness.

In the case of fuel consumption standards the organizations warn against voluntary agreements, giving their support instead to a legally binding roadmap towards the 120 g/km CO₂ target, and recommending that the group sets a timetable for meeting the 100 and 80 g/km values. "California-style CO₂ performance regulation is an inspiring example that could, in adapted form, bring great benefits to Europe," say the organizations.

The report also calls for stricter emission standards for particles and nitrogen oxides in the EU.

¹ Public Consultation of the European Commission: The Automotive Regulatory Framework of the Next 10 Years. Available at www.t-e.nu.

Voluntary targets soon out of reach

Emissions of carbon dioxide from new cars in the EU continue to fall, but are still a long way from what is needed to meet the target of 140 gram/km by 2008-09. According to information in the Financial Times in May, emissions fell on average by 1.8 per cent in 2004, to a level of 160 g/km. Annual 3.3-per-cent improvements are needed to meet the target of 140 g/km by 2008/09, it reported.

The European Federation for Transport and Environment, T&E, repeated its call for obligatory consumption standards to replace the voluntary agreement, and said that there is now support from the Commission for forcing car makers to limit emissions from new cars to 120 g/km, since this can be justified on economic and social grounds. The Commission's director of air and chemicals, Jos Delbeke, said at a T&E seminar in April: "Preliminary work indicates that the costs are not as high as the manufacturers have claimed, and that benefits for society may outweigh costs."

Sources: Financial Times 14 May 2005. T&E Bulletin 137, April 2005.

Dirty kilowatts

A huge share of the air pollution from the US power sector comes from a handful of unnecessarily dirty plants.

THE 50 WORST SULPHUR emitters among the 359 largest power plants in the United States generate as little as 25 per cent of the electric power but account for up to 50 per cent of the emissions, according to a report¹ from the Environmental Integrity Project (EIP).

The EIP has also ranked the plants' emissions in relation to the amount of electricity they generate. Of the 359 plants, the 50 with the worst emission rates accounted for 38 per cent of SO₂ emissions, but only 14 per cent of the electricity generated. Thirty out of the 50 plants appeared on both lists.

The situation is much the same for NO_x, where the top 50 emitters in relation to power generated accounted for 26 per cent of the emissions but only 14 per cent of net electricity generation.

EIP makes clear that most of the pollution from the worst power plants is avoidable. The 50 dirtiest US power plants averaged 10.4 kg of SO₂ emissions per megawatt-hour, compared to an average of 3.8 kg for all of the 359 largest plants, and less than 0.5 kg for plants equipped with state-of-the-art scrubber technologies.

As regards nitrogen oxides the top 50 plants had an average emission rate of 2.6 kg of NO_x per megawatt-hour, almost double the 1.4 kg average for all 359 power plants.

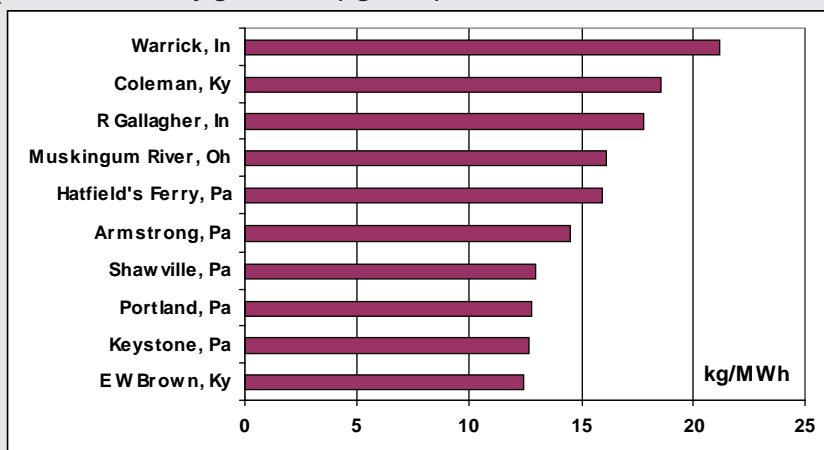
Environmental Integrity Project Director Eric Schaeffer said: "The real tragedy for the health of Americans and our environment is that most of this problem is already preventable. A huge share of these emissions comes from a handful of unnecessarily dirty power plants that have not yet installed modern pollution controls, or which operate inefficiently. Power plant sulphur dioxide and nitrogen oxide emissions contribute to fine particle pollution that triggers asthma attacks and causes lung and heart disease linked to more than 20,000 premature deaths each year."

Emissions of the greenhouse gas carbon dioxide by the 359 power plants were also compared in the study. The average emission rate was 894 kg per megawatt-hour, while the plant topping the list emitted twice as much, more than 2,043 kg.

The EIP report is based on the latest available EPA and other federal data. The 359 plants account for almost 90 per cent of electricity generated by the 1,000-plus power plants tracked by EPA, and roughly 56 per cent of total US electricity generation. Three out of four of the 359 largest plants in the study reported coal as their primary fuel source in 2004.

¹ **Dirty Kilowatts: America's Most Polluting Power Plants.** Available in pdf format at www.environmentalintegrity.org.

The ten worst power plants in the US. Emissions of sulphur dioxide per unit of electricity generated (kg/MWh).



A call for binding national targets

A DECLARATION by more than 40 organizations from 19 member states calls for a directive that sets an overall EU target of 25 per cent renewable heating and cooling by 2020. The law must also include legally binding national targets, it says.

Nearly half of European energy consumption is used for heating, but there is not yet one piece of legislation in place at European level that aims to increase the proportion of heating and cooling generated from renewable sources, state the organizations behind the declaration.

They believe that the promotion of renewable heating and cooling is not only necessary to fulfil the EU targets in the renewable energy sector, but

will also significantly contribute to the reduction of EU dependence on energy imports, to the reduction of greenhouse gases and to the creation of sustainable jobs.

The overall EU target of 25 per cent renewable heating and cooling should be broken down into different mandatory targets for the member states. The proposed measures within the directive include the setting of framework conditions for promotion mechanisms in the member states, the removal of administrative barriers, common statistical procedures and the raising of awareness.

Further information: European Renewable Energy Council, www.erec-renewables.org.

BIOFUELS

Low level of ambition in many countries

THE EU WILL NOT meet its target that two per cent of all road vehicle fuel sold in the member states this year should be biofuels. A spokesman for the Commission's directorate for energy and transport estimates that the actual figure will be around 1.5 per cent, compared with 0.2 per cent in 2000 and around 0.6 per cent registered in 2003.

Two indicative target levels – of 2.0 per cent by 2005 and 5.75 per cent by 2010 – were laid down in a directive that was adopted two years ago (2003/30/EC). The directive compels member states to set their own targets and report them to the Commission. The countries may however adopt lower targets than indicated in cases where there is little potential for producing biofuel, or if it is already being used for other purposes.

In March the Commission sent letters of formal notice to nine member states that had not communicated their target for the share of biofuels in 2005.

Among those countries that have reported their targets, half chose a level lower than two per cent. Denmark is the most striking, with a target of zero per cent. But Ireland comes close behind with 0.06 per cent, followed by Finland at 0.1 and the UK at 0.3 per cent. The Commission has started to examine whether they have given adequate reasons for the lower targets.

Most environmental organizations in Europe have shown low interest in the use of biofuels in the EU transport sector. The umbrella organization T&E, the European Federation for Transport and Environment, takes the stance that the directive is primarily about agricultural policy – if the goal is to reduce vehicle emissions of greenhouse gases then it is much more effective to legislate on fuel consumption standards for vehicles.

Sources: Press release from the Commission 16 March 2005. Planet Ark (Reuters), 3 March 2005.

NEWS IN BRIEF



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Leading markets for windpower

A total of 8,321 MW of new windpower capacity was added worldwide in the year 2004. The leader in terms of new installations is Spain with 2,061 MW, taking over the number one position from Germany (2,020 MW 2004). Germany however remains the leading country in terms of overall capacity, with one third of global wind energy installations.

