

Acid News

NO. 3, SEPTEMBER 2005

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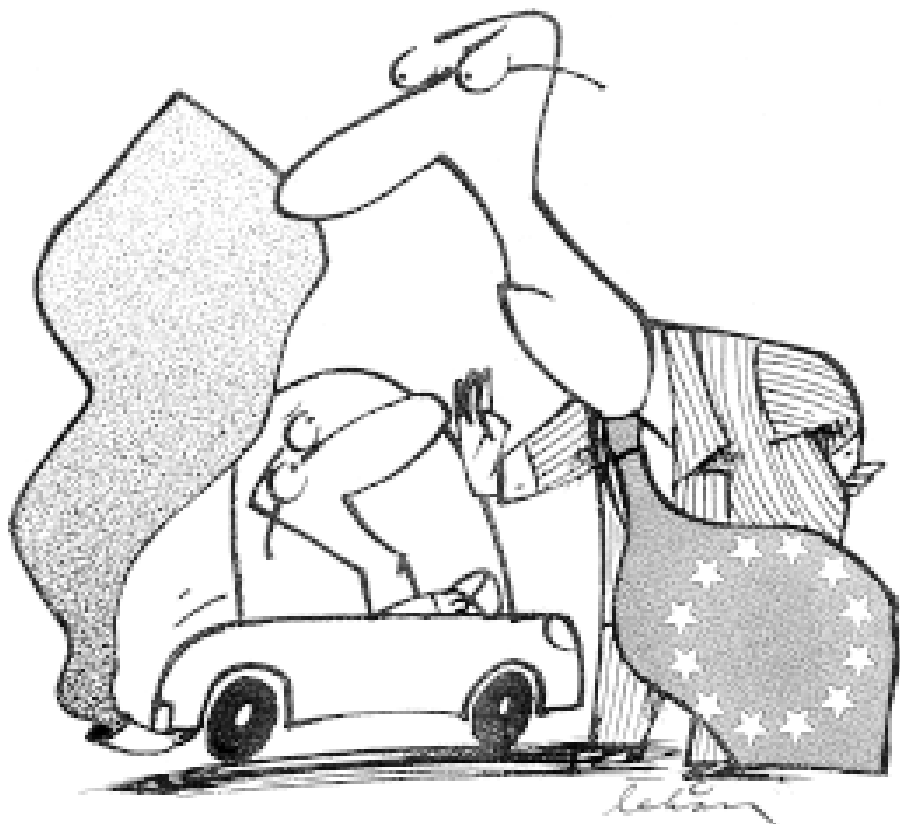
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CAR EMISSIONS

Tougher stance on particulates

SIGNIFICANTLY TIGHTER LIMITS on particulate emissions from diesel cars are the only marked stiffening of EU emission rules for passenger cars in the draft proposal sent out for consultation by the EU Commission at the start of summer. In its draft the Commission also paves the way to supplement existing weight standards for particulates with a new standard to limit the number of particulates new cars can emit.

The current EU emission rules were laid down back in 1998. Despite the improvements in technology made since then, the standards have not been upgraded. As a result it is now possible to build considerably cleaner

cars than the legislation requires.

In autumn the EU Commission is expected to invite member states to negotiations on a new generation of emission rules. In advance of these negotiations a draft proposal was presented in July, and organizations, industry and the public were asked for their feedback by 9 September. The Commission will formulate a final proposal for negotiation with member states on the basis of the feedback received.

The draft proposal entails very limited stiffening of requirements compared with the Euro 4 rules that came into force on 1 January 2005.

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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.

Get on with it!

IN THE EU some 370,000 people die each year from breathing contaminated air. This means that the toll of air pollution, much of which comes from cars and trucks, is more than seven times greater than the number of deaths from road accidents.

More than 90 per cent – nearly 350,000 – of these premature deaths are caused by fine particulates (PM), the remaining 21,000 by ground-level ozone. To these should be added a large number of morbidity effects that affect a much greater number of people.

For example, the current levels of PM are estimated to be responsible for around 100,000 cases of respiratory or cardiac hospital admissions, 30 million respiratory medication use days and several hundred million restricted activity days each year.

Expressed differently, particulates alone is shortening the life of an “average” EU citizen by more than eight months. Because air pollution levels vary, this figure varies between countries.

Lost life expectancy is worst in Belgium, where on average people lose 13.2 months of life, and the Netherlands, at 11.8 months. Other countries with high figures are Hungary (10.6), Poland (9.6), Germany (9.2) and Italy (9.0). The Finns are the least affected, losing 2.6 months on average, followed by the Swedes at 3.5 months.

The figures above come from studies prepared under the European Commission's Clean Air For Europe (CAFE) programme. The outcome of this four-year programme provides the backbone for the thematic strategy on air pollution, which was scheduled for adoption by the Commission before the summer, but is now expected by September (see p. 5).

The CAFE programme has produced some alarming figures – not only regarding health impacts, but also the environmental damage caused by air pollution. It has also clearly demonstrated that the benefits of taking additional action to further reduce air pollutant emissions by far outweigh the costs.

A recent Eurobarometer survey showed that the EU citizens rank air pollution among the most important environmental concerns. Moreover, the majority of people responding to the Commission's internet consultation for the thematic strategy on air pollution wanted a very high level of ambition for air quality. More than two-thirds considered one should spend substantial funds to increase life expectancy and even more (84 per cent) thought substantial funds should be spent to reduce risks to the environment.

Against this background it is impossible to understand the motives of those individuals in the European Commission who attempted to block the air pollution strategy in summer. After all, the evidence clearly suggests that the EU's credibility, and hence support from EU citizens, would be boosted by a farsighted environmental policy.

In the case of air pollutants the goal must be to achieve as quickly as possible the long-term objectives laid down in the Sixth Environmental Action Programme (6EAP). For 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 in the 6EAP 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.

It is clear that the existing legislation is totally inadequate to meet these objectives. In spite of reductions in emissions, in 2020 air pollution is expected to cause 292,000 premature deaths.

An ambitious, target-oriented strategy on air pollution is therefore an essential first step towards attaining the EU's objectives for protecting health and the environment.

CHRISTER ÅGREN



A few sport utility vehicles (SUVs) in the European market weigh more than 2,500 kg, and under the proposal will have to meet emission requirements for cars instead of the weaker standards for light commercial vehicles. The photo shows a Volkswagen Touareg.

Continued from front page

The most significant change is to particulates from diesel cars, for which the emission standard is reduced from 25 to 5 mg/km. In practice this means that all new diesel cars will have to be fitted with particulate filters.

The figure of 5 mg/km is the same given in the recommendation for tax incentives for particulate filters that the Commission issued in January this year (see AN 1/05). The Commission commented at the time that this level should not be seen as a way of forestalling review of the obligatory emission rules. But now it has chosen to propose the same level, even though it would have been perfectly viable in technical terms to insist on 2 mg/km or lower.

In the debate preceding the negotiations, several stakeholders, including the German environment agency Umweltbundesamt, have demanded that future emission standards should be technology neutral, in other words the same standards should apply regardless of engine type or fuel. The Commission has made a small concession to these demands by introducing the same particulate standards for diesel cars as for direct injection petrol cars.

In all essential respects, however, the differences

between diesel and petrol cars will remain, and all emission requirements will be stiffened by 20–25 per cent. Diesel cars will still be allowed to emit around three times the level of NO_x as petrol cars.

One apparently marginal change that could nevertheless be very significant in the long term is that the

*The differences between
diesel and petrol cars
will remain*

Commission wants the right to introduce its own new particulate standard based on the number of particulates emitted, as soon as technical methods are reliable enough.

The present standards are based on particulate weight, which means they place most emphasis on the

largest and heaviest particulates. But when it comes to health effects there are many indications that other factors, such as the number of particulates or their shape and chemical composition, are at least as important. The Commission wants to take advantage of the progress that is being made in this area as soon as it can and therefore wants the Council and the Parliament to allow it to introduce its own standard based on numbers of particulates.

The proposal also contains some minor adjustments to the existing regulations. At present very heavy passenger cars (over 2,500 kg) are equated with light commercial vehicles, which means that the emission requirements are milder for the very heaviest passenger cars than for lighter cars. The Commission wants to remove this inconsistency. It also wants to extend manufacturer's durability guarantee period for emission control devices from 80,000 to 160,000 km.

Compared with current US legislation (Tier 2) the draft proposal for new EU standards falls well behind in terms of NO_x emissions from diesel cars, with 200 mg/km compared with around 44 mg/km (70 mg/mile) in the US. The Commission has acknowledged that the NO_x cuts in diesel emissions are lower than those in the US, and that it is already possible to reduce them further, but has insisted the technology to do so "is not yet mature".

T&E, the European Federation for Transport and Environment, is critical of the Commission's proposal. It is calling for the limit for particulates to be set at 2.5 rather than 5 mg/km, and for a ceiling of 75 mg/km to be set for NO_x emissions from diesel cars.

New EU standards for light commercial vehicles are expected to come into force in 2008 at the earliest. The proposed new standards for heavy vehicles (Euro VI) that were to be presented in autumn will probably not appear until next year.

MAGNUS NILSSON

Further information: http://europa.eu.int/comm/enterprise/automotive/pagesbackground/pollutant_emission/

See also "SCR for diesel cars", next page!

A comparison of emission standards for passenger cars effective from 1 January 2005 (Euro 4) and the Commission's proposed new standards. (mg/km)

	Petrol-driven cars		Diesel-driven cars	
	Euro 4	Proposal	Euro 4	Proposal
Hydrocarbons (HC)	100	75	(50)	(50)
Nitrogen oxides (NO _x)	80	60	250	200
HC + NO _x	-	-	300	250
Particulates (PM)	-	5 ¹	25	5
Carbon monoxide	1000	1000	500	500

¹ Applicable only to "lean-burn direct injection engines".

Further reductions possible

SOME OF THE KEY ELEMENTS for a forthcoming review¹ of the directive on emissions of air pollutants from large combustion plants (LCPs) have recently been investigated for the European Commission by the UK consultancy Entec².

According to national emission inventories, current emissions of sulphur dioxide (SO₂) from LCPs in the EU15 amount to some 3.6 million tonnes, which equals two-thirds of the total land-based SO₂ emissions. Emissions of nitrogen oxides (NO_x) from LCPs are approximately 1.5 million tonnes, about 16 per cent of the total. For both SO₂ and NO_x, most of the emissions – more than 70 per cent – come from the largest plants, i.e. those with a thermal capacity above 500 MW.

The report shows that many countries have imposed tougher emission limit values than required under the directive for “existing” plants (i.e. those built before 1987), and some countries have also set stricter limits for new plants.

On the feasibility of requiring further emission reductions from LCPs – beyond what is expected to result from the current directive – Entec says technologies such as after treatment offer the possibility of bringing emissions of NO_x and particulates (PM) below the levels required by the directive. Further cuts in SO₂ emissions could also be made, but at a relatively higher cost.

Moreover, it is emphasized that cost-effectiveness analyses should not only focus on single-pollutant cost curves, but should also take into



PHOTO: BERNE LUNDKVIST/SYDOKRAFT

account additional benefits resulting from the potential abatement of other pollutants. This could be a significant issue for some types of abatement measures for SO₂, PM and mercury.

In addition to the areas already expected to be reviewed, Entec carried out a “screening level analysis” of the feasibility and desirability of using market-based instruments to cut emissions of SO₂ and NO_x in the LCP sector. It concluded that a hybrid trading/tax scheme could be more efficient than a tax or tradable permit scheme alone. Such a scheme must however be carefully designed to have a tax rate that sets an upper limit to the permit price and a subsidy that sets a lower limit.

The Entec report provides only one of several inputs that will influence

the already delayed LCP directive review. Others include the thematic strategy on air pollution (CAFE), expected from the Commission in September, and a forthcoming study into the feasibility of streamlining EU industrial emissions policies.

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¹ Article 4.7 of the LCP directive (2001/80/EC) requests the Commission to submit, before 31 December 2004, a report to the European Parliament and the Council in which it shall assess among others the need for, and the technical and economical feasibility of, further emission reduction measures.

² **Preparation of the review relating to the large combustion plant directive.** Final report, July 2005. By Entec UK Limited. Available at http://europa.eu.int/comm/environment/air/pdf/final_report_05225.pdf and appendices: http://europa.eu.int/comm/environment/air/pdf/final_report_05app.pdf.

