

# Acid News

NO. 3, SEPTEMBER 2004

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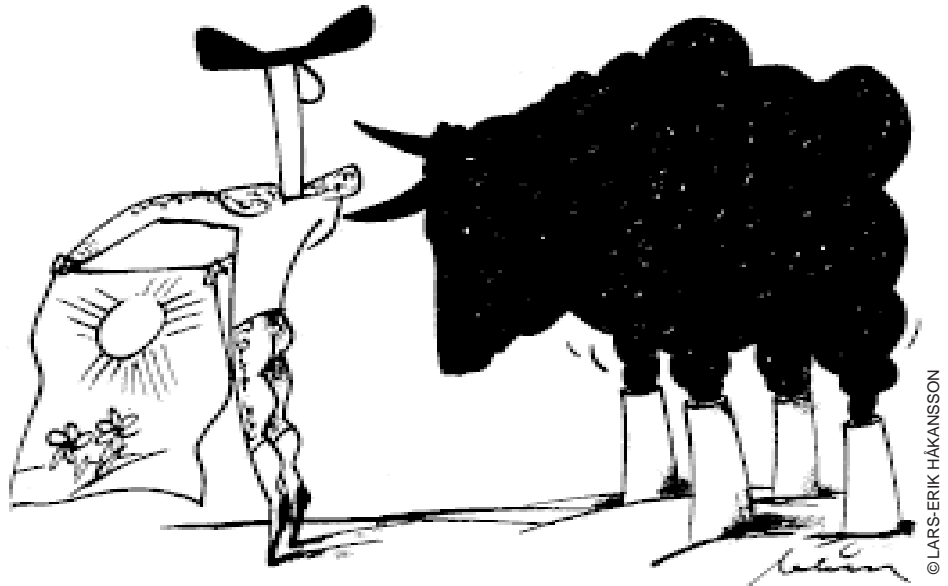
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LARGE COMBUSTION PLANTS

## Worst in Spain

The As Pontes coal-fired power plant in northwest Spain is the largest single emitter of sulphur dioxide in the "old" EU15. The plant is also among the largest emitters of nitrogen oxides and carbon dioxide in the region, according to the EPER (European Pollutant Emission Register). But Spain has also several other large emitters of air pollutants.

### As Pontes

The As Pontes de García Rodríguez coal-fired power plant is located in the municipality bearing the same name, in the province of A Coruña, in the north of the Iberian Peninsula, situated in a wide valley crossed by the river Eume and its tributaries. It uses a type of coal called lignite and has four turbines rated at 350 MW each, giving it a power generating capacity of 1400 MW.

The plant, which produces six per cent of all the electricity generated

in Spain, emitted 336,095 tonnes of SO<sub>2</sub> in 2002. Its output and emissions vary considerably from year to year, however, as can be seen from table 1 (p.3). The Region of Galicia, where the power plant is situated, is an energy exporter to the rest of Spain, accounting for 37 per cent of the total SO<sub>2</sub> emissions by the country. In addition to high emissions of sulphur, As Pontes also releases around 20,000 tonnes of NO<sub>x</sub> per year.

To reduce harmful effects in the immediate vicinity of the plant it has a 356-metre-high chimney to disperse the gases in an effective manner. The power plant does not have any emission control equipment for reducing SO<sub>2</sub> and NO<sub>x</sub> emissions.

One major reason why emissions of sulphur dioxide are so high is that the main source of power is lignite from a nearby opencast mine. This fuel has a very high sulphur content

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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.

# Happy anniversary!

IT WAS OVER THIRTY years ago that air pollution was identified as an environmental problem that was not limited by national borders, and one that required international co-operation. This fact laid the foundation for the drawing up of the Convention on Long-Range Transboundary Air Pollution (CLRTAP), which was signed in Geneva on 12 November 1979, and is now entering its 25th year.

The convention, which applies to the whole of Europe, Canada and the US, initiated a process that stimulated research and the international exchange of knowledge and information, which in turn spurred on political decisions on the measures needed to reduce emissions, both nationally and internationally. Since it was signed, the convention has led to a series of agreements, known as protocols, which give binding commitments on emission limits.