India has established itself as the third biggest wind energy market worldwide in terms of new installations (875 MW). India is soon expected to move ahead of the former pioneer country Denmark – with an increase of only 7 MW in 2004 – as well as becoming number four in terms of total capacity.

Source: World Wind Energy Association, www.windea.org, press release 21 March 2005.

Solar cell production up 62 per cent in 2004

World solar photovoltaic market installations reached 927 MW in 2004, representing growth of 62 per cent over 2003. Once again, Germany led the pack with a startling 152 per cent growth. Germany has taken over market leadership from Japan. In combination, the Japanese, German and United States markets accounted for 78 per cent of the world market.

Source: www.solarbuzz.com, 21 March 2005.

Harmful subsidies identified

A Polish-German seminar on environmentally harmful subsidies was held in Krakow, Poland, in February. Polish experts identified several such subsidies, mostly in the energy sector, and in the state-owned coal-mining industry.

All presentations are available in pdf format from the Institute of Sustainable Development, www.ine-isd.org.pl/subsydia/english.htm

German lignite use must be reduced

Lignite power generation is one of the most inefficient and ecologically damaging forms of energy production in Europe. A report released in April by the Swedish NGO Secretariat on Acid Rain describes the environmental, social, and economic drawbacks of lignite use in Germany.

Because of its deep concern over these findings, the Secretariat appeals to the German Lignite Industry Association and its members to present – by the end of this year – a detailed plan and strategy for eliminating 40 per cent of the greenhouse gas emissions from lignite power generation by 2020 (relative to 1990 levels).

Further reading: Press release from the Secretariat 18 April 2005, see www.acidrain.org/pages/news/news_main.asp

Cheaper driving in the United Kingdom

Figures from the British government say the cost of owning a car for the UK's 24.5 million motorists has fallen by 11 per cent in real terms since 1975. Then there were half the number of cars, but with rail fares now 70 per cent higher and bus fares up 66 per cent, another 12 million have been added. Even since Tony Blair's Labour government was elected in 1997 promising to reduce car dependence, driving is six per cent cheaper while bus fares have risen 16 per cent and rail tickets seven per cent.

Source: T&E Bulletin 137, April 2005.

New tractor emission limits in force

New EU emission limits for agricultural and forestry tractors took legal effect on 21 March.¹ The new directive introduces three waves of stricter controls along the same lines as an EU law agreed last year for other non-road mobile machinery and inland waterway vessels. It offers manufacturers some flexibility over compliance with the stricter limits, which focus on cutting emissions of nitrogen oxides (NO_x).

¹ Directive 2005/13/EC concerning the emission of gaseous and particulate pollutants by engines intended to power agricultural or forestry tractors. L.3.2005 Official Journal of the European Union L 55/35.

24 out of 25 NAPs approved by Commission

But trading in CO₂ emission rights is still modest.

THE ITALIAN national allocation plan (NAP) for carbon dioxide emission rights was approved by the European Commission on 25 May, but only on condition that the allocated emission rights for the period 2005–07 are first reduced by 23 million tonnes (9 per cent), and that further plants are included in the system.

The Czech Republic's NAP was approved on 12 April, but also on condition that the allocated emission rights for the period 2005–07 are first reduced, in the Czech case by 9.4 per cent.

Poland's NAP was approved on 10 March, in this case with the proviso that the number of emission rights is reduced by 16.5 percent, which is equivalent to just over 140 million tonnes of CO₂ for the period 2005–07. In absolute terms this is the largest reduction the Commission has so far required before approving a plan.

In April the Commission also confirmed its belief that a UK request to increase the 2005–07 allocation from 736 to 756 million tonnes is inadmissible under the emissions trading directive. In March the UK announced it would take legal action against the stance, but decided in the meantime to distribute allowances based on the lower allocation. This will allow UK companies to start participating fully in emissions trading.

The approval of the Italian NAP brings to 24 the number of plans approved by the Commission; that of Greece is still being scrutinized by officials.

The trade in emission rights has so been modest so far, but is growing steadily. The price has risen from around seven euro per emission right at the start of the year, to nearly 20 euro today (end of May).

The EU emissions trading system is not expected to result in any major investments in cleaner processes and plants over the next three years. This is due to the relatively generous levels of free allowances being given out by governments for the first period. Stronger caps are however needed for the period 2008 to 2012, when the trading system runs in parallel with the Kyoto Protocol.

Several proposals have been submitted for extending the trading system in the second phase of the programme. The UK wants to see the aviation sector included. Others want to see the chemicals and aluminium sectors fully integrated, and to discuss the inclusion of other gases in addition to carbon dioxide. Any major change to the Directive will however take time to proceed through the EU institutions and is highly unlikely to be implemented for the next trading period.

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Further information:

European Commission emission trading scheme: <http://europa.eu.int/comm/environment/climat/emission.htm>

The NAP website: http://europa.eu.int/comm/environment/climat/emission_plans.htm

Climate Action Network Europe: www.climnet.org

The EU emissions trading system

The EU has agreed to establish a cap-and-trade system to limit emissions of carbon dioxide from large industrial sources. This so-called Emissions Trading System (ETS) came into effect on 1 January 2005. Companies must not emit more carbon dioxide than the number of allowances they hold. If they cut emissions more, they can sell their surplus permits on the open market. If they want to pollute more, they must buy them. The idea of the trading system is that emissions are cut where it is cheapest.

Effects of f-gases evaluated

IN AN EFFORT to protect the ozone layer around the Earth a long list of ozone-depleting substances have been replaced with other gases, which unfortunately contribute to global warming.

A new report by the Intergovernmental Panel on Climate Change (IPCC), in collaboration with an expert panel under the Montreal Protocol, identifies the danger to climate posed by the use of these ozone-friendly fluorinated gases (f gases), and identifies ways to minimize their warming effect. The report is the result of two years of work by 145 experts from 35 countries.

In the business-as-usual scenario, annual CFC and HCFC emissions are together decreasing from 2.1 to 1.2 billion tonnes CO₂-equivalents from 2002 to 2015, and annual emissions of HFCs are increasing from 0.4 to 1.2 billion tonnes CO₂-equivalents the same period.

The contribution to global warming of fluorinated gases can be halved, according to the report, by measures that reduce emissions, such as better containment to prevent leaks and evaporation, reducing the amounts of the chemicals needed in equipment, and improving end-of-life recovery, recycling and destruction of HFCs and PFCs. The use of alternative substances with a lower or zero global warming potential should be increased.

The report gives specific emission reduction and cost estimates for applications that use fluorinated gases, which include not only refrigeration and air conditioning but also foams, medical aerosols, solvents and fire protection.

Further reading: IPCC/TEAP Special Report: Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons. A summary for policy makers can be downloaded from www.ipcc.ch. The full report will be published later this year by Cambridge University Press.



EU CLIMATE TARGETS

EU leaders back 2020 greenhouse gas target

EU heads of state have for the first time set a target for avoiding global warming for the period after 2012.

IN FEBRUARY, the European Commission said in a strategy paper that it considered it "premature" to set targets now for lowering emissions after 2012. Instead it wanted to focus on bringing the United States and some developing nations to the negotiating table (see AN 1/05, p. 19).

At their meeting in Brussels in March however, the EU environment ministers said in a statement that developed nations ought to aim for cuts "in the order of 15–30 per cent by 2020 and 60–80 per cent by 2050, compared to the baseline envisaged in the Kyoto Protocol". The ministers did not set targets for the EU itself, speaking instead of developed nations in general.

At their meeting on 22–23 March the EU Heads of State (European Council) backed the environment council's calls to aim for a 15–30 per cent reduction in emissions from industrialized countries by 2020.

The environment ministers' target of a 60–80 per cent cut by 2050 was however dropped; various sources claim because of pressure from Germany and Austria.

The Heads of State also endorsed – for the first time – the goal of keep-

ing global temperature rise below 2°C over pre-industrial levels.

"Despite the recent rejection of greenhouse gas reduction targets by former climate champions Germany and Austria, and the continued sabotage efforts of Italy, the EU has stood strong and sent a clear political signal that it will push for further action. Much more is urgently needed, but this is a good start," commented Mahi Sideridou, EU climate policy director at Greenpeace.