SCR for diesel cars

The decision by the car maker Daimler Chrysler to do field trials of Selective Catalytic Reduction (SCR) looks set to be a breakthrough in the battle to reduce nitrogen oxide emissions from diesel cars.

SCR, which reduces NO_x while leaving fuel consumption largely unchanged, has in recent years been developed for heavy vehicles, but the automotive industry has

always said SCR is a long way away for cars.

Daimler Chrysler now says it is field-testing diesel cars which reduce emissions of NO_x by 80 per cent while at the same time allowing the engine to be optimized for fuel economy and particulate emissions.

“Daimler Chrysler has broken the industry front,” said Jos Dings, director of the European Federation for Transport

and Environment (T&E). “It could be that Daimler is looking to prepare its diesel engines for the stricter emissions standards that apply to the US market. If that is right, we could have a repeat of the situation in the 1980s, when EU car makers argued that three-way catalytic converters were not feasible while they were in widespread use in America.”

Source: **T&E Bulletin** (www.t-e.eu), June 2005.

EU Commission battle over environment

The thematic strategy on air pollution was suspended at the last minute after complaints by industry interests.

THE FUTURE OF EU environment policies was the focus of a special debate of the full European Commission on 20 July. Officially, the session was set up to inform the Commission about the seven thematic strategies¹ of the Sixth Environment Action Programme, but in reality it reflected an internal power struggle between environmental and business interests.

Two of the seven strategies – those on air pollution and the marine environment – were due to be adopted before the summer break. In early June, UNICE, the Union of Industrial and Employers' Confederations of Europe, sent a letter to the Commission's president José Manuel Barroso expressing "deep concerns of European industries regarding the ambition levels" of the draft air pollution strategy.

In a quick response, the European Environmental Bureau (EEB) urged Barroso not to be "intimidated by a stakeholder whose strategy it is constantly to exaggerate perceived negative impacts in order to reduce as much as possible obligations on the business sector."

Later that month, president Barroso ordered the suspension of the air pollution strategy, which had previously been scheduled for adoption by the Commission on 23 July, and instead set up an "orientation debate" on 20 July for the Commission to agree the direction of the EU's environmental policy. Additionally, in early July, Barroso ordered postponement of a separate communication on aviation and the environment, and the Commission also delayed the adoption of new EU passenger car emission standards.

According to a policy paper presented by Stavros Dimas, commissioner for the environment, on 20 July, the seven strategies respond to real long-term environmental chal-

lenges on which action is needed now. It argues that all measures proposed are designed to achieve environmental objectives in the most cost-effective way, and in a manner that promotes economic growth and jobs to the greatest extent possible.

Dimas also stated that the costs of non-action would be higher in the long run. While the costs for the air pollution strategy for example could be as high as 12 billion euro in 2020 in the worst-case scenario, taking action now could lead to annual health benefits of at least 46 billion euro.

After debating the issue, the Commission agreed to move forward to present the seven strategies between September and December. The air pollution strategy is likely to be the first one out, with adoption due by late September.

Secretary General of the EEB, John Hontelez commented: "While we welcome the decision to move on with these strategies, we have serious concerns about the expected content of several of them. We know that the ambition level is not high in many cases, and the current pressure to not come with any proposal that business considers to be bad for competitiveness is not helping."

CHRISTER ÅGREN

¹ The seven thematic strategies cover: air pollution; marine environment; pesticide use; urban environment; sustainable use of resources; waste prevention and recycling; and soil management. The Sixth Environment Action Programme was adopted by the Council and the Parliament on 22 July 2002, and the seven strategies were to be adopted within three years of that date.

Further reading: The letters from UNICE and EEB are available at www.unice.org and www.eeb.org. Policy scenarios for the thematic strategy on air pollution were described in *Acid News* 2/05, pp. 8-9. See also editorial comment, page 2 in this issue.

All NAPs approved

On 20 June the Commission approved the Greek national allocation plan (NAP), the last of 25 approved plans for the allocation of emission rights under the EU's trading system (ETS) for carbon dioxide. There are now more than 11,400 installations participating in the system under a carbon dioxide ceiling of 2.2 billion tonnes per year for 2005-7.

The countries have to deliver new allocation plans for the period 2008-12 to the Commission by June next year, plans which must allow considerably fewer emission rights than at present if the EU is to meet its climate target. Roughly half the emissions of carbon dioxide in the EU are covered by the trading system.

A Commission review of the ETS legislation is also due by June 2006. This is primarily expected to describe suggested changes for the period after 2012.

Further information: European Commission, <http://europa.eu.int/comm/environment/climat/emission.htm>. See also CAN-Europe position paper on the NAPs for phase 2 (2008-12), June 2005, available at www.climnet.org/EUenergy/ET.html

CO₂ charge instead of registration taxes

Vehicle registration taxes in the member states could be abolished and replaced with a harmonized EU tax based on a vehicle's carbon dioxide emissions.

This proposal, put forward by the Commission, is intended to simplify car taxation so that people who move cross borders do not have to pay twice, as well as offering incentives for more fuel-efficient cars.

The idea of linking car taxes to emissions is welcomed by the European Federation for Transport and Environment (T&E), but the organization is sceptical towards linking CO₂ emissions to an abolition of vehicle registration taxes.

"Member states should retain the right to impose registration taxes – they too should be linked to CO₂ emissions, and set at levels that genuinely encourage consumers to buy cleaner cars," said T&E director Jos Dings.

Sixteen of the EU's 25 member states levy a registration tax, varying from a nominal amount to a high levy in Denmark, while nine countries have no registration tax. The chances of approval of the proposal are not good, as finance ministers traditionally oppose tax proposals at EU level.

Further reading: T&E Bulletin, June 2005. Proposal for a Council directive on passenger car related taxes. COM(2005)261 final.

Stricter standards to be studied

In July the United Nations body that regulates shipping across the world agreed to review and potentially tighten air pollution standards for the world's shipping fleet.

AT ITS MEETING IN JULY the Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) agreed to initiate a process to revise international standards for emissions of sulphur and nitrogen oxides from shipping and to consider regulating emissions of particulates as well as volatile organic compounds emitted from cargoes. Limits on existing engines will also be considered.

The MEPC's commitment to revise MARPOL Annex VI was supported by environmental NGOs as well as many nations, including Finland, Germany, Italy, Netherlands, Norway, Spain, Sweden, United Kingdom, United States, Canada, Mexico, Japan, Korea, China and South Africa. Only a few nations opposed revision, including Russia, India, Saudi Arabia and Argentina.

The forthcoming review of Annex VI is to be carried out by the Sub-committee on Bulk Liquids and Gases (BLG), and should be ready by 2007.

The MEPC's action came after a group of seven European nations of-

ficially proposed the commencement of a process to consider stronger air pollution standards.

A coalition of environmental NGOs had also submitted to the MEPC a technical background paper, which demonstrated that shipping emis-

"The current IMO regulations were outdated before they became effective"

sions are significant and growing; occur mostly near shore areas where they contribute to disease, death and ecosystem damage; and can be substantially reduced through existing feasible, cost-effective emissions control measures (see AN 2/05, p. 20).

"Shipping emissions represent one of the last major air pollution sectors on the planet that remain virtually unregulated, and it's time for these emissions to be cleaned up," noted David Marshall, Senior Counsel for the Clean Air Task Force.

"Ships burn much dirtier fuel and emit air pollutants at much higher rates than land-based diesel engines. The current IMO regulations were adopted in 1997, but were outdated before they became effective and are woefully inadequate."

At the same session, the MEPC adopted the North Sea as a new SO_x Emission Control Area (SECA), which means that the maximum allowed sulphur content will be 1.5 per cent for marine fuels used by ships in this sea area.

The date of implementation is not yet final, but is expected to be 21 November 2007. (The only other SECA established so far is the Baltic Sea, in which the 1.5-per-cent sulphur limit will become mandatory as from 19 May 2006.)

New data from monitoring of the worldwide sulphur content in marine fuel oils, presented to the MEPC, revealed that the latest three-year rolling average (2002–2004) was 2.67 per cent.

CHRISTER ÅGREN

NGO recommendations for IMO environmental action

As the MEPC convened in London on 18–22 July, environmental NGOs released the first-ever Environmental Report Card on the IMO, giving it failing grades on air pollution, human health and climate change.

In a letter addressed to the IMO's Secretary General as well as to the member states' delegations, a coalition of environmental NGOs put forward a series of recommendations for action. As regards air pollution, these included to:

- Promptly amend Annex VI to adopt an international marine fuels standard that caps sulphur at 1.5 per cent sulphur content at sea and 0.2 per cent sulphur or less while in ports and coastal waters out to 200 miles.
- Promptly adopt a second tier of NO_x emission limits for new marine diesel engine standards that are 90 per cent more stringent than Annex VI standards.
- Promptly adopt particulate matter (PM) emission limits for new marine diesel engine standards that will reduce PM emissions by 50 to 90 per cent.

- Promptly adopt NO_x, SO₂, and PM emission standards for existing marine engines that reflect the application of best available retrofit control technology.
- Promptly set new standards for additional criteria for air pollutants not currently covered in Annex VI including PM, hydrocarbons, airborne toxins and carbon monoxide emissions.
- Promptly set an international voltage and infrastructure standard for ship and port electrification so that all new vessels and port terminals are equipped for shoreside power.
- Prohibit all onboard incineration within 200 miles of land, and strictly limit materials that can be incinerated. End burning of oily sludge, require proper on-shore disposal.
- Conduct a feasibility study on the availability and cost of alternative fuels and propulsion systems including biofuels, natural gas, and wind and sail configurations.

A complete version of the letter and the Environmental Report Card presented by the organisations at the MEPC meeting in London, can be downloaded from www.bluewaternet.org

Marine sulphur directive in force

The directive on sulphur in marine fuel entered into force in August, after having been published in the Official Journal.¹ Its first provisions, including the 1.5-per-cent fuel sulphur limit for the Baltic Sea and passenger vessels, will apply from 11 August 2006.

Its full name is Directive 2005/33 of the European Parliament and Council amending Directive 1999/32 as regards the sulphur content of marine fuel.

¹ Official Journal of the European Union. L 191/59, 22 July 2005. See also Acid News 2/05.

Slow start for biofuels directive

Progress is slow on implementation of the EU directive on biofuels that was adopted in 2003. The directive calls for a two-per-cent reference goal by 2005 and states had to explain if their targets were different.

Despite letters of formal notice sent in February, by the start of July eight countries had still not informed the Commission of the measures they have taken to transpose the directive into national law. For five countries, reports on national targets were missing or regarded as incomplete. The Commission also rejected very low targets submitted by seven states, saying they did not comply with EU rules.

Source: Press release from the Commission, 6 July. Member states' national reports under the biofuels directive are available on http://europa.eu.int/comm/energy/res/legislation/biofuels_en.htm

Mercury export ban

At its meeting in June the EU Environment Council gave support to the mercury strategy that was presented by the Commission in February (see AN 1/05, p. 22).

Ministers said exports of the heavy metal should be phased out "as soon as possible, and by 2011 at the latest." The council said it was also "essential...to develop viable techniques" to further reduce mercury emissions from fuel combustion, but did not specifically call for limits on emissions from this source.

The strategy, which will now be transposed into concrete legal bills (directives) by the EU Commission, presents around 20 measures for reducing the threat of mercury in Europe and the world in general.

NEW STUDY

Monitoring of ships' emissions feasible

THE LEVEL OF EMISSIONS of sulphur dioxide (SO₂) and nitrogen oxides (NO_x) from individual ships could feasibly be monitored, according to a new consultancy report¹. This means that reductions in such emissions from ships, as a result of abatement techniques or cleaner fuels for example, could also be monitored and verified.

In 2002, shipping and oil industry interests put forward ideas for EU-wide trading schemes involving sea-based emissions of NO_x and SO₂ (see AN 4/02, pp. 8–9). The environment directorate of the European Commission said it was interested in using economic instruments in general, but raised practical concerns. An overview of the potential of using such instruments in the shipping sector was published in 2004 (AN 1/04, pp. 6–7).

The final report of the so-called Demo Project, produced by consultancy PriceWaterhouseCoopers, sets out to answer these practical concerns. Its authors claim that there

is potential for emission trading schemes involving ships to be cost-efficient, and that they could lead to substantial emission reductions. The report does not however include any complete cost estimates for monitoring or for verification activities.