Today we can state that emissions of sulphur dioxide from land-based sources in Europe have fallen by more than two-thirds since 1980. Emissions of other air pollutants have also dropped, but not by anywhere near as much – nitrogen oxides and volatile organic compounds have fallen by roughly a third, and ammonia by a quarter.

It is naturally difficult, and perhaps impossible, to give a quantitative estimate of the proportions of these emission reductions that can be ascribed to the convention, but there is no doubt that it has been a contributory factor.

The work carried out under the convention has had a consistently strong scientific basis, particularly the mapping out and description of air pollutant emissions, transport, deposition and environmental effects. During the 1990s the convention also developed and applied new tools, such as critical loads and integrated assessment modelling, which in turn led to the development of cost-effective, effect-based strategies to tackle the problems.

The latest agreement under the convention, the Gothenburg Proto-

col of 1999, was put together according to this model and set binding national emission ceilings for four pollutants (SO<sub>2</sub>, NO<sub>x</sub>, VOCs, and NH<sub>3</sub>) that must be achieved by 2010.

The Gothenburg Protocol is cleverly constructed with nationally differentiated undertakings that are designed to achieve commonly agreed interim environmental targets at least cost for Europe as a whole. However, this requires that every country participates, and so far – almost five years after being signed – the protocol has only been ratified by twelve of the sixteen countries that are required for it to come into force. (The protocol has been signed by 31 countries in total.)

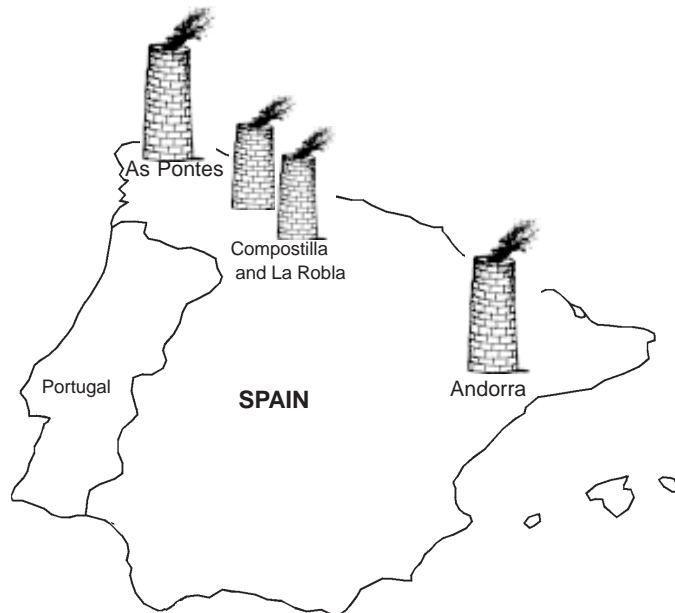
Even when the agreement was signed in 1999 it was clear that the emission reductions that were agreed were insufficient to achieve the long-term objective of not exceeding critical loads. It is therefore expected that there will be a process of review and revision in which emission ceilings are progressively lowered – a process that cannot begin, however, until the agreement has come into force.

Ratification ought to be particularly easy for the EU25 member countries, since they are already bound by the EU directive on national emission ceilings, which entails commitments for every country that are at least as far-reaching as those of the Gothenburg Protocol. The fifteen EU countries<sup>1</sup> that still have not ratified must therefore do so immediately.

The coming into force of the protocol is critically important in order to start the necessary process of review and revision, and is also important for the credibility of the convention. It would also make a very welcome and well-earned present for the convention's 25<sup>th</sup> anniversary.

CHRISTER ÅGREN

<sup>1</sup> The countries that have not yet ratified are listed on the convention's website: [www.unece.org/env/lrtap/status/99multi\\_st.htm](http://www.unece.org/env/lrtap/status/99multi_st.htm)



Continued from front page

(6–8 per cent), as well as a very low calorific value (between 1,600 and 2,200 kcal/kg). The operating reserves were estimated at 300 million tonnes in 1972.

On the other hand the plant also burns coal of a higher quality (anthracite). This is imported mainly from Indonesia and has a considerably lower sulphur content, at around 0.8 per cent. Burning a larger proportion of imported coal would mean significantly lower emissions of SO<sub>2</sub>, but also go against an energy policy that encourages the use of native resources, since lignite production from this mine represents around 30 per cent of the total national energy production (in tonnes).