"The EU now has to speedily implement policies and measures to not (only) fully comply with Kyoto targets, but also to comply with this longer term objective of 2020," said Stephan Singer, climate change expert at environmental group WWF.

Jan Kowalzig, climate campaigner at Friends of the Earth, was more critical: "The target agreed on by the Heads of State is both weak and ambiguous. There is a world of difference between 15 and 30 per cent, and only the higher target reflects what industrialized countries must achieve to prevent catastrophic climate change."

PER ELVINGSON

Edinburgh rejects congestion charging

The citizens of Edinburgh have rejected a scheme to charge motorists entering the city centre on weekdays. The proposed charge was modest – three euro per day – but the rejection was emphatic. With a voter turnout of 62 per cent in the postal ballot, 74 per cent voted to reject the plans.

Source: T&E Bulletin, March 2005.

Successful charging scheme in London

The congestion charging scheme in London, introduced in 2003, has been a big success in terms of reducing congestion, but not great at raising revenue.

Despite initial predictions that it would be a failure, the charge has reduced traffic levels by an average of 15 per cent, led to 16 per cent less NO_x and 19 per cent less CO₂ in the charging zone, 38 per cent more bus users, 5,000 more motorcycle/moped journeys, 4,000 more cycle trips, and 16.2 per cent fewer accidents in the charging zone, despite faster speeds and more cyclists.

But because so many car journeys have been avoided, income has been less than predicted, and some financial restructuring has been necessary. In the first year, around 65 million euro net income was received.

The charge will be increased from £5 to 8 (7 to 11.50 euro) in July, and the charging zone will probably be extended westwards – public consultation will continue until 15 July.

Sources: T&E Bulletin. Special Feature. February 2005. Transport for London, www.cclondon.com.

Trials in Stockholm

Congestion charging will be trialled in the Swedish capital Stockholm from 3 January next year. The aim is to find out whether congestion charging combined with improved public transport can improve traffic flow and benefit the environment. The charge will be set at around 1–1.5 euro per passage in and out of the charging zone and will apply during daytime on weekdays.

Legal challenges have resulted in the trial being much shorter than planned. It will end on 31 July and will be followed by a local referendum on the future of the system at the same time as the general election on 17 September 2006.

Further information: www.stockholm.se



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ROAD TRANSPORTATION

New EU agreement on kilometre taxes

THE EU MEMBER STATES should soon be able to introduce kilometre taxes for heavy vehicles, a move that will make it possible to set strong incentives to reduce environmental impact from the transport sector.

It was at a meeting on 21 April, after almost two years of discussions and three failed attempts, that EU Ministers of Transport finally succeeded in agreeing on a revision to the Eurovignette directive (1999/62/EC).

One important change is that the tax can be imposed on all vehicles over 3.5 tonnes (the current limit is 12 tonnes) and that it can be applied throughout the road network, not just on motorways. The level of the tax may be set country by country and can be adjusted depending on the size, weight and environmental performance of the vehicle.

One of the points at issue between the states was what should be done with the revenues from taxes. The ministers' agreement recommends that revenues be ploughed back into transport networks but does not make this compulsory, in recognition of the principle of subsidiarity.

The decision not to earmark the revenues was not popular with several of the member states on the periphery of the EU. Malta, Estonia and

Portugal opposed the proposal on concerns that higher transport costs would raise prices. Belgium also voted against, while Greece and Finland abstained.

The agreement is however welcomed by most countries that are more centrally located – which have to bear the brunt of transit transport costs in the form of road wear, noise, accidents, etc. – and by more environmentally aware countries.

The European Parliament must still approve the new legislation. The differences in opinion are not dramatic, however, and the UK, which takes over chairmanship in July, expects that an agreement will be reached before the year is out.

The European Federation for Transport and Environment (T&E) called on the Parliament to ensure EU states could factor the costs of environmental and health damage into taxes and criticised ministers' failure to include this in the bill. According to the ministers' decision, kilometre taxes may only be charged at a level that will cover the direct costs incurred by each country for its road transport system. The costs that can be included are not set out in detail, however.

PER ELVINGSON



Kilometre taxes

There are three distance-based charges currently in effect in Europe:

Switzerland – introduced in 2001, applies to vehicles over 3.5 tonnes on all roads. The charge for a 40-tonne vehicle (Euro 3) is 0.55 euro per kilometre, which covers payment of social and environmental costs.

In each of the first two years after its introduction the charge induced a reduction in road transport of 5 per cent, compared with a 5–6 per cent increase the year before. The overall lorry fleet has become cleaner, with a drop of about 6–8 per cent in CO₂ and NO_x emissions expected by 2007 (compared with pre-taxation). Only negligible effects on consumer prices have been registered.

The amount of freight transported through the Swiss Alps by rail grew faster last year than the amount carried by road. Rail transport was up 10 per cent while road transport rose 5 per cent. However, little or no modal shift has taken place since the charging scheme came into effect. This may change when the first of the New Alpine Rail Axis (NEAT) tunnels opens in 2007 or 2008. The prices for using Swiss roads went up on 1 January this year, by 45 per cent for the most polluting lorries. Another increase is expected when the first NEAT tunnel opens.

Austria – introduced in 2004, applies to vehicles over 3.5 tonnes on motorways only. The charge for a 40-tonne vehicle (Euro 3) is 0.22 euro per kilometre, which covers road infrastructure only.

Though the charge has been a success in bringing in revenue – expected to be 740 million euro a year – it has done nothing to reduce traffic levels, in fact on transit stretches they have gone up. There

have been reports of heavy goods traffic using non-motorway roads to avoid the charge.

Germany – introduced in 2005, applies to vehicles over 12 tonnes on motorways only. The charge for a 40-tonne vehicle (Euro 3) is 0.12 euro per kilometre, which covers road infrastructure only.

It is too early to judge the German system, though both France and the Czech Republic have reported increased heavy traffic on their roads, implying some vehicles are avoiding Germany.

Officials in the **Czech Republic** say the numbers of lorries crossing the Czech-German border has increased from 13,500 in April 2004 (the last month before the country joined the EU) to 70,000 now, which ministers say is largely because the tolls on German, Swiss and Austrian roads make the Czech Republic seem cheap.

The result has been that the Czech government has begun the process that will lead to a motorway toll, with the aim to have the system in place by mid-2006.

Slovakia and **Hungary** also have plans to introduce distance-based schemes.

The next major scheme could be in **Great Britain**, where the plans are for a distance-based charge that would apply to all roads and cover social and environmental costs. It is expected to be ready in January 2008. Over a 10–15 year period the British government wants to move away from the current form of vehicle taxation towards a national road pricing system for all vehicles, not just lorries.

Sources: T&E Bulletin Special Feature February 2005 and T&E Bulletin, April 2005.

Nitrogen oxide levels too high in Austria...

Emissions of nitrogen oxides in Austria must not exceed 103,000 tonnes by 2010 according to the EU national emission ceilings directive (2001/81/EC). But according to a report from the country's environment agency, the national NO_x emissions rose by 4.2 per cent in 2003 to reach 229,000 tonnes – more than twice the 2010 ceiling. The agency said the increase was mainly due to rising road transport emissions – the sector accounted for 57 per cent of total output in 2003.

Austria's emission ceilings for sulphur dioxide and ammonia have already been met and it is reported that the 2010 target for VOCs is within reach.

Further information: The inventory report can be downloaded from www.umweltbundesamt.at/fileadmin/site/publikationen/BE263.pdf

... and in Norway

Figures published by Statistics Norway (SSB) show that the national emissions of nitrogen oxides (NO_x) in 2004 totalled around 221,000 tonnes, slightly higher than the year before. Domestic shipping, including fishing vessels, accounted for 33 per cent of Norwegian NO_x emissions in 1990, while in 2003 this had risen to 40 per cent.

To meet its commitment under the Gothenburg Protocol, which is 156,000 tonnes, Norway's emissions must be reduced by 30 per cent by 2010.

Source: Statistics Norway, 5 April 2005, www.ssb.no/english/subjects/01/04/10/agassn_en.