Last year the environment directorate commissioned another consultancy study on economic instruments to cut air pollution from shipping, which is expected to be published this autumn.

Emissions of air pollutants from ships are an increasing source of concern. According to projections under the EU's CAFE programme, by 2020 the emissions of SO₂ and NO_x from international shipping around Europe will have surpassed the total from all land-based sources in the 25 member states combined.

CHRISTER ÅGREN

¹ **Demo Project. Final report.** (April 2005). By PriceWaterhouseCoopers. Available at www.demoproject.org.



Increased power production drives EU emissions up in 2003

EMISSIONS OF greenhouse gases in the EU15 rose by 1.3 percentage points in 2003, according to a report from the European Environment Agency.¹ This means there has been a continuous rise since 2000, and in 2003 emissions were only 1.7 per cent lower than in the base year (which is usually 1990). In order to fulfil its commitment under the Kyoto Protocol average emissions in the EU15 over the five years 2008–12 must be eight per cent below the base-year level.

In absolute figures, emissions increased between 2002 and 2003 by 53 million CO₂ equivalent tonnes. The EEA identified higher coal burning as the main driver for the rise. In the EU15, energy industries emitted an extra 24 million CO₂ equivalent tonnes. Households and services emitted 18 million tonnes more, partly because of cold weather in the first quarter, and industry an extra 17 million tonnes. Transport emissions rose by a comparatively modest 6 million tonnes.

Emissions of the main greenhouse gas, carbon dioxide, have steadily risen since 1992 and were 3.4 per cent above the base-year level in 2003. The only noteworthy reductions in emissions of carbon dioxide to date happened as a consequence of the economic breakdown in Eastern Germany after the reunification and the fuel switch from coal to gas in the United Kingdom in the 1990s.

Between 2002 and 2003, Italy, Finland and the UK saw the largest emission increases in absolute terms: 15, 8 and 7 million tonnes respectively.

Only two of the fifteen countries reported lower emissions compared with the year before: Portugal with -5.3 per cent, and Ireland with -2.6 per cent. In Portugal a sharp increase in hydropower production was one of the main reasons. In Ireland, the decline is the result of a number of factors.

In the EU15, emission levels now range from 41 per cent above the 1990 baseline (Spain) to nearly 19 per

cent below (Germany). See table.

The commissioner for the environment, Stavros Dimas, commented that the new figures were “disappointing”, but also pointed out that several major initiatives, including the EU Emission Trading Scheme, were not yet in place in 2003. He remains confident that the EU will achieve its Kyoto targets once these kick in fully.

In addition, some member states are starting to take advantage of other options for reducing emissions that are available under the Kyoto Protocol. These options allow countries to achieve part of their targets by investing in emissions-saving projects in other countries that have ratified the Kyoto Protocol, or by undertaking projects that sequester CO₂ in forests or agricultural land.

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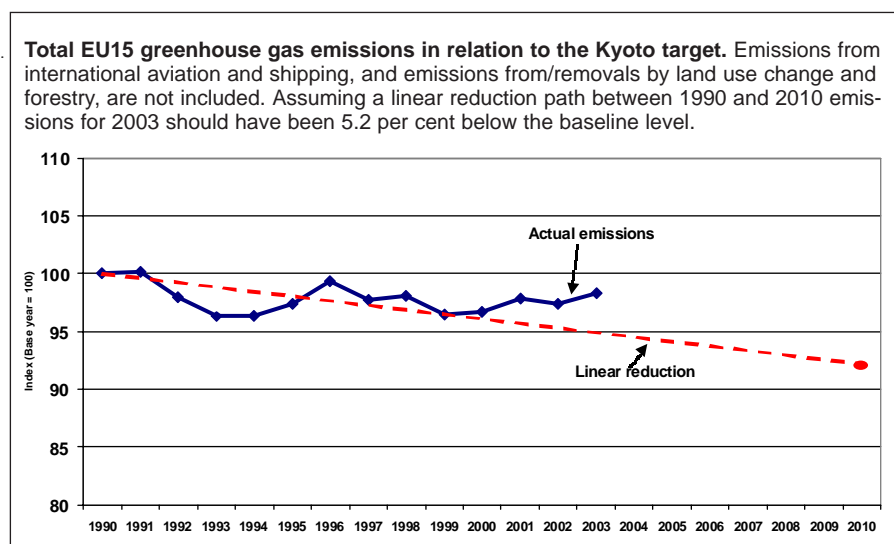
¹ **Annual European Community greenhouse gas inventory 1990–2003 and inventory report 2005.** Available at http://reports.eea.eu.int/technical_report_2005_4/en.

Note. Because the EU’s collective undertaking in the Kyoto Protocol only applies to the Union’s 15 pre-2004 members, only emissions from these countries are dealt with here. Of the ten new member states, all except Malta and Cyprus have their own climate targets, which they look set to meet easily, with the exception of Slovenia.

Greenhouse gas emissions trends and Kyoto Protocol targets for 2008–2012.

Country	Base year (million tonnes)	Target: base year to 2008/12	Change: base year to 2003
Austria	78	-13.0%	+16.6%
Belgium	147	-7.5%	+0.6%
Denmark	70	-21.0%	+6.3%
Finland	70	0.0%	+21.5%
France	568	0.0%	-1.9%
Germany	1248	-21.0%	-18.5%
Greece	112	+25.0%	+23.2%
Ireland	54	+13.0%	+25.2%
Italy	510	-6.5%	+11.6%
Luxembourg	13	-28.0%	-11.5%
Netherlands	213	-6.0%	+0.8%
Portugal	59	27.0%	36.7%
Spain	286	15.0%	40.6%
Sweden	72	4.0%	-2.4%
UK	751	-12.5%	-13.3%
EU15		-8.0%	-1.7%
Cyprus	6	NA	+52.8%
Czech Rep.	192	-8.0%	-24.3%
Estonia	44	-8.0%	-50.8%
Hungary	122	-6.0%	-31.9%
Latvia	25	-8.0%	-58.5%
Lithuania	51	-8.0%	-66.2%
Malta	2	NA	+29.1%
Poland	565	-6.0%	-32.1%
Slovakia	72	-8.0%	-28.2%
Slovenia	20	-8.0%	-1.9%

Note: Malta and Poland did not provide GHG emission estimates for 2003, therefore the data provided in this table is based on interpolation. Malta and Cyprus do not have Kyoto Protocol targets.





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Initiative for sustainable construction

The Swedish and British governments have launched a joint initiative promising to highlight and share best practices in sustainable construction and to “provide leadership across the EU”.

The initiative stems from a letter written by the Prime Ministers of the two countries to the European Commission in 2003. The PMs stressed the importance of environmental technology in breaking the link between economic growth and environmental degradation, and highlighted the need to “actively exchange information and best practice between member states on building design and energy efficiency”.

Information: www.ukswedensustainability.org

CLIMATE CHANGE

Low-emission future within reach

The EU can reduce emissions of greenhouse gases substantially at a very low cost.

BY COMBINING domestic measures with emission trading it is possible to reduce emissions of greenhouse gases in the EU25 member states by 40 per cent between 1990 and 2030, according to new calculations by the European Environment Agency.

The starting point for the EEA’s calculations was that atmospheric levels of greenhouse gases should be stabilized at 550 ppm carbon dioxide equivalents (CO₂ eq.). This could be

achieved, according to the EEA, if global emissions fall 15 per cent between 1990 and 2050. (However, to have a reasonable degree of certainty of meeting the EU’s political target for a maximum 2°C temperature rise above the pre-industrial level, global emissions must fall 50 per cent by 2050 – see box below.)

To determine the EU’s share in a global reduction of 15 per cent the EEA has analyzed various models for

the distribution of future emissions, and found that emissions in the EU should be reduced 20 per cent below the 1990 level by 2020, 40 per cent below by 2030 and 65 per cent by 2050.

In the global, cost-effective approach used for the report, total global mitigation costs are minimized. This approach has been used to calculate the amount of expected “domestic action” in various global regions.

According to the EEA calculation model it will be cost-effective for the EU to use independent measures to achieve 50–70 per cent of the gap between the baseline projection for 2030 and the target of 40 per cent reduction for the same year.

The remaining reductions would be achieved by international emission trading abroad in an effective global emission trading market. For 2050 the expected domestic emission reduction is 61 per cent compared with 1990 levels. This represents 95 per cent of the assumed target of a 65 per cent reduction for 2050.

In the central climate action scenario the total domestic emissions

EEA working on too optimistic assumption

When the EEA began work on the analysis described in this article it assumed that stabilization of the level of greenhouse gases in the atmosphere at 550 ppm carbon dioxide equivalents would be sufficient to meet the EU’s long-term target of a maximum temperature rise of 2°C. This should be achievable if global emissions are restricted to an increase of 35 per cent above the 1990 level by 2020 and then decrease to 15 per cent below the 1990 level by 2050.

However, to reduce the risk of overshooting the 2°C target, recent scientific data has indicated that it may be necessary to reduce global emissions by 50 per cent by 2050. To achieve this, EU emissions must be reduced considerably more than the 65 per cent level by 2050 that the EEA had counted on.

The range mentioned by the EU Environment Council of March 2005 is a reduction in developed countries in the order of 15–30 per cent by 2020 and 60–80 per cent by 2050. For global emissions the ministers of the environment specified a decrease to 15–50 per cent below the 1990 level by 2050.

Decrease in emissions too slow

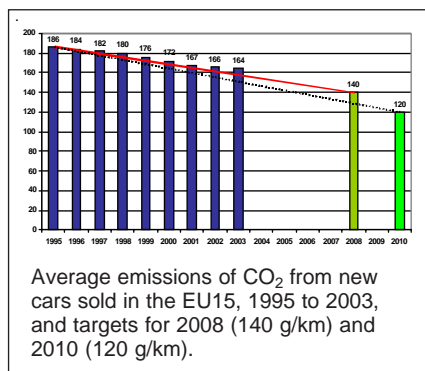
EMISSIONS OF CARBON DIOXIDE from new cars sold in the EU15 are falling, but not at the rate needed for the automotive industry to fulfil its undertaking. This is shown by the annual evaluation by the Commission that was presented in June.¹

Responding to threats of legislation, trade organizations representing the automotive industry promised, in an agreement with the Commission in 1998, to reduce emissions of carbon dioxide from new cars sold in the EU from 186 g/km in 1995 to a maximum of 140 g/km by 2008, a reduction of 25 per cent (Korean manufacturers were given an extension until 2009).

By 2003 the average level was 164 g/km, a reduction of almost 12 per cent since 1995 and an improvement of 1.2 per cent over the previous year. However, the rate of reduction will need to be doubled or trebled in order to reach the target by 2008/09.

Negotiations are due to start later this year on moving beyond the 140 g/km target to the EU's political goal of 120 g/km. In its own reviews the automotive industry has stated that a new interim target of 120 g/km by 2012 cannot be achieved cost-effectively. The Commission intends to carry out its own assessment and will present a proposal to Council and Parliament in the second half of 2005.

¹ Implementing the Community Strategy to Reduce CO₂ Emissions from Cars: Fifth annual Communication on the effectiveness of the strategy. COM(2005)269 final. Available at http://europa.eu.int/comm/environment/co2/co2_home.htm. See also AN 1/05, p.10.



Continued from previous page

of greenhouse gases in the EU25 fall gradually over the coming decades, so that by 2030 they are more than 16 per cent lower than in 1990. With a stronger commitment to renewable energy this reduction could rise to 25 per cent.

The EEA report underlines that an energy system in line with the climate action scenario is within reach if the EU:

- Improves energy efficiency, particularly in households, services and industry. These are expected to account for almost half of the emission reduction in 2010. Towards 2030 their contribution will decrease to about one third. With higher energy prices, further energy efficiency measures are more profitable, however.
- Changes the way it generates energy. Towards 2030 more than 70 per cent of the CO₂ emissions reductions are expected to be achieved in the power generation sector due to a shift to low-carbon or non-carbon fuels. The use of solid fuels is expected to decline substantially and of natural gas to increase rapidly. Combined heat and power will increase its share of electricity production.
- Removes environmentally harmful subsidies to fossil fuels. Subsidies to energy in the EU15 were 29 billion euro in 2001, with 73 per cent oriented towards the support of fossil fuels.
- Invests instead in renewable energy sources and sets targets for renewables. In particular wind power and biomass use are expected to increase their share in primary energy sources.
- Explores new technologies for carbon capture and storage, which can serve as a transition technology towards a low-carbon energy system.
- Increases research and development in clean technology, for example in hydrogen fuel cells.
- Raises awareness among the public, as well as business, of the contribution they can make in their lives to reduce the energy intensity of the economy.