In fact, there is a whole set of legislation designed to promote use of indigenous coal. For example, under this legislation, in 2003 the As Pontes power plant was awarded a specific bonus of 5.42 euro/MWh and a permanent bonus of 2.55 euro/MWh for using indigenous coal.

As Pontes belongs to ENDESA, a former public company that was gradually privatized in a series of stages leading to its total privatization in the late 1990s. A large percentage of the production of this company relies on coal, which in the past

has meant enormous economic benefits. Today, however, its profitability is not so good, partly as a result of stiffer environmental requirements.

#### Andorra

The Andorra power plant is located in the province of Teruel (Aragón region), between two tributaries of the River Ebro that run through the Iberian mountain chain in the northeast of the Iberian Peninsula. The province has an economy that is traditionally based on agriculture and cattle farming. The plant, which burns black lignite, also belongs to ENDESA and, like As Pontes, has four 350 MW turbines yielding a total generating capacity of 1400 MW.

Each year this power plant consumes four million tonnes of coal from various sources: 25 per cent from the mines near the plant (black lignite), 50 per cent from private mines in different parts of the province of Teruel, while the remaining 25 per cent is imported coal (soft coal). The coal used by this plant has a calorific value ranging from 3,000 to 4,500 kcal/kg.

One method that is used to reduce emissions of SO<sub>2</sub> is to mix high-sulphur “native” coal with that of higher quality (imported) coal, but since 1988 the power plant has also had a

coal washing facility, with the capacity to treat almost three million tonnes per year. This washing process achieves a 40-per-cent reduction in the sulphur content of the treated fuel. Part of the plant also has a fluidized bed system, which provides some reduction in SO<sub>2</sub> emissions.

Despite these measures, the plant emitted 209,148 tonnes of SO<sub>2</sub> in 2002, which makes it the second largest single emitter of SO<sub>2</sub> in the EU15 this year (the figure from EPER, 152,000 tonnes, refers to 2001 – see AN 2/04, in which the plant is incorrectly referred to as Teruel).

The Andorra power plant also emits large quantities of NO<sub>x</sub> – see table 2 below.

#### Other large point sources in northern Spain

The situation for other northern facilities in Spain is anything but encouraging. Also in the northwest of Spain (in the province of Leon) are the Compostilla and La Robla power plants. These facilities, belonging to ENDESA and Union FENOSA respectively, may not be among the largest SO<sub>2</sub> polluters, but their NO<sub>x</sub> emissions are the highest in Spain, see tables 3 and 4 below.

Compostilla also emitted 87,730 tonnes of SO<sub>2</sub> during 2002. Air quality measurement stations near Compostilla registered pollutant levels higher than the legal limits for particulate matter (PM<sub>10</sub>) in 2002.

To complete the picture, the Meirama power plant owned by Union FENOSA in the province of Galicia, not far from As Pontes, emitted 19,715 tonnes of NO<sub>x</sub> in the year 2000.

Overall this data paints a pessimistic picture, made even worse by the fact that ENDESA spokesmen put forward company plans this year that advocate the continued use of coal to generate electricity.

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

Table 1. As Pontes, emissions of SO<sub>2</sub> 2000-02.

Year	SO <sub>2</sub> (tonnes)	Electr. output (GWh)
2000	71,962	3,725
2001	315,202	10,714
2002	336,095	11,368

Table 2. Andorra, emissions of NO<sub>x</sub> 2000-02.

Year	NO <sub>x</sub> (tonnes)	Electr. output (GWh)
2000	27,942	7,254
2001	20,230	5,268
2002	28,072	7,369

Table 3. Compostilla, emissions of NO<sub>x</sub> 2000-02.

Year	NO <sub>x</sub> (tonnes)	Electr. output (GWh)
2000	38,360	7,575
2001	35,361	7,223
2002	39,403	7,722

Table 4. La Robla, emissions of NO<sub>x</sub> 2000-02.

Year	NO <sub>x</sub> (tonnes)	Electr. output (GWh)
2000	23,607	4,703
2001	22,593	4,210
2002	25,950	4,508

# Weak demands from Council

While the Parliament's proposal would reduce sulphur emissions by around 80 per cent, the Council's position is expected to mean that emissions would only fall by around 10 per cent.