Gothenburg protocol comes into force

The Gothenburg Protocol came into force on 17 May, after the sixteenth ratification, by Portugal in February. The other fifteen parties to the protocol are the Czech Republic, Denmark, Finland, Germany, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Portugal, Romania, Slovenia, Spain, Sweden, the US and the European Community.

The protocol was signed in Gothenburg, Sweden, in 1999 and sets country-by-country emission ceilings for four air pollutants – sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia – to be achieved by 2010.

Further information: The LRTAP Convention, www.uncece.org/env/lrtap

Global emission trends

Emissions of sulphur and nitrogen oxides are continuing to fall in Europe but rise in Asia, according to calculations based on individual countries' predictions of economic development. The upward trend is slower than in previous predictions, however.

EMISSIONS OF sulphur dioxide have fallen since 1990, not just in Europe but around the world, and a continuing reduction can be expected in coming years. This is the conclusion of a new analysis by IIASA¹, and contradicts many previous assumptions of a sharp rise in emissions in the future.

The researchers at IIASA have supplemented the regional versions of the RAINS computer model that exists for Europe and Asia with country-specific data for North America, the countries of the former Soviet Union, Latin America, Africa and Australia.²

The critical factors in the forecasts of future emissions are expected economic activity (primarily energy use) and emission control requirements. In the RAINS model, emissions of pollutants are calculated as a product of activity level, uncontrolled emission factor, removal efficiency of control technology applied, and implementation level of that technology in a given emission scenario.

The report presents two scenarios for the period 1990–2030.

The "current legislation" scenario (CLE) reflects the current perspectives of individual countries on economic development and takes into account the anticipated effects of al-

ready agreed emission control legislation.

The "maximum technically feasible reduction" scenario (MFR) outlines the scope for emission reduction offered by a full implementation of the best available emission control technologies.

Compilation of national expectations for the development of energy demand within the next 30 years results in an increase of global energy-related annual emissions of carbon dioxide of about 4.4 billion tonnes of carbon in 2030 (current annual emissions are around 6 billion tonnes).

Since the study concentrates on national emissions, the emissions from international shipping and aviation are not included.

Sulphur dioxide

According to the IIASA calculations, global SO₂ emissions in 1990 were about 122 million tonnes. In 2000 the emissions were about 20 per cent lower, which was mainly due to strict controls implemented in Western Europe, but also due to economic restructuring in Central and Eastern Europe and in Russia and the Newly Independent States (see table 1 and figure 1).

Under the baseline assumptions

(CLE), global emissions will decrease to about 97 million tonnes in 2010 and then increase again to 105 million tonnes by 2030, unless stricter controls are enforced in some world regions, particularly Southeast Asia. Implementation of the best available control technology (MFR) could reduce the emissions to about one fifth of the 1990 level by 2030.

Future development of emissions is strongly region-dependent. In five regions – Pacific OECD, Russia and the Newly Independent States, Middle East and North Africa, Central and Eastern Europe, and Western Europe – emissions are forecast to decrease by 40 to more than 60 per cent. The decrease in North and Latin America is modest, at 5–14 per cent.

The emissions from Centrally Planned Asia and China stabilize at a level close to year 2000 emissions. However, if policy targets from the recently announced pollution control plans in China materialize, the resulting emissions might significantly decrease.

National projections anticipate a large increase in the consumption of coal in many countries in South and Pacific Asia. Since the legislation in those countries is rather liberal, the

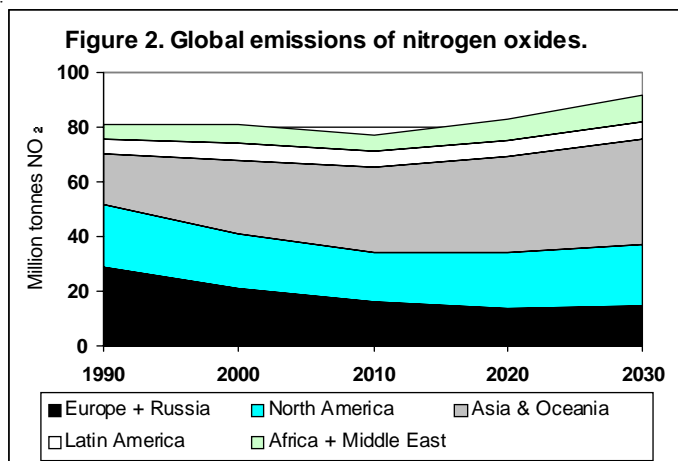
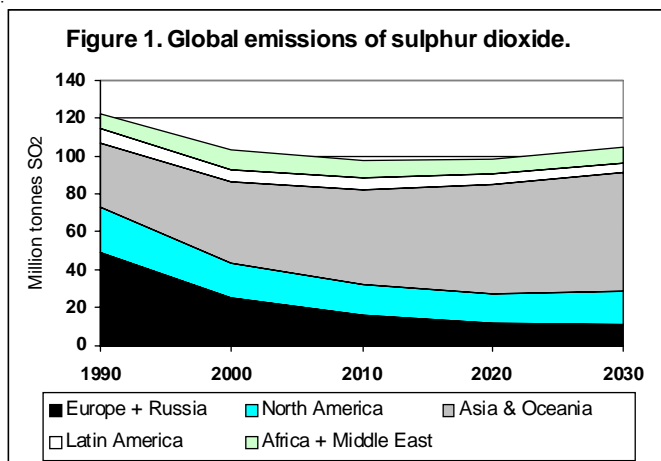


Table 1. Emissions of sulphur dioxide by regions: Current legislation (CLE) and maximum technically feasible reduction (MFR) scenarios. Million tonnes SO₂. Emissions from biomass burning, international shipping and aircraft are not included.

Region	Emissions		CLE scenario			MFR scenario		
	1990	2000	2010	2020	2030	2010	2020	2030
Western Europe	17.9	7.9	3.8	3.1	2.9	1.4	1.3	1.2
Central and Eastern Eur.	11.1	5.9	4.1	2.6	2.3	0.8	0.6	0.6
Newly Independent States	19.5	11.1	7.8	6.0	6.3	1.8	1.7	1.7
Centrally Planned Asia ¹	22.0	28.4	30.9	31.1	29.4	6.7	6.6	6.4
South Asia	4.8	7.6	11.0	17.3	22.5	1.9	2.6	3.3
Pacific OECD	2.7	2.6	2.8	2.1	1.5	0.6	0.5	0.5
Other Pacific Asia	5.1	4.3	5.4	6.9	8.7	1.5	1.8	2.0
North America	24.4	18.5	16.4	15.9	17.5	2.9	3.2	3.3
Latin Am. and Caribbean	6.7	6.2	6.8	5.8	5.3	1.8	1.8	1.7
M. East and N. Africa	3.1	5.0	3.5	2.8	2.4	0.8	0.7	0.7
Sub-Saharan Africa	4.8	5.4	4.9	5.2	5.8	1.3	1.3	1.3
World Total	122	103	97	99	104	22	22	23

¹ Including China.

Table 2. Emissions of nitrogen oxides by regions: Current legislation (CLE) and maximum technically feasible reduction (MFR) scenarios. Million tonnes NO₂. Emissions from biomass burning, international shipping and aircraft are not included.

Region	Emissions		CLE scenario			MFR scenario		
	1990	2000	2010	2020	2030	2010	2020	2030
Western Europe	14.1	10.8	7.5	6.0	6.1	2.8	3.0	3.1
Central and Eastern Eur.	3.5	2.8	2.0	1.7	1.8	0.6	0.6	0.7
Newly Independent States	11.2	7.2	6.7	5.9	6.7	1.5	1.6	1.8
Centrally Planned Asia ¹	7.8	12.3	13.8	15.0	16.2	3.7	4.2	4.5
South Asia	3.1	5.4	7.6	9.7	11.6	1.9	2.4	2.9
Pacific OECD	3.7	3.7	3.4	3.2	2.8	1.2	1.1	1.0
Other Pacific Asia	3.5	5.6	5.8	6.9	8.2	1.6	2.0	2.4
North America	23.4	19.9	18.3	20.8	22.2	5.7	6.3	6.8
Latin Am. and Caribbean	5.5	6.4	6.0	5.8	6.3	1.3	1.5	1.7
M. East and N. Africa	2.6	3.3	2.6	2.8	3.1	0.7	0.8	0.8
Sub-Saharan Africa	2.6	3.7	3.7	4.8	6.7	1.1	1.2	1.4
World Total	81	81	77	82	92	22	25	27

¹ Including China.