Under all scenarios explored by the EEA, the transport sector still remains a difficult area in which to reduce emissions. Emissions of carbon dioxide from transport are projected to continue to grow under all scenarios (to 25–28 per cent above the 1990 level by 2030) because of the steady increase in passenger and freight demand.

The EEA also explored the costs involved in converting Europe to a low-carbon energy system. Many early initiatives in energy efficiency in the household and service sectors may have low or even negative costs. But significant moves away from fossil fuels could represent an increased cost, compared with the baseline, of about 100 billion euro in 2030. This corresponds, in 2030, to 0.6 per cent of EU GDP, which is projected to double between 2000 and 2030.

The additional energy bill for European households by 2030, compared with the baseline, is projected to be relatively small, about 110–120 euro per household per year. This should be compared with an increase in the energy bill, in the baseline scenario, of 1,900 euro per household per year in the EU15 and 3,400 euro in the EU10 in 2030, compared with 2000. An alternative scenario involving a stronger commitment to renewable energy, which leads to substantial additional CO₂ emission reductions, could increase the energy bill by another 10–20 euro per household per year by 2030.

The EEA believes that there is increased evidence that the benefits of limiting global temperature increase to 2°C in terms of avoiding damage from climate change throughout the world, outweigh the costs of measures to reduce emissions.

Furthermore a European low-carbon energy system is expected to result in additional ancillary benefits, such as a reduction in emissions of air pollutants, enhanced security of supply, and potential beneficial effects on employment. The EEA considers that there is a need for further analysis of the macro-economic and sectoral costs, as well as the costs of inaction.

PER ELVINGSON

Source: *Climate change and a European low-carbon energy system*. EEA Report No 1/2005. Available in pdf format at http://reports.eea.eu.int/eea_report_2005_1/en

Energy Efficiency: Policies and Measures

New interactive website by the International Energy Agency, IEA. A worldwide compilation of recent government actions to improve energy efficiency in IEA member countries.

Website: www.iea.org/textbase/effi/index.asp



Environmental
Fact sheet No. 18
September 2005

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Targets, strategies and legislation

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The Kyoto Protocol

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

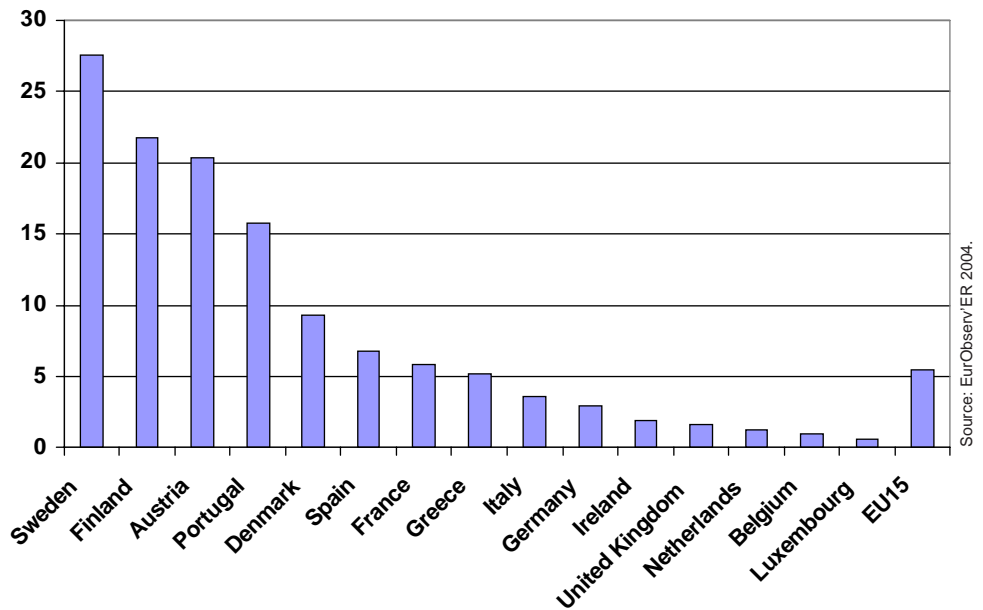
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CLIMATE CHANGE

Figure 1. The proportion of renewable energy in relation to total energy supply 2003. The EU target for 2010 is 12 per cent.



Source: EurObserv'ER 2004.

Renewable energy in the European Union

Around 20 per cent of our global energy supply comes from renewable sources. In the EU the proportion is six per cent.

From the environmental viewpoint there is no intrinsic value in increasing the supply of renewable energy; the important thing is to phase out the use of fossil energy. It should be stressed that the cleanest, and in many cases cheapest, type of energy is energy that is never used. Efforts to save electricity – or “negawatts” – must therefore go hand in hand with measures to increase our use of renewable energy if we are to reach the goal of an energy system that is sustainable in the long term.

Even at today's costs it is economically beneficial to society to increase the use of renewable energy. The most important benefits are shown in the box on the next page.

The situation today

Although the amount of renewable energy used today is relatively small it has significant potential. It is perfectly possible to meet global energy demand with renewable energy, despite the growing population and rising standard of living. The earth's surface receives an amount of solar energy that is nearly 10,000 times bigger than the world's total primary energy supply.

The use of renewable energy varies widely between the EU member states. Of the fifteen countries that were members before 2004 (EU15), the United Kingdom and Belgium are in bottom place with a renewable share of just a few per cent, while Austria, Finland and Sweden come top with shares of around 20–30 per cent (see figure 1).

The types of energy that account for the lion's share of renewables in the EU are biomass (more than 90 per cent of renewable heating) and hydro (85 per cent of renewable power generation). Windpower and solar heating are nevertheless starting to make substantial contributions.

Political framework

There are three concrete targets for the proportion of renewable energy used in the EU:

1. Double the share of renewable energy in national gross energy consumption from six per cent in 1995 to 12 per cent in 2010. This was set out in the Commission's white paper on renewable energy (COM(97)599 Final), which was presented in 1997. The target has since been confirmed by the Council of Ministers on several occasions.
2. Increase the share of green electricity in total electricity consumption from 14 per cent in 1997 to 22 per cent in 2010 (Di-

rective 2001/77/EC). The directive gives an indicative target for each member country. It also applies to the ten new members, which have indicative national targets in the accession treaty.

3. Raise the share of biofuels in the transport fuel market to 5.75 per cent (Directive 2003/30/EC) in 2010. Exemption from the target may be granted if there is little potential in the country for the production of biofuels, or if the biomass is being used for other purposes.

In a communication presented in 2004 (COM(2004)366 final) the Commission evaluated targets 1 and 2:

OVERALL ENERGY USE: At best, with full application of adopted legislation, a 10-per-cent share can be achieved by 2010. Extra action is needed in the heat sector to reach 12 per cent. The renewable share was 5.2 per cent in 1995 and 6 per cent by 2001. See the situation country by country in figure 1.

ELECTRICITY: With existing national policies and measures the EU15 will achieve a share of 18–19 per cent by 2010. The level in 1997 was 14 per cent. Only four countries – Germany, Denmark, Spain and Finland – are on track to achieve their national targets. Greece and Portugal are not on track and for the remaining countries the outlook is uncertain. See the situation country by country in Table 1.

The directives allow each member

country to decide how it will achieve the indicative national targets. If both targets for renewable electricity and biofuels are achieved, it will lead to a 10-per-cent general share of renewable energy in the EU, according to the Commission.

Renewable energy sources

The European Renewable Energy Council defines renewable energy as any energy resource regenerated over a short timescale that is derived directly from the sun (such as thermal, photochemical or photoelectric), indirectly from the sun (such as wind, hydropower and photosynthetic energy stored in biomass), or from other natural movements and mechanisms of the environment (such as geothermal and tidal energy).

Biomass

Biomass is generated by plants through the process of photosynthesis, using energy provided by the sun. Exploited in a sustainable manner, biomass is a renewable source of energy. The advantages of bioenergy include the fact that it is often a domestic resource, it is easy to store and it creates jobs, mainly in rural areas. Its disadvantages include the emission of air pollutants, particularly during small-scale combustion in old boilers (modern boilers produce very low emissions). Harvesting too much biomass can also threaten

the biodiversity of forests and deplete soil nutrient reserves. The latter can however be compensated for by returning the ash after combustion.

The current trend in the energy sector is to move away from large fossil fuel fired condensing power stations towards smaller combined heat and power plants. This favours bioenergy, although the amount of electricity generated from biomass is still modest. Denmark, Finland and the United Kingdom are the only countries in which there is steady growth.

A lot of bioenergy is used in the heating sector and there is also good potential here – over 40 per cent of the energy in Europe is used for heating buildings, for domestic hot water production and for heating in industrial processes.

At present renewable fuels for cars are produced almost exclusively from agricultural crops. The cultivation of oilseed rape to replace diesel is widespread in Germany and France in particular. Cereals and sugar beet are used to produce ethanol as a substitute for petrol. This is done mainly in France, Spain and Sweden. Imports are also significant. The bio-fuel share of road vehicle fuels sold in the EU amounted to 0.6 per cent in 2003.

Biomass accounts for just over half of renewable energy in the EU. In percentage terms, Finland, Sweden and Austria are the leading users in Europe. The EU

The benefits of renewable energy

Climate change. The burning of fossil fuels releases carbon dioxide, the most significant of the greenhouse gases that are produced by mankind. The extraction of coal also leads to considerable emissions of methane, another greenhouse gas. Gas extraction also produces methane emissions. Renewable energy sources are climate neutral. The burning of biomass results in CO₂ emissions, but these are bound up again by growing new crops on the site where the biomass was harvested.

Other air pollutants. The burning of coal and oil accounts for most anthropogenic emissions of sulphur and nitrogen oxides and many heavy metals. Acidification, eutrophication, damage from ground-level ozone and damage to health by particulates are some of the resulting effects. The only renewable energy source that can give rise to significant problems in this respect is biomass, which if burned inefficiently in old boilers can produce high emissions of volatile organic compounds (VOCs) and particulates.

Other environmental effects. Extracting coal from open-cast mines involves major disturbance to the land. Oil can cause serious damage to the aquatic environment during transport. Nuclear power gives rise to problems during the extraction of uranium and in the event of accidents. The radioactive waste is harmful for thousands of years and there are no safe storage methods. The negative effects of renewable energy are mainly limited to aesthetic impact on the landscape. However, the expansion of hydropower can cause major harm to the economy of local communities and the biodiversity of waterways. Over-harvesting of biomass can threaten the diversity of forest biotopes and deplete the nutrient reserves of woodland.

External costs. The costs of the various types of energy in terms of damage to the environment and health are called external costs, since they are not normally included in the price. Estimates made under the EU ExternE project (www.externe.info) show that coal and lignite have by far the highest external

costs, followed by oil, peat and gas. If the external costs are included in the price the cost of producing electricity from coal is roughly doubled.

Security of supply. The European Commission's green paper on energy security (COM(2002)321 final) highlights both renewable energy and energy efficiency in reducing dependence on imported energy. According to the green paper, in two decades Europe will be importing 70 per cent of its energy – compared to 50 per cent today – if business continues as usual. A higher share of domestic energy not only increases the security of supply, but also improves the balance of trade.

Job opportunities. Using renewable energy technologies creates employment at higher rates than many other energy technologies. The European renewable energy industry currently employs around 200,000 people and has a turnover of 10 billion euro a year.

member states do not all have the same natural potential for bioenergy, however there is considerable unexploited capacity. This is particularly true in some of the new member states: the Baltic States, the Czech Republic, Hungary and Slovakia.

An indicative figure on the biomass availability for energy purposes at EU15 level is 1,700 TWh per year (plus 400 TWh for the ten new member states plus Romania and Bulgaria). This compares with total consumption figures for energy and bioenergy by the EU15 in 2001 of around 17,000 TWh and 650 TWh respectively.

Hydropower

Electricity production from hydropower in the EU15 totalled 380 TWh in 2002, corresponding to about 15 per cent of total electricity production and 84 per cent of all renewable electricity.