ON 28 JUNE THE EU environment ministers reached political agreement on the draft directive aimed at reducing emissions of sulphur dioxide from ships. In doing so, the Council expressed its general support of the Commission's original proposal, that all ships in the North Sea, English Channel, and Baltic Sea, as well as all passenger ships travelling between EU ports, will be limited to using marine heavy fuel oil with a maximum sulphur content of 1.5 per cent.

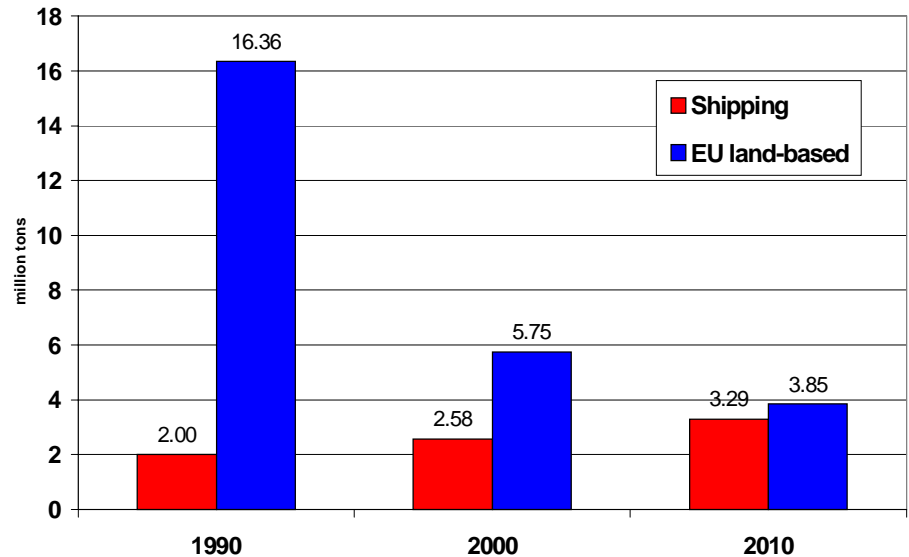
The decision was not unanimous however – Italy voted against the proposal, primarily to protest against the requirement for passenger ship fuels, which naturally will also apply to vessels in the Mediterranean.

The proposal was not supported by Sweden either, on the grounds that considerably stricter requirements should be imposed. Sweden argued that the Council should instead back the proposal of the European Parliament, which requires that sulphur content should be limited to 0.5 per cent, and that this limit should apply to all vessels in all seas around Europe, including the Mediterranean and the Northeast Atlantic (see AN 3/03).

While the Parliament's proposal would reduce sulphur emissions from vessels around European coasts by around 80 per cent, the Commission's more limited proposal is expected to mean that emissions would only fall by around 10 per cent by 2008 relative to emissions levels in the year 2000.

The text that the ministers of the environment agreed means, among other things, that the EU will:

- introduce its own legislation confirming the 1.5 per cent limit on sulphur content that was previously agreed by the International Maritime Organization (IMO), and which will apply from May 2006 to the Baltic Sea, and from 2007 to the North Sea and English Channel (see article on opposite page);
- introduce the same fuel require-



Emissions of sulphur dioxide in 1990, 2000 and 2010. Those from land-based sources refer to EU15 and assume that all fifteen countries will fulfill their commitments under the NEC directive. Emissions from shipping are those from international traffic in European sea areas. The projection for 2010 assume an increase in traffic by 3 per cent a year. Unit: million tonnes.

ment (max. 1.5 per cent sulphur content) for all passenger ships operating on regular services to or from Community ports, to apply as from May 2006; and,

- require ships at berth in EU ports as well as inland vessels to use fuel containing no more than 0.1 per cent sulphur, to apply from January 2010.

According to the Commission, these requirements will have significant human health benefits by reducing the incidence of asthma, bronchitis and heart failure. It is estimated that the expected emission reductions will lead to at least 2000 fewer life years lost in the EU every year through long-term exposure, and 750 fewer deaths from short-term exposure. It will also help reduce acidification of lake and forest ecosystems in northern Europe.