SO₂ emissions are likely to increase. This could be particularly dramatic in South Asia, where the current policies might cause a factor of three increase over the current level.

Nitrogen oxides

The calculations show no change in global emissions between 1990 and 2000. From then on the CLE scenario predicts a slight reduction until 2010, followed by rising emissions (see figure 2 and table 2). The rise is however significantly lower than in previous estimates, mainly because many developing countries have enforced stricter control requirements for mobile sources in recent years.

The moderate increase in emissions from developing countries would be partly offset by the decline in European emissions, so that global anthropogenic emissions would grow by no more than 13 per cent up to the year 2030. Implementation of the best available control technology (the MFR scenario) could reduce these emissions to about one third of the 1990 level by 2030.

As with SO₂, the future development of NO_x emissions is strongly region-dependent. The calculations suggest a strong decline in Europe and stabilization in North America due to present emission control legislation, despite the underlying economic growth and the corresponding increase in transport volumes.

For Asia, current national expectations anticipate a growth in transport demand by a factor of four to five. However, under the assumption

of full implementation of the recently decided pollution control legislation for vehicles, NO_x emissions would not grow by more than 60 per cent from present levels until the year 2030.

Latin American emissions are expected to stabilize due to recently imposed control requirements in the majority of countries in this region.

Carbon monoxide

Carbon monoxide is primarily of interest due to its contribution to the formation of ground-level ozone at the hemispheric scale. According to the CLE scenario, global emissions will fall by around 15 per cent between 2000 and 2030, despite increased economic activity. Most previous calculations have indicated a sharp increase.

Once again there are regional differences. The highest decline, by 55 per cent, occurs in Latin America, mainly due to a switch from fuel wood to other energy sources in the residential sector. The only region with increasing emissions is Africa, with a rise of 10 per cent. This leads to a global decrease in the anthropogenic emissions of 16 per cent from 1990 to 2030 under the CLE scenario.

Methane

Like carbon monoxide, methane contributes to the formation of ground-level ozone at the hemispheric scale. Methane is also a greenhouse gas. The IIASA analysis suggests that "current legislation" (CLE) will result in a continued increase in global anthropogenic emissions, leading to 35

per cent higher emissions in 2030 than in 2000. Overall, emissions from all sectors are expected to grow due to increased economic activity and absence of widespread emission control measures. The calculated growth in emissions is close to other estimates, for example those used in the IPCC emission scenarios.

Emission control

Implementation of the best available control technology (MFR) would make it possible to further reduce the emissions of all these pollutants. Compared with 2000 levels, the achievable reductions are 77 per cent for SO₂, 67 per cent for NO_x, 53 per cent for CO, and 6 per cent for CH₄.

In this context it should be noted that the potential for emission reductions offered by structural changes, such as increased energy efficiency measures, fuel substitution, more efficient production techniques or reduced transport demand were not considered in this scenario. Earlier studies have shown that the emission reduction potential of such measures is considerable.

PER ELVINGSON

¹ Scenarios of World Anthropogenic Emissions of Air Pollutants and Methane up to 2030. By J. Cofala, M. Amann and R. Mechler. International Institute for Applied System Analysis, 2005. Available at www.iiasa.ac.at/rains/global_emiss/global_emiss.html

² In total, estimates were prepared for 75 countries or country groups. Detailed emissions by scenario and country are available at the same address as above.

En-route charges possible for vessels in the Baltic Sea

The feasibility of introducing a scheme for charging for emissions of sulphur and nitrogen oxides from sea vessels in the Baltic Sea looks promising, but needs further investigation, according to environmental consultant Per Kågeson.

AT THE CONFERENCE "Greening Motorways of the Sea", held in Stockholm on 21–22 April, environmental consultant Per Kågeson presented the idea of applying environmentally differentiated en-route charges for ships. Such a scheme could be modelled on the successful Swedish emission charge on nitrogen oxides (NO_x) from land-based larger combustion plants, where the money is returned to the owners based on the plants' annual net production of useful energy.

However, in the case of shipping, a better ground for recycling money might be, according to Kågeson, to divide the total annual revenue from the scheme by the number of gross registered tonne-kilometres of shipping in the designated sea area belonging to each ship owner.

Another possibility would be to use the revenue for funding grants to ships that invest in air pollutant abatement techniques. There might be additional options for returning the money in ways that do not interfere with the effectiveness of the charge.

Provided that the level of the charge is accurately set, this programme would provide a correct marginal incentive without causing the average ship to pay more than it will receive. However, ship owners who invest in emission abatement techniques would receive more than they pay, and owners of heavily polluting ships would pay more than they get back. For the industry as such it would be a zero sum game.

The Baltic Sea has some of the busiest shipping routes in the world, with around 2,000 sizeable ships normally at sea at any time, and these shipping activities contribute significantly to air pollution problems in the region. Moreover, shipping in the Bal-

tic Sea is expected to grow 70–100 per cent between 2005 and 2015.

Efficient, low-cost techniques for considerably reducing the emissions of air pollutants from shipping are available – the real challenge is therefore legal and political rather than technical.

Against this background, Per Kågeson has made some initial exploration of the feasibility of introducing an emissions charging scheme for maritime transport in the Baltic Sea. A longer-term objective may be to develop a regime that internalizes the social costs of sea transport in a similar way to that proposed for road transport.

Some of the potential practical and legal obstacles were addressed by Kågeson, and his preliminary conclusions in relation to these are summarized below:

Is it possible to effectively measure and control emissions covered by the charge?

Measuring emissions and/or registering the specific emissions from different vessels appear not to be a technical problem. The Automatic Identification System (AIS) system makes it possible to identify all ships and to measure the distance that each ship travels in the sea area.

Would the scheme conflict with the right of innocent passage as expressed in the United Nations Convention on the Law of the Sea (UNCLOS)?

One way for Baltic Sea states to avoid a conflict with the right of innocent passage would be to make clear that the charge is relevant only to ships calling at ports in states that have chosen to participate in the scheme. This means that no ship is charged for crossing the Baltic Sea on its way to a port that is not participating. This would, for instance, be the case for trips to Russian ports,

if the coastal states belonging to the European Union choose to participate but Russia decided not to. The fact that the fee would correspond to emissions emitted from the point of entry into Baltic Sea waters or since departure from another Baltic port, would not imply a violation of the right of innocent passage. The ship owner or his customers could alternatively choose a port that is not part of the programme – a risk that those creating and adopting the scheme must be aware of.

Would emissions charging conflict with the rules of UNCLOS Article 26, which declares that no charge may be levied upon foreign ships by reason only of their passage through the territorial sea, and that charges may be levied upon a foreign ship passing through the territorial sea as payment only for specific services rendered to the ship?

In the case of a revenue-neutral charge there will be no net payment levied upon foreign ships and the right of passage would not be violated.

Would the introduction of kilometre charging require an amendment to the MARPOL 73/78 Convention in order to avoid conflict with harmonized international regulations?

Coastal states may introduce more stringent emission standards not only in territorial waters but also in their respective economic zones for the protection not only of sensitive sea areas but also for the protection of human health, vulnerable terrestrial and freshwater ecosystems, materials and cultural heritage, etc.

The potential conflict between such standards and the right of innocent passage diminishes if the coastal states use flexible policy instruments such as non-revenue raising charges instead of enforcing mandatory technical standards.

Unsustainable resource use

Human activities are rapidly changing the Earth's natural environment and threatening the planet's capacity to support future generations.

This stark warning is the conclusion of more than 1,300 scientists from 95 countries, who found that 60 per cent of the ecological systems that support life on Earth are being degraded or used unsustainably.