Large-scale hydropower has largely been exploited already and the potential for further small-scale hydropower plants (under 10 MW) is also limited. In the new member states, particularly in Hungary, Lithuania and Slovenia, there is still significant potential to increase hydropower generation, however.

Small-scale hydropower contributed 40 TWh of electricity within the EU15 in 2002 and 2–3 TWh in the new member states. The building of new small hydropower plants often meets strong local resistance, because of the damage they cause to waterways.

Windpower

In recent decades there has been a trend towards bigger and bigger windpower turbines. A large, modern wind turbine can produce as much electricity as 200 turbines did in 1980. At the same time the costs have fallen sharply. In good conditions windpower can be produced from around 3.4 eurocents per kWh – half what it cost 20 years ago. The production cost is comparable with new coal power and nuclear power, even without factoring in the health costs and environmental costs of the various types of power.

Almost 80 per cent of all global windpower is produced in the EU15, and around 90 per cent of that produced in the EU15 comes from three countries: Germany, Spain and Denmark. The installed windpower capacity in the EU amounted to 34 GW in 2004 (an increase of around 8 GW over the previous year). In an average wind year this capacity can produce 70 TWh of electricity, approximately 2.4 per cent of EU electricity consumption. The industry estimates that by 2010 the installed capacity will reach 75 GW (of which 10 GW will be offshore), with an annual electric-

ity production of almost 170 TWh.

The potential for windpower in Europe is massive, especially at offshore sites, where it is estimated at 3,000 TWh per year. To arrive at the level of 720 TWh per year in 2020, as suggested in a report from Greenpeace, would require a total capacity of around 240 GW, calling for some 50,000 new large turbines. The area they would take up would not need to be very great, amounting to no more than three per cent of the EU15 countries' seabed.

Variable wind strength means that electricity generation by wind farms varies in a totally different way to that from hydroelectric plants, for instance. This poses problems for electricity grid management, although less serious than many feared. However, the electricity grid will require upgrading in many areas before there can be a major expansion offshore.

Solar thermal heat

Solar thermal energy is now an established technology that is capable of converting 25–50 per cent of incoming solar radiation to useful heat. Thanks to improved technology and mass production the costs have fallen drastically in the last decade, and the quality has improved markedly at the same time. A further halving of the cost is considered realistic over the period 2002 to 2010.

The main disadvantage of solar heating is that availability is often poorest when demand is greatest. Solar thermal energy must therefore generally be supplemented by some other energy source.

Solar heat is difficult to store and requires a water circulation system for distribution. In some locations in Denmark and Sweden there are massive solar thermal collector arrays measuring 10,000–20,000 m² connected to district heating systems. Smaller installations are more common, however.

Around 80 per cent of the installed area of solar thermal collectors in the EU is located in three countries: Germany, Greece and Austria. The total area in the EU15 at the end of 2003 was 14 million m², plus a further 0.6 million m² in Cyprus. The technical potential in the EU15 is estimated at 1,400 million m² with an annual energy output of almost 700 TWh.

Solar thermal collectors cover two thirds of the warm water needs of Greek households; in Cyprus up to 90 per cent, and nearly 10 per cent in Austria. In Spain, Portugal and Italy only a marginal 0.5 per cent of warm water needs are covered.

In comparison with windpower and solar electricity the growth of solar heating is moderate, but rising. Europe makes up just 17 per cent of the current global

Table 1. Share of renewable electricity in relation to targets for 2010 (%).

	1997	2002	2010
Austria	70.0	68.0	78.1
Belgium	1.1	1.4	6.0
Denmark	8.7	20.0	29.0
Finland	24.7	24.7	31.5
France	15.0	14.4	21.0
Germany	4.5	8.1	12.5
Greece	8.6	5.8	20.1
Ireland	3.6	5.1	13.2
Italy	16.0	16.8	25.0
Luxembourg	2.1	2.2	5.7
Netherlands	1.8	3.4	9.0
Portugal	38.5	21.8	39.0
Spain	19.9	12.6	29.4
Sweden	49.1	46.0	60.0
United Kingdom	1.7	2.8	10.0
EU15	13.9	15.2	22.0
Cyprus	0.0	0.0	6.0
Czech Republic	3.7	3.9	8.0
Estonia	0.1	0.2	5.1
Hungary	0.7	0.6	3.8
Latvia	50.1	48.0	49.3
Lithuania	4.0	4.6	7.0
Malta	0.0	0.0	5.0
Poland	1.6	2.0	7.5
Slovenia	31.1	30.4	33.6
Slovakia	15.9	20.2	31.0

Source: Commission staff working paper, SEC(2004) 547.

market – two-thirds of which is in China.

Solar thermal collectors that operate at higher temperatures are under development. Such systems can also be used for space cooling, which accounts for a growing share of energy consumption in many countries. The use of solar energy for space cooling is seen as very promising, since periods of high demand coincide with high levels of solar radiation.

Solar electricity

Photovoltaic (PV) technology involves the direct generation of electricity from light. The solar cells are made from semiconductor materials – usually silicon – which can be adapted to release charged particles, forming the basis of electricity. The greater the intensity of light, the greater the flow of electricity. The most widely used are cells of crystalline silicon, which are able to convert 13–16 per cent of sunlight into electricity, but more efficient thin-film cells are being developed.

Photovoltaics are already economically competitive for loads up to a few kW in many remote sites away from main electricity grids. Most of the installed capacity in Europe is connected to the grid however as result of extensive support schemes in Germany, where 80 per cent of the total capacity can be found.

The cost of solar cells has fallen by a factor of ten in the last 15 years. If the

market grows by 20 per cent each year it is estimated that the price will drop to one-third of the current level by 2020. In the last few years the annual growth rate has been 30–40 per cent. The cost could be pressed down even further if solar panels are used to replace other materials on the exterior walls of buildings, an application that has become increasingly common in recent years.

The industry's own scenario is an increase to 41 GW of installed capacity within the EU by 2020 (compared with 0.4 GW today), capable of producing 27 TWh of electricity, a development that could create around 450,000 full-time jobs. Solar cells are most profitable where sunlight is strongest, which for the EU means that the greatest potential is in the south.

Geothermal

Heat from the Earth's core can be used for heating and electricity production. Like several other renewable energy sources geothermal energy involves high investment costs and relatively low operating costs.

Electricity generation requires steam at temperatures in excess of 150°C. Within the EU15 the installed capacity is 800 MW, and 98 per cent of this is in Italy. Electricity production in 2003 totalled 5 TWh.

Italy is also the leading country in the EU15 for low-energy applications of geothermal energy (heating) with a capacity of 0.44 GW_{th}, followed by France and Germany. Total production in the EU15 amounted to 3.5 TWh in 2002.

Geothermal energy is also a well-developed energy source in Hungary, where the installed capacity is similar to that of France. The Czech Republic, Slovakia, Slovenia and Poland use geothermal energy mainly in the form of direct heat.

The category of very low energy applications includes heat pumps, the use of which for space heating and cooling has expanded considerably over recent years. Sweden is at the top of the list with a capacity estimated at 1 GW_{th} from 176,000 units in 2002, representing one-third of all the heat pumps installed in Europe. Germany and France come next. Growth in Sweden has continued, with 100,000 new units installed in 2004 alone.

Heat pumps are powered by electricity, with one kWh of electricity yielding three kWh of heat in return. More heat pumps therefore mean greater electricity consumption, which is a problem, especially during peaks in demand.

Wavepower

Technology for generating electricity from the wave motion is still in its infancy. The

first commercial installation is located in Portugal. This has an initial output of 2 MW, but if successful there are plans to extend it to 20 MW in the next few years.

According to industrial estimates the potential is very large. For example, there is enough wave energy off Britain's coastline to provide three times its current electricity consumption (350 TWh in 2002). Some five to eight per cent of that is estimated to be economically realized.

The World Energy Council predicts that wavepower can eventually supply 15 per cent of current global energy demand. With existing technology the production cost per kWh would be roughly double that of windpower.

How to increase the renewable share

Although the availability of renewable energy has grown rapidly in the EU in recent decades, the use of finite energy sources has also increased. It is therefore important to continue promoting renewable energy, while at the same time taking strong measures to use energy more efficiently. However, the debate tends to concentrate on energy supply, partly because the energy suppliers are much better organized than consumers.

Renewable energy could be strongly promoted if each country created a level playing field in the energy sector, by including external societal benefits/costs in its energy policy framework.

In many EU countries there are large tax subsidies for the nuclear and coal industries. Subsidies to energy in the EU15 totalled 29 billion euro in 2001, with 73 per cent directed towards the support of fossil fuels. In Germany, where the highest subsidies are now paid, 2.5 billion euro go every year to subsidizing coal production, which is about 70,000 euro per coal worker.

Support schemes are needed in order for renewable energy to establish its place in the market. Experience from those countries where windpower has flourished point to various factors for success, including an attractive long-term financial framework, uniform planning procedures and licensing systems, and non-discriminatory terms for grid connection.

Different means are available in the EU member states, such as feed-in tariffs, green certificates, market-based mechanisms and tax exemptions. Rising costs for carbon dioxide emissions as a result of the EU's trading system for emission rights may also favour renewable energy.

OECD data indicate that only 10 per cent of government energy R&D budgets are related to renewable energy, in contrast

with more than 50 per cent for conventional (fossil fuel and nuclear) energy technologies.

Many interest groups want the EU to formulate a new target for renewable energy. A share of 20 per cent by 2020 has been suggested. Such a target would give investors a clear signal of the level of political ambition. However, the Commission wants to wait until 2007 before proposing a target, as it will then have a better picture of progress towards to the 12-per-cent target for 2010.

Further information

The share of renewable energy in the EU.

COM(2004)366 final. Progress report, includes a Commission staff working paper with country profiles for all member countries, SEC(2004) 547.

Sea Wind Europe. 2004. Published by Greenpeace, www.greenpeace.org

Vision 2050. The 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 Inforce Europe, www.inforce.dk.

AGORES, A Global overview of Renewable Energy Sources: www.agores.org

European Renewable Energy Council (EREC): www.erec-renewables.org.

European Commission, DG Energy and Transport: http://europa.eu.int/comm/energy/index_en.html

Global Wind Energy Council: www.gwec.net

International Solar Energy Society: www.ises.org

Johannesburg Renewable Energy Coalition (JREC) database: www.iea.org/textbase/pamsdb/jr.aspx

Renewable Energy in Europe: Building Markets and Capacity

This book, compiled by the European Renewable Energy Council (EREC) and published in 2004, has been the main source for this fact sheet. It presents an overview of the latest techno-



logical, financial and economic information on renewable energy technologies. It also explains how renewable energy sources could play a more significant role in the EU's future energy balance.

176 pp. £35.00. ISBN 1-84407-124-3. Available from Earthscan/J&J, 8–12 Camden High Street, London NW1 0JH, UK. www.earthscan.co.uk

Broad support for action

The aviation industry is once again growing fast, and the industry's contribution to climate change is high on the European political agenda.



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A PUBLIC INTERNET consultation conducted by the European Commission has shown broad support among the aviation industry, NGOs and citizens for action to be taken to limit the aviation sector's growing impact on climate change.

Almost 5,600 individuals and 200 organizations submitted responses to the internet consultation carried out during the spring.

A large majority of those citizens responding (82 per cent) fully agreed with the policy objective of including the air transport sector in efforts to mitigate climate change. Nine out of ten fully or partly agreed with the objective of strengthening economic incentives for air transport operators to reduce their impact on the climate.

Organizations such as airports, airlines and NGOs also believe that action is required: 99.5 per cent of respondents fully or partly agreed that the air transport sector should be included in efforts to mitigate climate change – although opinions differ on how this should be done.

To complement previous studies on fuel taxation and emissions charges, the Commission had a study carried out into the possibility of including aviation in the EU greenhouse gas emission trading scheme (ETS).¹

The study shows that including aviation in the ETS would be feasible, although the effects of such a reform are likely to be fairly modest. It is expected that the main response of airlines will be to buy emissions rights rather than reduce their own emissions. The price rise for a long-haul return flight would, at most, be under 10 euro per ticket and it is estimated that demand growth would be only slightly slower than if business continued as usual.

The Commission is now working on an EU strategy to tackle aviation's contribution to climate change, and this is expected in September. The inclusion of aviation in the ETS, effective from 2013, is said to be one

of the main ambitions of this work.

Emission trading has also met a positive response from many airports and several airlines. Environmentalists are not against the move but say it is insufficient to reduce emissions.

Jos Dings, director of T&E, the European Federation for Transport and Environment, believes that the airlines see emission trading as a way to avoid tougher – and hence more effective – measures:

“From our perspective, there are several reasons why we believe that such measures as fuel taxation or en-route charges are also needed,” he says, and mentions the fact that the aviation sector currently escapes most of the taxes and charges that affect every other area of economic activity.

A tax of just ten cents per litre on aviation fuel – a fraction of road fuel taxes – would reduce emissions by eight per cent, according to Dings, who feels it should be made clear that emission trading “is the beginning, not the end, of climate policy for the aviation sector”.

¹ Giving wings to emission trading. Inclusion of aviation under the European Emission Trading System (ETS): Design and impacts. Delft, CE, July 2005. Available at http://europa.eu.int/comm/environment/climat/aviation_en.htm

See also the June 2005 joint NGO position paper, **Measures to Curb the Climate Change Impacts of Aviation**. Available at www.t-e-nu.

Background

Aircraft contribute to climate change in many ways, of which the emission of the greenhouse gas carbon dioxide (CO₂) is the best understood and quantified. The EU Commission reports that emissions of carbon dioxide, nitrogen oxides and water vapour at high altitudes have three to four times the climate effects of carbon dioxide alone.

Aviation's share of overall EU greenhouse gas emissions is relatively small today but rapidly increasing. From 1990 to 2003, EU emissions from international aviation rose by 73 per cent, corresponding to annual growth of 4.3 per cent. With the world passenger aircraft fleet likely to double by 2020, the growth in emissions could continue if no further action is taken.

Greenhouse gas emissions from international aviation are reported under the UN Framework Convention on Climate Change, but they are not part of the quantified commitments undertaken by the developed countries that ratified the Kyoto Protocol.

Not only good for the environment

Economic growth, more jobs and better security of supply highlighted in a recent green paper.

ENERGY USE within the EU could be reduced by 20 per cent by 2020, resulting in economic savings of 60 billion euro per year, while at the same time increasing economic growth, creating jobs and reducing the union's dependence on energy from foreign sources. It would also help EU meet its Kyoto commitments.

These are the findings of the European Commission in the green paper on energy efficiency that was presented at the end of June.¹ The environmental benefits of using energy more efficiently are mostly mentioned in passing, instead the emphasis is placed on factors such as competitiveness and security of supply.

The EU's own oil and gas reserves are shrinking steadily, while energy use is increasing by one to two per cent each year, a trend that is primarily driven by growing demand for electricity and transport. The Commission expects an increase of 10 per cent over the coming 15 years if business continues as usual, from 1725 Mtoe today (2005) to 1900 Mtoe by 2020.²

The objective of the green paper is to arrive at the level of 1990, i.e. 1520 Mtoe by 2020. This is 20 per cent below the expected level if no action is taken, and 12 per cent below today's level.

The positive environmental effects of such a development would undoubtedly be significant and would greatly improve the potential of the EU to meet future climate targets. The likely environmental effects were not however quantified by the Commission.

Because the green paper is intended as a basis for discussion it does not contain any concrete measures, but the Commission does list a number of options to reach the target in a cost-effective way, which not only save energy but also save money. They involve increased use of energy

Potential cost-effective savings. Indicative only. Million tonnes of oil equivalent per year.

Potential savings	2020 Rigorous implementation of adopted measures	2020+ Implementation of additional measures
Buildings: heating/cooling	41	70
Electrical appliances	15	35
Industry	16	30
Transport	45	90
Combined Heat and Power	40	60
Other energy transform. etc.	33	75
Total energy savings	190	360

efficient technologies, as well as changes in consumer behaviour.

Transport is identified as a key sector, since energy use continues to rise steadily, and buildings are iden-

Transport and buildings are identified as key sectors for improvement

tified as another, since they offer excellent potential for improvements in energy efficiency.

The Commission is of the opinion that half of the saving compared with business as usual could be achieved through a full implementation by member states of legislation already adopted, or about to be adopted, on

buildings, domestic appliances or energy services.

To save the other 10 per cent "Europe now needs to be imaginative and proactive," said energy commissioner Andris Piebalgs when the green paper was presented.

The Commission suggests a wide range of policy tools. Examples of actions include:

- Establishing annual energy efficiency action plans at national level.

- Improving energy pricing and taxation to ensure that the polluter really pays.

- Using public procurement to kick-start new technologies.

- Extending the scope of the directive on buildings.

The publication of the green paper will be followed by a consultation process. In 2006 the Commission intends to put forward an action plan outlining the specific action to be taken at EU and national levels.

PER ELVINGSON

¹ **Green paper on energy efficiency or doing more with less.** COM(2005)265 final. Available at http://europa.eu.int/comm/energy/efficiency/index_en.htm

² Mtoe = million tonnes of oil equivalent. 1 Mtoe = 11.6 TWh.

Background

In 2002, EU energy use consisted of 40 per cent oil, 22 per cent natural gas, 16 per cent coal, 13 per cent nuclear, four per cent hydro, and one per cent renewables other than hydroelectric power.

Today the European Union imports about 50 per cent of its energy needs, a proportion that is expected to rise.

According to estimates referred to in the green paper, more than 2,000 full-time jobs could be created for each million tonnes of oil equivalent that will be saved as a result of measures and/or investments specially taken to improve energy efficiency as compared to investing in energy production.

Despite a decrease in energy intensity (the ratio of GDP to energy use) by a third from the early 1970s until 2002, total energy consumption in the EU25 increased over the same period by almost 40 per cent, or one per cent per year.

The annual improvement in energy efficiency within the EU in the 1990's was 1.4 per cent per year, but the rate is now stationary at 0.5 per cent. It must be tripled in order to meet the target of the Commission's green paper.



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Member countries do not want mandatory targets

IN A FIRST READING of the Commission's proposed directive on energy end-use efficiency and energy services¹ on 7 June the European Parliament asked for progressively rising energy efficiency targets of 1 per cent per year for the first three years (2006–08), 1.3 per cent for the next three years, and 1.5 per cent for the following three years – in all an improvement in energy efficiency of 11.5 per cent by 2015.

In addition they asked for higher targets for the public sector, starting with 1.5 per cent in the initial years. The Parliament also wanted the targets to be mandatory. The Commission proposed mandatory one-per-cent annual efficiency improvements between 2006 and 2012.

Environmental groups were disappointed that Parliament had not set even higher efficiency targets. WWF said only annual targets for “at least 2.5 per cent for the private sector and

3 per cent for the public sector could encourage ... action and have a real impact in fighting climate change and promoting industry's competitiveness”.

The energy ministers chose however to set the ribbon even lower in an agreement reached at their meeting on 28 June. They agreed to only a 6-per-cent increase in energy efficiency for the first six years, with no mandatory targets and no special targets for the public sector.

The Parliament is expected to discuss the proposal in a second reading in autumn 2005. In the event of a disagreement between Parliament and the Council – which seems likely – the two bodies will settle their differences through negotiation.

¹ COM(2003)739. See also “The Energy Efficiency Challenge” by WWF European Policy Office 2005. Can be downloaded free of charge from www.panda.org/epo.

Biomass and heating

The Commission is preparing a strategy for biomass use, responding to the slow development of biomass use in the EU compared with prior expectations. The strategy is expected to be presented during the autumn and to include action for promoting biomass for heating.

Source: Sustainable Energy News, June 2005.

Ecodesign directive comes into force

The framework directive for the setting of ecodesign requirements for energy-using products, which was presented by the Commission back in 2003, has now entered into force.¹

The directive was adopted following a compromise between Parliament and the Council of Ministers in April this year. Specific minimum requirements for different products will be laid down by the Commission with effect from 2007. Over a hundred different product groups are affected, including heating boilers, water heaters, electric motors, office equipment, computers, lighting and household appliances.

Voluntary agreements on minimum requirements will form the basis in areas where there are many European manufacturers, while mandatory requirements are expected in others.

The possibility of voluntary agreements has been criticized by environmental organizations, which see these as a much weaker option. They are also critical of the fact that the directive makes it more difficult for individual countries to set stricter requirements of their own.

¹ Directive 2005/32/EC establishing a framework for the setting of ecodesign requirements for energy-using products. *Official Journal L 191, 22/07/2005 P. 0029-0058.*

Sustainable Energy Europe

In July the EU Commission launched the Sustainable Energy Europe campaign, in an effort to promote examples of best practice, ensure a strong level of public awareness, understanding and support, and stimulate the necessary trends towards an increase in private investment in sustainable energy technologies.

The campaign has a number of benchmarking targets for 2008. The total budget is 3.7 million euro.

Further information: www.sustenergy.org

Falling on land, rising at sea

EUROPEAN EMISSIONS of acidifying, eutrophying and ozone-forming substances from land-based sources are continuing to fall slightly, but considerably slower than in the 1990s. Some of the reductions on land are also countered by rising emissions from international shipping.

Since the early 1980s total European emissions of sulphur dioxide, the most significant acidifying pollutant, from land-based emission sources have fallen by close to 75 per cent, from around 53 million tonnes in 1980 to 14 million tonnes in 2003.

At the same time, however, emissions from international shipping in European waters have nearly doubled, from 1.7 to 3 million tonnes a year.

Emissions of nitrogen oxides, volatile organic compounds and ammo-

nia remained more or less constant during the 1980s, but since 1990 have fallen by around 30–40 per cent.

In the case of nitrogen oxides a large part of the emission reduction from land-based sources has been offset by rising emissions at sea. As with sulphur dioxide, these have almost doubled since 1980.

The data in the table on the opposite page is taken from figures reported by the countries themselves to the Convention on Long-range Transboundary Air Pollution and is compiled by EMEP, the cooperative programme for monitoring and evaluating long-range transmissions of air pollutants in Europe.¹

The EMEP programme is not confined to keeping track of emissions.

Its main task is to model the ways in which emissions from one coun-

try are affecting the environment in others (see below).

An overview of calculations for source-receptor relationships, covering acidifying, eutrophying and photo-oxidant pollution as well as fine particles (PM) is presented in another EMEP report.²

PER ELVINGSON
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¹ **Inventory Review 2005: Emission Data reported to LRTAP Convention and NEC Directive. Initial review for HMs and POPs.** Technical Report MSC-W 1/05. Available at www.emep.int/mscw/mscw_publications.html

² **Transboundary acidification, eutrophication and ground-level ozone in Europe 2003.** EMEP Status Report 1/05. Available at www.emep.int/publ/common_publications.html.

Export and import of pollutants

The source-receptor relationships calculated by EMEP show the transboundary movements of air pollutants across Europe. They also quantify the “export” and “import” between countries of these pollutants.

The figures presented here are based on EMEP data for 2003, and show the situation for two pollutants and two selected countries – Germany as an example of a net exporter of pollutants, i.e. one that exports more pollutants than is being im-

ported, and Sweden as an example of a net-importer of pollutants.

In common to both these countries – and in fact to most European countries – is the fact that most of the depositions of sulphur and oxides of

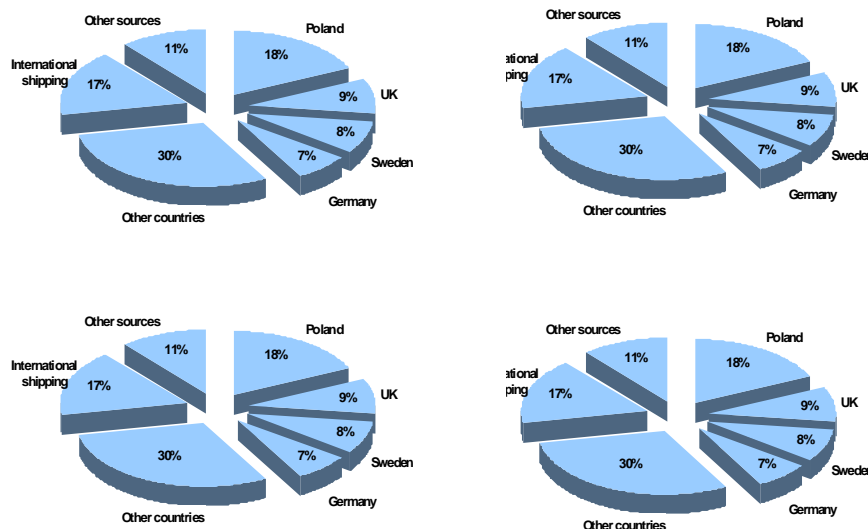
nitrogen emanate from outside their own territory.