Further information: The Millennium Assessment, www.millenniumassessment.org.

Hidden subsidies to use private cars

Every year local governments in Germany spend some 15 billion euro on car traffic, according to estimates made in a study for the network ICLEI, Local Governments for Sustainability. As little as 15 to 45 per cent of these costs are recovered through parking fees and contributions from regional and national government, for example. The remainder, 100–150 euro for every citizen, is paid from the local authority budget.

Results from other European cities indicate comparable levels. In the Austrian city of Graz, the net spending on car transport is double the amount contributed to the public transport system.

Source: ICLEI, www.increase-public-transport.net

Voluntary levy on airline tickets

EU finance ministers have agreed to a voluntary levy on airline tickets to fund development aid. The aviation industry opposed the proposals and strongly criticized the agreement in media coverage the following days.

Jos Dings, Director of the European Federation for Transport and Environment (T&E) said: "British Airways calls this extremely modest proposal 'absurd' and 'illogical' but the same can be said of the aviation industry's current tax privileges. The sector pays no fuel taxes, there is no value added tax (VAT) on international tickets, and both aircraft manufacturers and airlines have received billions of euro in direct and indirect aid."

Source: T&E press release, 17 May 2005. Internet: www.t-e.nu.

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The Baltic Sea has some of the busiest shipping routes in the world, and shipping is expected to grow 70 to 100 per cent between 2005 and 2015. The photo shows the ferries MV Silja Festival, MV Amorella and MV Isabella, all of which run between Stockholm and Finland.

The potential conflict ceases to exist in the case where the policy instrument is used only in connection with calls at ports belonging to the participating states. When designed in this manner, the introduction of a distance-related en-route charge is neither conditional on amendments to MARPOL nor on any decision by the International Maritime Organization.

Would a decision on kilometre charging in European sea areas require a unanimous vote in the EU Council of Ministers?

Programmes that may be considered as tax regimes would be difficult to introduce in the EU as they require a unanimous vote in the European Council. However, distance-related en-route charges that apply to calls at ports in some member states do not require a vote by the Council at all. According to the Treaty's principle of subsidiarity, member states are free to act in areas that do not require common legislation, provided that the measures taken are non-discriminatory and proportional to the objective pursued. If member states bordering the Baltic Sea feel that they need to protect their environment from airborne pollutants from ships, other member states have no reason to object so long as ships or cargo owners registered in their

countries are not discriminated against. Alternatively, if the European Commission thinks that the Baltic scheme is of such importance that it should be introduced by common law, a decision on a possible EU directive can be taken by qualified majority as it does not set any tax rates. It is rather a framework of much the same character as the existing directive on road charging.

Kågeson's study represents the first step towards an investigation of the feasibility of creating a scheme for kilometre charging of sea vessels in the Baltic Sea. He underlines that, besides the legal aspects, it is necessary to conduct an in-depth analysis of the size of the charges and of how the revenue would be returned to the shipping sector. The possibility of combining the administration of the en-route charge with other tasks based on the AIS system would also require further elaboration.

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Reducing Emissions from Ships in the Baltic Sea Area: The feasibility of introducing a distance-related en-route charge. By Per Kågeson, Nature Associates, April 2005. To be published by the European Federation for Transport and Environment, www.t-e.nu. Contact: kageson@comhem.se

Emission control is cost-effective

There is no apparent reason for the continued lax regulation of shipping emissions.

AIR POLLUTION FROM SHIPPING is a problem that is drawing increased attention, internationally as well as nationally, especially in Europe and the US. The impact of shipping emissions on health and the environment include premature death, various illnesses and lung complaints, as well as acidification, eutrophication of terrestrial and coastal ecosystems, and climate change.

According to a recent report¹ there are, however, feasible and cost-effective methods for substantially reducing air emissions from ships. Produced by a coalition of environmental organizations (NGOs), this report has been submitted to the forthcoming meeting of the IMO's Marine Environment Protection Committee (see box).

Until recently, air pollution from ships went largely unregulated, with regulatory and advocacy focus on more visible land-based sources. As a result, emissions from shipping have come to represent an increasingly large share of air pollution. Given the increasing pace of shipping activity, without stringent controls, shipping emissions are likely to become an even larger environmental problem in the coming years.

The authors of the report note that the permitted rates of SO₂, NO_x and PM emissions from marine engines are much greater than from almost any other category of mobile sources. The US Environmental Protection Agency's current regulations permit diesel marine engines fitted to new coastal and harbour craft to emit NO_x and PM at rates between 2 and 27 times higher than new non-road, land-based heavy-duty diesels. Furthermore, emission rates for larger ocean-going ships are higher still, up to 43 times higher for NO_x, and infinitely higher for PM, as there are *no* PM standards at all for these large marine diesels.

According to the NGOs, there is no justification for the continuation of such large disparities between diesel emissions at sea and on land. On



The freighter MS Cellus emits 90 per cent less nitrogen oxides and 80 per cent less sulphur dioxide than an equivalent standard ship. It is equipped with an SCR flue gas emission control system and uses low-sulphur fuel oil.

the contrary, the cost-effectiveness of measures to reduce marine emissions of air pollutants compares very favourably with further measures for land-based sources. In other words, it is less expensive – in some cases, dramatically less expensive – to obtain the necessary reductions from marine engines rather than additional reductions from land-based sources.

Like power plants, large marine engines can have very long lives (20–30 years or more), so it will take a long time for the effect of emission standards for new marine engines to be fully realized throughout the fleet. Therefore, in order to reduce the environmental impact from shipping, it will be necessary to reduce emissions from existing ships through a combination of cleaner fuel, engine modifications, add-on retrofits and other measures. At the same time, it is important to begin to reduce emissions from new engines as soon as possible.

The report provides a survey of the most promising emission control measures for ships, which are summarized below:

Lower sulphur content in fuel

One of the most important initial actions that can be immediately taken to reduce shipping emissions is to lower the sulphur level in marine fuels. Because SO₂ emissions are directly proportional to the sulphur content of the fuel burned, this will produce immediate reductions. For instance, reducing the sulphur level of marine heavy fuel oil (HFO) used by ocean-going ships from the current average of 2.7 to 0.5 per cent would reduce SO₂ emissions from those ships by about 80 per cent.

Lowering the fuel sulphur content will also reduce sulphate formation and therefore PM emissions. Moreover, large cuts in fuel sulphur content will permit additional reductions in NO_x and PM from both new and existing engines using certain after-

treatment devices that do not work as effectively in the presence of high sulphur concentrations.

Other SO₂ reduction measures

Another possible means of reducing shipping emissions of SO₂ is seawater scrubbing. This is essentially the marine equivalent of flue-gas desulphurization, a well-established, reliable and cost-effective control methodology used in power plants, for example. Trials using this technology indicate that it can achieve sustainable removal levels of about 74–80 per cent. Potential emission reductions of up to 95 per cent for SO₂ and 80 per cent for PM have been claimed, but still remain to be verified in practical use.

Widespread adoption of seawater scrubbing will likely be dependent upon satisfactory resolution of the issue of the impact of seawater scrubbing on water quality. The spent effluent from the scrubber contains particulates and other pollutants, as well as sulphur compounds.

Although the effluent can be treated prior to discharge to remove many of the contaminants, the discharge will be more acidic than seawater. The potential impact of this discharge on water quality is presently under review.

NO_x reduction measures

There are a larger variety of NO_x reduction measures available, and these may be classified as engine modifications, pre-engine technologies and after-treatment technologies.

Engine modifications such as engine de-rating, retarding injection timing, fuel injector upgrades, etc.,

have been reported to reduce NO_x by about 15–20 per cent, but may have the disadvantage of increasing PM emissions and fuel consumption somewhat. More advanced combinations of internal engine modifications are under development, and these are projected to be able to reduce NO_x emissions to levels that are at least 30–40 per cent below the MARPOL Annex VI standard.

Pre-engine approaches generally involve the reduction of combustion temperature by the addition of water to the combustion process. Water can

There are no PM standards at all for large marine diesels

be injected into the combustion chamber, reducing NO_x by almost 30 per cent, with higher reductions reported. A variation of this approach is the addition of water vapour to the combustion air (called “humid air motor” or HAM). The retrofitting of a Scandinavian ferry, the MS Mariella, for HAM in 1999 was reported to reduce NO_x emissions by 80–85 per cent.

Mixing water with the fuel to create a stable emulsion is an approach particularly suited for ships using residual fuel, which may contain emulsified water in any event (standard engine design permits about a 20-per-cent water mixture). This technology is reported to reduce NO_x emissions by up to about 40 per cent or more, and PM by about 15 per cent or more.

Large NO_x reductions may be

achieved with selective catalytic reduction (SCR), which involves treatment of the exhaust gases with ammonia or urea in the presence of a catalyst. SCR has been effectively used in both marine and land-based applications, producing mobile source emission reductions of NO_x ranging from 65–99 per cent, with an average of about 80 per cent. PM reductions in the range of 30–40 per cent have also been reported. Because the size of SCR installations can be an issue in marine applications, a compact form of SCR has been developed for ships, and has been demonstrated to reduce NO_x by 85–95 per cent from ocean-going ships burning fuel with sulphur contents up to one per cent. (Very high levels of sulphur in the fuel may reduce the efficiency of these compact marine SCR systems.)

In addition to those NO_x reduction measures available at present, other control measures are being developed but are not yet available commercially. One highly effective catalyst-based control technology projected by the US EPA to be available over the next decade is the NO_x adsorber, which is capable of reducing emissions by over 90 per cent. This control technology will only be effective with engines that use ultra-low sulphur fuel (up to 15 ppm), which will be available in the US for coastal and inland marine diesel engines by 2012.

PM reduction measures

Advanced PM reduction techniques such as particulate filters and diesel oxidation catalysts have been used for years in many land-based diesel applications. Advanced diesel oxidation catalysts can reduce PM by between about 20 and 50 per cent, given low sulphur fuel.

Catalyzed diesel particulate filters are much more effective, achieving removal efficiencies of up to 99 per cent, given ultra-low sulphur fuel. The US EPA has recently stated that “PM filters and NO_x adsorbers can be applied to marine diesel engines for emission reductions of 90 per cent or more.” These technologies are however not yet as fully developed for application to the largest marine diesel engines.

Alternative power sources

A different approach to reducing air pollution from shipping is to use a different fuel or power source for the ship's engines. Natural gas engines

IMO and Annex VI

Globally, shipping activities are regulated by the UN International Maritime Organisation, IMO. After years of negotiation, agreement was reached in 1997 on an air pollution annex to the MARPOL 73/78 Convention.

Annex VI establishes a global sulphur cap of 4.5 per cent for marine HFO, as well as designating two so-called sulphur emission control areas – the Baltic Sea and the North Sea – where the sulphur content of fuel used by ships must be below 1.5 per cent.

It also prescribes emission stand-

ards for NO_x for diesel engines with a power output of more than 130 kW, but these standards are so weak that virtually all new engines have been in compliance since the late 1990s.

The meeting of the IMO's Marine Environment Protection Committee, MEPC, in London on 18–22 July will be the first such gathering after the entry into force on 19 May of Annex VI. Consequently it provides an important opportunity to propose and discuss a strengthening of the Annex.

The contribution from shipping

Despite the fact that emissions of sulphur dioxide from land-based sources in Europe have halved since the start of the 1990s, sulphur deposition in the south-west parts of the British Isles and in Brittany have not changed significantly during this period. This is partly due to increased emissions from international shipping, according to new model calculations. In certain areas the contribution from shipping accounts for more than half the total sulphur deposition.

Nitrogen oxides emitted by shipping contribute to the formation of the harmfully high levels of ground-level ozone that are regularly recorded in Europe each summer. In this case the calculations show that the contribution from international shipping during summer-time peaks at 6 ppb over Ireland, Brittany and Portugal.

Further reading: The contribution from shipping emissions to air quality and acid deposition in Europe. R.G. Derwent et al. *Ambio* Vol. 34, No. 1, February 2005.



E/S Orcele, a concept model of a cargo ship with the capacity to transport 10,000 cars.

Setting sails for the future

Sun, wind and waves will power the concept vessel E/S Orcele, which was introduced by the shipping company Wallenius Wilhelmsen at the World Exposition 2005 in Japan in April.

Three giant rigid sails manufactured of special lightweight composite materials are covered in solar panels to help drive the ship at its cruising speed of 15 knots. Besides picking up wind energy, its large sails generate electricity using solar cells fitted to their entire surface. A system of horizontal fins will also make use of wave energy.

Built as a pentamaran, the E/S Orcele's main hull and four sponsons provide stability and eliminate the need for ballast water.

E/S Orcele is said to be designed for a future in which diminished fossil fuel reserves and increasing environmental responsibility have become important business drivers.

Further reading: www.2wglobal.com



Viking Line's MV Mariella is the first passenger ship in the world to use HAM technology on all its main engines. The technology has reduced emissions of nitrogen oxides by 80–85 per cent.

are commercially available and have been used on ships for more than a decade. Although emissions data for marine natural gas ships is not voluminous, emissions of NO_x and PM from their land-based counterparts are extremely low. At present, cost and the lack of a marine fuelling infrastructure appear to be the primary barriers to the more widespread use of this approach. Ships powered by fuel cells are even cleaner. Although this technology is not yet commercially available, it has the potential in the future of powering a clean and efficient fleet of marine vessels.

A further opportunity exists to reduce emissions from ships at berth. Ships at dock operate either their auxiliary or main engines to meet their electrical "hotel" power needs. These hotelling emissions can be substantial, even if they are produced by auxiliary engines running on cleaner distillate fuel (rather than HFO). For many ships, these emissions can be more or less eliminated through the use of shore-side electrical power, often called "cold ironing."

Conclusions

It is concluded that there is no apparent reason for the continued lax regulation of shipping emissions. This is especially true given the availability of feasible and cost-effective means of reducing those emissions. While different engine types and configura-

tions will definitely result in a variety of appropriate control measures being applied, in general, the most promising appear to be:

- For SO₂ reduction, lower sulphur content in fuel, and once water quality issues can be resolved, seawater scrubbing;
- For NO_x reduction, internal engine modifications, water/fuel emulsions, water or water vapour introduced into the combustion process, and SCR;
- For PM reduction, SO₂ reduction measures, as well as advanced diesel oxidation catalysts and particulate filters.

The environmental NGOs expect that a variety of new and efficient control technologies will become available in the future as air pollution from ships becomes an increasingly pressing issue. Experience from other sectors indicates that the tightening of emission limits is likely to spur on and hasten the development of these control technologies.

CHRISTER ÅGREN

¹ **Reducing Shipping Emissions of Air Pollution – Feasible and Cost-effective Options** (2005). Produced by Clean Air Task Force, Bluewater Network, European Environmental Bureau, European Federation for Transport and Environment, North Sea Foundation, Seas at Risk and the Swedish NGO Secretariat on Acid Rain. Available in pdf format at www.acidrain.org.

Climate change and air pollution most worrying

– environmentalist organizations most trusted

FOR EUROPEANS, a healthy environment is as important to their quality of life as the state of the economy and social factors, according to a Eurobarometer survey published in May.

The four outstanding environmental issues that citizens worry most about are water pollution (47 per cent), man-made disasters such as oil spills and industrial accidents (46 per cent), climate change and air pollution (both at 45 per cent).

There are however some significant differences between the former EU-15 and the ten new member states (EU-10). Climate change is the number one issue in the EU-15 but only ranks seventh place in the EU-10. Air pol-

lution on the other hand is the second highest concern in the EU-10 (52 per cent), while the issue scores 43 per cent in the EU-15.

When it comes to sources of environmental information, citizens most trust environmental associations (42 per cent), followed by scientists (32) and television (27 per cent). Compared with the last survey in 2002, confidence in the media has increased significantly. Trust in the EU itself is not too high (12 per cent), although slightly higher than in national governments (11 per cent).