Another similarity is that an increasing share of the depositions originates from international shipping.

Emissions and depositions of sulphur (S) and oxidized nitrogen (N) in 2003 (ktonnes).

	Germany		Sweden	
	S	N	S	N
Emission	308	435	26	63
Total deposition	252	206	108	104
Deposition of domestic origin	116	71	9	9
Net import			82	41
Net export	56	229		

The origin of the deposition of sulphur (left) and oxidized nitrogen (right) over Germany (above) and Sweden (below) in 2003.



European emissions of sulphur dioxide, nitrogen oxides (as NO₂), ammonia, and volatile organic compounds. Thousands of tonnes a year.

	Sulphur dioxide			Nitrogen oxides (NO ₂)			Vol. Org. Compounds			Ammonia		
	1980	1990	2003	1980	1990	2003	1980	1990	2003	1980	1990	2003
Austria	346	76	34	246	211	229	432	286	182	52	57	54
Belgium	828	354	153	442	368	297	399	399	226	89	109	77
Cyprus	28	46	46	13	18	22	14	14	16 ¹	8	8	6
Czech Republic	2257	1881	232	937	544	324	275	441	203	156	156	82
Denmark	451	177	31	307	283	209	261	229	158	138	133	98
Estonia	287	252	101	70	68	39	81	88	40	24	24	8
Finland	584	260	99	295	300	219	210	224	145	39	38	33
France	3213	1330	492	1989	1830	1220	2660	2416	1400	810	787	753
Germany	7514	5326	616	3334	2846	1428	3224	3534	1460	835	736	601
Greece	400	493	509 ¹	306	290	318 ¹	255	255	268 ¹	79	79	73
Hungary	1633	1010	347	273	238	180	215	205	155	157	124	67
Ireland	222	186	76	73	118	120	111	111	78	112	112	116
Italy	3441	1773	665 ¹	1585	1927	1267 ¹	2034	2041	1343 ¹	441	428	447 ¹
Latvia	96	99	8	70	70	37	121	121	79	52	52	15
Lithuania	311	222	43	152	158	53	100	108	74	85	84	34
Luxembourg	24	15	3	23	23	17	15	19	15	7	7	7
Malta	26	26	26	9	9	9	2	2	2	5	5	5
Netherlands	490	189	65	583	559	364	579	486	225	234	249	128
Poland	4100	3210	1455	1229	1280	796 ¹	1036	831	576 ¹	550	508	325 ¹
Portugal	253	307	205	158	252	265	189	259	278 ¹	96	96	94 ¹
Slovakia	780	542	106	197	216	98	252	252	82	63	63	30
Slovenia	234	196	66	51	63	56	39	44	46	24	24	19
Spain	2913	2089	1317	1068	1185	1411	1392	1097	1098	285	326	396
Sweden	491	112	52	404	315	206	528	517	303	54	55	56
United Kingdom	4841	3711	979	2652	2828	1570	2099	2421	1089	370	370	300
Sum EU25	35763	23882	7726	16466	15999	10754	16523	16400	9541	4765	4630	3824
Albania	72	72	58	24	24	29	31	31	34	32	32	32
Belarus	740	637	131	234	285	140	549	533	309	142	142	120
Bosnia & Herzegovina	482	482	419	79	79	55	51	51	42	31	31	23
Bulgaria	2050	2008	968	416	361	209	309	217	119	144	144	52
Croatia	150	180	67 ¹	60	88	69 ¹	105	105	88 ¹	52	52	51 ¹
Iceland	18	24	27	21	26	28	8	13	10	3	3	3
Norway	136	52	23	191	224	220	173	295	300	23	23	23
Macedonia (F.Y.R.)	107	107	150	39	39	50	19	19	17	17	17	16
Moldova	308	265	21	115	100	30	105	157	29	53	49	28
Romania	1055	1311	833 ¹	523	546	349 ¹	829	772	474 ¹	340	300	164 ¹
Russia ²	7323	4671	2130 ¹	3634	3600	2566 ¹	3410	3668	2777 ¹	1189	1191	600 ¹
Serbia & Montenegro	406	508	396	192	211	158	142	142	129	90	90	79
Switzerland	116	42	18	170	154	89	323	279	111	77	65	52
Ukraine	3849	2783	1252	1145	1097	523	1626	1369	318	729	729	242
Sum Non-EU	16812	13142	6493	6843	6834	4515	7680	7651	4757	2922	2868	1485
Sum Europe	52575	37024	14219	23309	22833	15269	24203	24051	14298	7687	7498	5309
Int. ship: Baltic Sea	139	178	246	215	275	379	5	6	9	-	-	-
Int. ship: Black Sea	35	45	61	52	67	93	1	2	2	-	-	-
Int. ship: Mediterran.	725	929	1281	1000	1280	1765	21	27	37	-	-	-
Int. ship: North Sea	277	355	489	395	506	698	9	12	16	-	-	-
Int. ship: N.E. Atlantic	550	704	970	772	989	1363	15	20	27	-	-	-
Sum internat. shipping	1726	2211	3047	2434	3117	4298	51	67	91	-	-	-
Sum Europe + ships	54301	39235	17266	25743	25950	19567	24254	24118	14389	7687	7498	5309
Turkey	1030	1590	2112	364	644	951	359	463	726	321	321	321

¹ 2002 data. ² Part within EMEP domain. Italics = Expert estimates.

Climate threat increasingly clear

Serious effects start to become widespread with just a two-degree rise in global mean temperature.

IN FEBRUARY some 200 climate researchers gathered in the UK at the invitation of Prime Minister Tony Blair to report the latest findings on the effects of global warming. The researchers' summary provides a new and coherent picture of the negative effects that climate changes are having on everything from alpine vegetation to coral reefs and rainforests.

The global mean temperature is now 0.7 degrees higher than the pre-industrial level. Even with a temperature rise of just one degree, in around 25 years' time if current trends continue, sensitive ecosystems will be affected and food production will fail as water shortages become more frequent in dry regions.

With a rise of two degrees, in around 50 years' time, serious effects will start to spread. The Arctic ice sheet will be halved and coral reefs will die. Sensitive but diverse ecosystems such as the flora of the South African Cape, China's subtropical forests and European alpine flora will begin to die. More than one and a half billion people will experience water stress and we will have at least 150 million climate refugees. Agriculture will face major problems in dry areas. Economic development will be threatened in many countries.

With a three-degree global rise, within 60–70 years at current trends, the situation will become critical. The Amazon rainforest will be seriously damaged, most coral reefs will be dead and areas of alpine flora will have completely disappeared. More than 5.5 billion people could then be living in areas with greatly reduced food production, and three billion people are likely to experience acute water shortages.

Global warming will probably exceed two degrees even if atmospheric greenhouse gas concentrations are stabilized at 550 ppm (CO₂ equivalent). Concentrations would have to stabilize at 400 ppm, which is actually about 25 ppm lower than today, for there to be a high certainty of the 2°C temperature limit being respected.



Fragile ecosystems, from alpine environments to coral reefs, are seriously damaged if temperatures rise just two degrees above the pre-industrial level – a figure often reported as “safe”.

Limiting greenhouse gas concentrations to even 550 ppm represents a challenge. The world would have to cut emissions 15 per cent from 1990 levels by 2050 to achieve this. Emissions would have to be halved to achieve stabilization at 400 ppm.

The researchers at the conference also presented new and worrying evidence of increased acidification of the oceans as a result of the seas soaking up more and more carbon dioxide, which combines with water to form carbonic acid. Free chalk is becoming a scarce commodity in the seas, which has a major effect on plankton production and coral reefs. This

poses a long-term threat to most marine food chains.

Data was also presented at the conference which shows there is a risk that the West Antarctic ice sheet could eventually break up and be carried out to sea. Several gigantic floes have already broken away from the ice shelf, and the rate at which the glaciers in the area are losing ice has increased by a factor of two to six.

ANDERS FRISTRÖM

More information, including a summary, “Report of the International Scientific Steering Committee”, is available from the conference website at www.stabilisation2005.com

All the world's glaciers could melt

Global warming may result in the complete disappearance of glaciers from entire mountain ranges, according to the latest update of a report issued once every five years. “The last five-year period of the 20th century has been characterized by an overall tendency of continuous if not accelerated glacier melting,” says the World Glacier Monitoring Service’s 1995–2000 edition of the *Fluctuations of Glaciers* report, compiled with the support of the UN Environment Programme (UNEP).

Melt water from glaciers is critically important for the supply of freshwater in many dry areas, such as parts of India and the Peruvian capital, Lima.

Source: ENS News Service, 5 August 2005. See also www.geo.unizh.ch/wgms.

Summits pave way to Montreal in November

IN NOVEMBER the first major meeting under the climate convention will be held since the Kyoto Protocol came into force in spring. The big question is what will happen post-Kyoto, in other words when the protocol runs out in 2012. One of the first priorities is to get the USA – which alone accounts for one quarter of global greenhouse gas emissions – to return to the negotiations.

In July the leaders of the G8 group, representing the world's richest countries, met in Scotland. Climate change was the main topic chosen by this year's chairman of the group, the UK Prime Minister, Tony Blair. The outcome of the meeting was a rather watered-down resolution, however.

Clearer recognition of the problem by the USA could possibly be seen as a step forwards – climate change is happening now, human activity is contributing to it, and it could affect every part of the globe, states the final declaration. But the leaders decided on dialogue, technological development and marketing rather than emission limits to address the problem.

In mid-August Denmark hosted an informal meeting in Greenland

with ministers and officials from 22 countries, including the USA, China, India, Brazil, Japan and the European Union. This meeting again resulted in a fairly general declaration, but also an agreement on further dialogue. The next meeting will probably be held in South Africa in 2006.

In July, China, India, Japan, South Korea, Australia and the USA founded a new partnership – the Asia-Pacific Partnership on Clean Development and Climate – to address energy security, climate change and air pollution issues.

The six countries made a joint vision statement that pledges to “develop, deploy and transfer existing and emerging clean technology.” Australia and the USA are both outside the Kyoto Protocol. However according to the USA the new initiative should be seen as “a complement, not an alternative,” to Kyoto.

Further information: The chair's summary from the G8 meeting and from the discussions in Greenland, as well as information on the forthcoming summit in Montreal can be found on the climate convention website: www.unfccc.int.

UK environmental organizations mobilize on climate issue

FIVE HUNDRED VOLUNTEERS forming a giant human banner on London's South Bank provided a spectacular launch for Stop Climate Chaos, a climate coalition made up of eighteen UK organizations, which together have several million members.

The new movement believes politicians have so far failed to take anything like sufficient action to tackle the threat. “With coordinated action and the mobilization of its massive supporter base Stop Climate Chaos aims to become a potent political force for action,” declares a press release.

Among other things the coalition

calls on the UK government to deliver substantial annual reductions in UK greenhouse gas emissions, to meet its target of cutting CO₂ emissions by 20 per cent by 2010 and to commit to an EU-wide greenhouse gas reduction target of 30 per cent by 2020.

It also urges the UK government to put climate change at the top of the agenda in its international efforts and to direct aid to poor countries towards low-carbon technologies and clean energy.

Information: www.stopclimatechaos.org

Hotter in the European cities

A report from WWF, analyzing summer temperature data from 16 EU cities, shows the continent's capitals warming by sometimes more than 2°C in the last 30 years. The report highlights the likelihood of more frequent and intense heat waves, droughts and rainstorms as average temperatures increase, the kind of events expected as a result of global warming.

Further reading: **Europe feels the heat – Extreme weather and the power sector.** Published in August 2005. Available in pdf format (1.9 MB) at www.panda.org/campaign/powerswitch

Hard times ahead for the tourism industry

Tourists are set to sizzle in hotter summer temperatures and may well stay in cooler countries as the Mediterranean region's climate becomes hotter and more variable, according to a report commissioned by WWF.

The Mediterranean coastline is the world's most popular tourist destination, attracting 30 per cent of the world's tourists and tourism revenue. But the report says that a 2°C rise in global temperatures would mean more frequent heat waves and droughts, more forest fires, and problems for freshwater and agriculture. All these factors, directly and indirectly, discourage summer holidays in the Mediterranean.