Further information: <http://europa.eu.int/comm/environment/barometer/index.htm>

EU could be totally renewable by 2050

THE 25 EU STATES could phase out both nuclear energy and 98 per cent of fossil fuels by 2050, according to a vision presented by the NGO network Inforse Europe.

Continued growth of renewable energy is important in order to realize this vision. The proposed renewable energy development follows general forecasts published by the European Renewable Energy Council (EREC) for the period until 2020.

A substantial increase in energy efficiency is equally important for the vision. In general it is possible to increase efficiency by a factor of four in most sectors. This fourfold increase in efficiency is expected to be realized in electricity consumption, industrial production and road transport. A smaller increase in efficiency is expected for space heating because of the slower turnover of houses.

The energy efficiency measures proposed are cost-effective today or will become cost-effective if used on a large scale as proposed in the vi-

sion, according to Inforse. The renewable energy technologies will become cost-effective if used on a large scale.

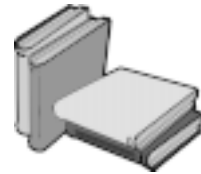
A major economic benefit of the vision is that it will reduce dependency on imported fuels, not least the ever more expensive oil.

Further information: www.inforse.dk/europe/Vision2050.htm

World's first commercial wave farm

A Scottish company, Ocean Power Delivery, plans to build a wave power plant five kilometres off Portugal's northern coast. Initially the plant will comprise three wave power generation units with a capacity of 2.25 megawatts. This form of electricity generation is estimated to reduce emissions of carbon dioxide by 6,000 tonnes per year. The project may be extended if the results are successful.

Source: Planet Ark (Reuters), 23 May 2005.



Recent publications

Clearing the Air

A new newsletter that will report on developments in the Convention on Long-range Transboundary Air Pollution. There will be three to four issues per year. Can be ordered free of charge from the Convention, air.env@unece.org.

Whose Power is IT Anyway – A Report on European Energy Suppliers (2005)

The ten largest power companies are responsible for 60 per cent of all greenhouse gas emissions from the European power sector and 90 per cent of the nuclear waste, according to this report by Greenpeace.

Available in pdf format free of charge from www.greenpeace.org/international/press/reports/WhosePower

Climate change and river flooding in Europe (2005)

Briefing from European Environment Agency. 4 pp. Can be downloaded from the EEA website: http://reports.eea.eu.int/briefing_2005_1/en/briefing_1_2005.pdf

Winning the Oil Endgame (2004)

By Amory Lovins et al. According to this study the United States could effectively end its dependence on oil over the coming decades by developing ultralight vehicles, increasing use of biofuels, and using natural gas far more efficiently.

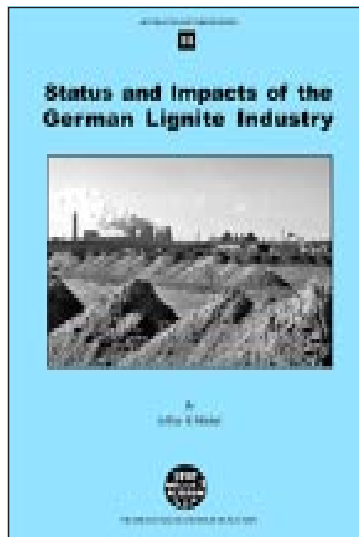
309 pp. \$40.00. ISBN 1-881071-10-3. Available in pdf format free of charge from www.oilendgame.com.

Making Cars More Fuel Efficient. Technology for Real Improvements on the Road (2005)

A joint publication from the International Energy Agency and the European Conference of Ministers of Transport. Studies show that cars use significantly more fuel per kilometre than suggested by official certification test ratings. This publication presents an analysis of the fuel efficiency gap and examines technologies available that could reduce the gap and improve fuel economy.

82 pp. 24.00 euro. ISBN 92-821-0343-9. Order from www.oecdbookshop.org, or from Extenza-Turpin, Stratton Business Park, Pegasus Drive, Biggleswade, Bedfordshire, SG18 8QB, UK.

Status and Impacts of the German Lignite Industry

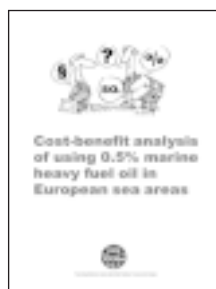


Lignite, or brown coal, is the main domestic fuel resource in Germany. The accessible geological deposits are sufficient for generating more than one-fourth of the country's electrical power over the next two centuries. However, lignite is ultimately a very costly fuel to employ because of factors not reflected in market prices.

This report includes a historical treatment of German lignite use and discusses many of the hidden costs involved: excessive greenhouse gas emissions, depletion of groundwater resources, and destruction of hundreds of villages. Special consideration is paid to eastern Germany, where lignite accounts for up to 85 per cent of electrical power consumption in some regions.

By Jeffrey H. Michel, April 2005.

Other recent publications from the Secretariat



Cost-benefit analysis of using 0.5% marine heavy fuel oil in European sea areas

A lowering of the sulphur content of marine heavy fuel oil to 0.5 per cent would reduce SO₂ emissions from international shipping around Europe by more than three quarters by 2010. The benefits of such a measure clearly outweigh the costs, according to this study. By Christer Ågren, January 2005.



Atmospheric emissions from large point sources in Europe

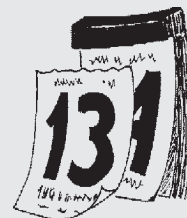
This report identifies and lists the 200 largest emitters of sulphur dioxide and the 200 "best" fossil-fuelled power stations, in terms of SO₂ and NO_x emissions per useful output. By Mark Barrett, SENCO. Published October 2004.



Air and the Environment

Which are the main air pollutants, how they arise, and what they are doing to us and our environment, as well as what can be done to counteract their spread, is described in detail in this book, which also brings out the fact that it will actually pay to cut down the emissions. By Per Elvingson and Christer Ågren, published March 2004.

HOW TO ORDER. Single copies of the above mentioned material can be obtained from the Secretariat (free of charge within Europe). Please call for quotation if more copies are required. Can also be downloaded in pdf format from www.acidrain.org



Coming events

For the latest news and direct links, please visit www.acidrain.org.

Acid Rain 2005. 7th International Conference. Prague, Czech Rep. 12–17 June 2005. *Information:* www.acidrain2005.cz.

European Sustainable Energy Seminar. Brussels, Belgium. 15 June 2005. *Information:* www.inforse.org.

1st International Conference on Harbours and Air Quality. Genova, Italy, 15–17 June 2005. *Information:* www.fisica.unige.it/atmosfera/HAQ.htm

2nd European Solar Thermal Energy Conference. Freiburg, Germany. 21–22 June. *Information:* www.estec2005.org

13th International Conference of the Climate Alliance. Luxembourg, 24–25 May. *Information:* www.climatealliance.org

Environment Council. Luxembourg, 24 June 2005.

Transport, Telecoms and Energy Council. Luxembourg, 27–28 June 2005.

IMO Marine Environment Protection Committee. 53rd session. London, UK. 18–22 July. *Information:* www.imo.org

Towards Carfree Cities V. Budapest, Hungary, 18–21 July 2005. *Information:* www.worldcarfree.net/conference/

Green Power Central & Eastern Europe. Prague, Czech Republic, 7–9 September. *Info:* www.greenpowerconferences.com.

European Mobility Week. 16–22 September. www.mobilityweek-europe.org.

6th Annual Global Conference on Environmental Taxation. Leuven, Belgium, 22–24 September 2005. *Information:* www.kuleuven.ac.be/english/

14th IUAPPA Regional Conference. Istanbul, Turkey, 26–30 September. *Info:* <http://web.deu.edu.tr/tuncap/aqm2005>

14th European Biomass Conference and Exhibition. Paris, France, 17–21 October. *Info:* www.conference-biomass.com.

Bioenergy 2005. Trondheim, Norway, 26–28 October 2005. *Information:* www.bioenergy2005.no

COP 11 and COP/MOP 1. First meeting of the Parties to the Kyoto Protocol and 11th session of the Conference of the Parties to the Climate Convention. Montréal, Canada. 28 November–9 December 2005. *Information:* www.unfccc.int