For the agricultural sector higher temperatures and longer droughts could mean less food produced. As temperatures warm up and summer rain diminishes, crops depending on rain would be most severely affected, with yields expected to decline by up to 40 per cent.

Further reading: **Climate change impacts in the Mediterranean resulting from a 2°C global temperature rise.** Can be downloaded in pdf format from www.panda.org/campaign/powerswitch

Testing energy ideas

Supported by the Canadian government, among others, a web-based support centre has been set up which offers a free program for analyzing the technical and economic viability of projects for renewable energy and energy efficiency. The modelling method uses integrated databases for products, costs and meteorology, and is designed for use worldwide.

Further information: International Clean Energy Decision Support Centre, www.retscreen.net.

Energy efficiency plan for Spain

Spanish emissions of greenhouse gases in 2003 were 41 per cent above the level for 1990. The country's EU undertaking permits a maximum rise of 15 per cent for the period 1990–2010.

The high emissions are largely due to the steady growth in demand for electricity. This in turn is a result of economic growth, as well as the low cost of electricity itself. So reports Ecologistas en Accion, the largest Spanish environmental NGO, which in May presented an Electricity Efficiency and Saving Plan that identifies concrete measures to be implemented over a ten-year period that would reduce current electricity consumption by at least 35 per cent.

A large number of the measures focus on increasing the price of electricity to at least that of neighbouring Portugal, a country with a lower per capita income but where electricity is 29 per cent more expensive.

Further information: The Energy Efficiency and Saving Plan (in English) can be downloaded from www.ecologistasenaccion.org



Plan to double renewable energy

The supply of energy from renewable sources will be almost doubled in Spain by the year 2010, according to a plan that was adopted by the government at the end of August. The five-year plan foresees electricity from windpower rising from 20 to 45 TWh a year, biomass capacity going up fivefold, and photovoltaic and thermal solar capacity expanding even faster.

The renewable sector's contribution to primary energy production will reach 12 per cent in 2010, while the share of electricity production will be 30.3 per cent. Under the EU renewable electricity directive, Spain's indicative 2010 target is a share of 29.4 per cent.

The plan aims for investment of 23.5 billion euro in the renewable sector from 2005 to 2010, with private companies footing the majority of the bill.

Source: **Environment Daily**, 29 August 2005.

Stronger standards recommended in the US

IN DECEMBER 2004, the Environmental Protection Agency in the United States began implementing the first fine particulate standard (PM_{2.5}), when 225 counties (partially or entirely) in 20 states were designated to be in non-attainment of the standard.

Now the EPA is reviewing the standards. The conclusion of the final staff paper that was published on 30 June is that the latest scientific information supports strengthening the current health-based standards for fine particulates.

The recommendation is that PM_{2.5} should continue to be used as the indicator for fine particulates, but that limits should be tightened to provide increased public health protection from the effects of both long- and short-term exposure to fine particulates in ambient air.

The staff paper provides two alternative approaches: either to retain the annual standard at 15 µg/m³, together with a revised 24-hour standard in the range of 35 to 25 µg/m³, or to revise the annual standard, within the range of 14 to 12 µg/m³, together with a revised 24-hour standard in the range of 30 to 40 µg/m³, and either the annual or the 24-hour standard, or both, at the middle to lower end of these ranges.

It is proposed that the current PM₁₀ standards are replaced with a

new standard for respirable particulates in the size range 2.5–10 microns. The staff paper recommends consideration of a 24-hour standard with a level in the range of 50 to 70 µg/m³ (98th percentile form), or 60 to 85 µg/m³ (99th percentile form). The lower end reflects a more precautionary interpretation of the health effects information, while the upper end would provide protection that is approximately equivalent to that provided by the current PM₁₀ standards.

The staff paper also recommends that consideration be given to revising the current suite of secondary PM_{2.5} standards to increase visibility.

The final staff paper forms the basis for the review of the standards that has to be carried out regularly under the Clean Air Act. A final rule is to be presented by September 2006.

The EU does not currently have any standards for PM_{2.5}, but a recommendation is expected from the Commission as part of the thematic strategy on air pollution that will be presented in September.

Further reading: The final staff paper, a fact sheet, and related materials, are available at http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html

German state must develop action plans

An administrative court in Stuttgart has ruled that the state of Baden-Württemberg had not done enough to meet the EU limits for particulates (PM₁₀) in the air.

Backed by the environmentalist organization Deutsche Umwelthilfe (DUH), the plaintiffs – two individual citizens – presented evidence showing that Stuttgart and three other cities in the state had not drawn up action plans to reduce particulate pollution, in spite of the fact that the limit values (plus the margin of tolerance) were first exceeded in 2002. The region has argued that it was only obliged to introduce an action plan after the limit values became mandatory in 2005. This argument was however rejected by the court, which obliged the state to develop action plans.

DUH welcomed the judgement, saying it had implications for other states and cities in breach of the new EU limits. It urged them to impose restrictions on diesel cars and trucks that are not fitted with particulate filters.

Source: Press release from Deutsche Umwelthilfe, www.duh.de (in German), 6 June 2005.

High levels, especially in south

Harmfully high levels of ground-level ozone were observed over the whole of Europe in 2004. Levels in southern Europe were highest of all.

Ground-level ozone is formed in the air by nitrogen oxides and volatile organic compounds (VOCs).

In summer 2004, exceedances of the long-term objective for the protection of human health (maximum $120 \mu\text{g}/\text{m}^3$ eight-hour mean value) were observed in every country (except Latvia), in almost every summer month and at most of the stations.

The target value for 2010 set in an EU directive adopted in 2003 – no more than 25 exceedances of the eight-hour mean value per year – was overshot in eight countries: Spain, Portugal, France, Germany, Austria, Switzerland, Slovenia and Italy.

The spatial extent of the exceedances observed was comparable with previous years, except for summer 2003. The most frequent exceedances of the information threshold ($180 \mu\text{g}/\text{m}^3$ one-hour average) were observed in southern France, northern Italy and at several locations in Portugal, Spain and Greece.

The same countries also had the most exceedances of the alert threshold ($240 \mu\text{g}/\text{m}^3$ one-hour average). The highest one-hour concentrations were observed in Italy and Spain.

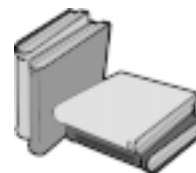
Over the period 1996–2002, the observed ozone trends are in general not statistically significant.

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Source: Air pollution by ozone in Europe in summer 2004. Overview of exceedances of EC ozone threshold values during April–September 2004. EEA Technical report No. 3/2005. Available at www.eea.eu.int.

Information on actual exceedances is available from the website of the European Topic Centre on Air and Climate Change (<http://etc-acc.eionet.eu.int/databases/o3excess>). This site also has links to national websites that continuously report current levels and exceedances.

Recent publications



Health effects of transport-related air pollution (2005)

Edited by M. Krzyzanowski, B. Kuna-Dibbert and J. Schneider. Provides a systematic review of the literature and a comprehensive evaluation of the health hazards of transport-related air pollution. It identifies the key facts emerging from the accumulated evidence, and uses them to suggest both topics for further research and short-term action to protect health. A separate summary for policy-makers is also available.

206 pp. ISBN 92-890-1373-7. Published by WHO Regional Office for Europe, www.euro.who.int. Order no. 13400051. CHF 60.00, in pdf format free of charge.

The Clean Ship: Opportunities for innovation, policy and business (2005)

The Clean Ship is an integrated approach to sustainable shipping. This “sketchbook” gives the reader an idea of what it’s all about.

9 pp. Produced by the North Sea Foundation in cooperation with the European Federation for Transport & Environment (T&E). Available from www.t-e.nu.

Environmental policy integration in Europe (2005)

Report on the progress in integrating environmental considerations into other policy areas, both at EU and national level, produced by the European Environment Agency (EEA).

EEA Technical report No 2/2005. Available from www.eea.eu.int.

Europe 2005 – The Ecological Footprint

The EU’s “ecological footprint” is more than twice the size of its population, according to this report from environmental group WWF. With seven per cent of the world’s population using up 17 per cent of its resources, the EU is said to be eroding ecosystems “beyond the point at which they can easily recover”.

Available in pdf format (1.1 MB) at www.panda.org/downloads/europe/europe2005ecologicalfootprint.pdf

Towards a Global Climate Regime: Priority Areas for a Coherent EU Strategy

By C. Egenhofer and L. van Schaik. Identifies priority areas for coherent EU domestic policies in the short, medium and long term. The focus is on policy coherence, cost-effective mitigation options in the short and medium-term and the interaction of such options with inter-

national negotiations in the “post-2012 framework”.

60 pp. 25 euro. CEPS Task Force Reports. Available from the Centre for European Policy Studies, <http://shop.ceps.be>.

Environmental Policy in the European Union. Actors, Institutions and Processes (2005)

Second edition. Comprising five parts, this book includes in-depth case studies of contemporary policy issues such as climate change, trans-Atlantic relations and an assessment of how well the EU is responding to new challenges such as enlargement, environmental policy integration and sustainability.

384 pp. £22.95 ISBN 1844071588. Published by Earthscan/James & James, <http://shop.earthscan.co.uk>

Workshop on Review and Assessment of European Air Pollution policies

Proceedings from a workshop held in October 2004. The workshop on review and assessment of the scientific basis and tools employed in European air pollution policy work was held to provide guidance to further policy development. Emphasis was placed on the role of airborne particles. The needs for considering air pollution on a hemispheric scale were also highlighted.

159 pp. 210 DKK. TemaNord 2005:537. Published by the Nordic Council of Ministers, St Strandstræde 18, 1255 København K, Denmark. www.norden.org/pub/sk/showpub.asp?pubnr=2005:537

China Environment Yearbook 2004

Consists of 32 sections with specific topics, including reports on China’s environmental protection, the establishment and enforcement of policies, statutes and standards, statistics, etc.

550 pp. US\$199.50. Published by Business Data International Inc., Montreal, Canada, www.businessdataint.com

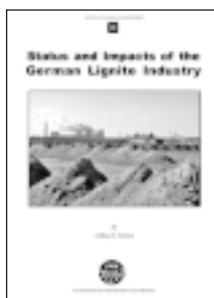
Guide to European Union Funding for NGOs: Accessing Europe’s Largest Donor (2005)

11th Edition. 39 euro. ISBN 2-87451-001-7. Published by European Citizen Action Service (ECAS), www.ecas.org.

EU Funding for Environment (2005)

A handbook for the 2007–13 programming period, published by the WWF European policy office. Can be downloaded free of charge from www.panda.org/epo.

Recent publications from the Secretariat



Status and Impacts of the German Lignite Industry

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.



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.

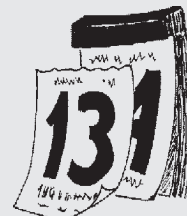
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Coming events

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

Towards Robust European Air Pollution Policies: Constraints and Prospects for a wider dialogue between scientists, experts, decision-makers and citizens.

Göteborg, Sweden 5-7 October 2005. *Information:* http://asta.ivl.se/Workshops/Workshop_oct2005.htm

Time for Action: A discussion on the future of European transport policy. Brussels, Belgium, 5 October. Seminar organized by European Federation for Transport and Environment. *Information:* www.t-e.nu

EU Environment Council. 17 October.

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

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

Clean Vehicles and Fuels. European Symposium and Exhibition 2005. Stockholm, Sweden, 8-10 November. *Information:* www.cleanvehicles.net.

Clean Air For Europe (CAFE) Steering Group. Brussels, 22-23 November 2005.

Third International Conference on Plants & Environmental Pollution. Lucknow, India. 29 November-2 December. *Info:* www.geocities.com/isebindia/index.html

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

EU Environment Council. 2 December.

The importance of Non-Technical Measures for reductions in emissions of air pollutants and how to consider them in Integrated Assessment Modelling. Göteborg, Sweden, 7-9 December. *Information:* <http://asta.ivl.se/workshops/NTM.htm>

LRTAP Convention Executive Body. Geneva, Switzerland, 12-16 December.

Challenges and Innovations for Environment, Transport and Tourism. Conference on environmentally friendly travelling. Vienna, Austria, 30-31 January. *Information:* www.eco-travel.at/english/