Commenting on the agreement, the Environment Commissioner Margot Wallström said she believes that EU countries can and must do more internationally to improve environmental standards for ships, and pointed out that twenty EU countries still have not ratified the 1997 An-

nex VI to the MARPOL convention.

Following the present agreement by the Council, a formal so-called common position will be adopted by the Council. This will then be sent to the Parliament for a second reading. Should there still remain major disagreement between the two institutions, there will have to be recourse to conciliation negotiations, before the directive can be finally adopted.

CHRISTER ÅGREN

Further information can be found at the website of the Commission's Environment Directorate: <http://europa.eu.int/comm/environment/air/transport.htm#3>

**BACKGROUND:** The Commission's proposal for a revision of directive 1999/32/EC on the sulphur content of liquid fuels was presented in November 2002, jointly with a communication on an EU strategy for reducing atmospheric emissions from seagoing ships (see AN 1/03). The European Parliament gave its opinion (first reading) in June 2003, including a large number of proposals aimed at strengthening the requirements (see AN 3/03).

# Rules for large ships take effect next year

FOLLOWING ITS RATIFICATION by 15 countries, Annex VI to the International Convention on the Prevention of Pollution from Ships (MARPOL) will come into force on 19 May 2005. Samoa became the fifteenth and hence deciding country to ratify the agreement, which was originally signed eight years earlier, in 1997.

The fourteen other countries that have ratified the agreement are the Bahamas, Bangladesh, Barbados, Denmark, Germany, Greece, Liberia, the Marshall Islands, Norway, Panama, Singapore, Spain, Sweden, and Vanuatu. Together these fifteen countries represent just over 54 per cent of the world's merchant shipping tonnage<sup>1</sup>.

Annex VI sets limits on the sulphur content of marine heavy fuel oils (with a global cap of 4.5 per cent) and on the emissions of NO<sub>x</sub> from new ship engines. These standards

are however so weak as to be hardly likely to have any appreciable effect. For example, the current global average sulphur content of marine heavy fuel oil is estimated to be about 2.7 per cent. On the other hand, the annex also sets a limit of 1.5 per cent sulphur for heavy fuel oil used by ships sailing in Sulphur Emission Control Areas (SECAs), which should lead to reductions in the two designated areas, the Baltic and the North Sea. (As an alternative to using 1.5 per cent sulphur fuels, ships may choose to fit an exhaust gas emission control system to limit their SO<sub>2</sub> emissions.)

The very construction of the treaty however permits still further delay in SO<sub>2</sub> emission reductions, since there is a special exemption from the 1.5-per-cent requirement in SECAs for a further year after the date of entry into force. In practice

this will mean that the 1.5-per-cent sulphur limit won't start to apply in the Baltic until May 2006, while the corresponding requirement for the North Sea will be delayed until May 2007. This is because the decision to make the North Sea a SECA was taken later than that for the Baltic.

The weak requirements do not mean that the eventual entry into force of Annex VI will be of little practical importance. For one thing the SECA limits, such as they are, will at least begin to apply, and for another it will open the way to further proposals and negotiations for tighter limits on fuels and emissions, as well as the setting up of more SECAs. Moreover, the annex calls on the International Maritime Organization (IMO) to monitor the worldwide average sulphur content of fuels.

CHRISTER ÅGREN

<sup>1</sup> The entry-into-force requirements specify acceptance by 15 member states of the International Maritime Organization (IMO), representing at least 50 per cent of the world's merchant shipping tonnage. The rules of the annex apply to all ships, but can be enforced only by parties to the annex. *Further information:* [www.imo.org](http://www.imo.org)



## Clean Marine Award

In an effort to obtain positive publicity for environmentally responsible shipping the EU Commission has established a Clean Marine Award, covering three different categories. The winners were presented in Brussels on 1 June.

**Winner in the Ship Operators category** was the German company *Reederei Rord Braren* for their three ultra-clean ships. They emit 90 per cent less nitrogen oxides (NO<sub>x</sub>) and 80 per cent less sulphur dioxide (SO<sub>2</sub>) than standard ships. Credit is also due to Finnish shippers *Stora Enso* who use the vessel.

**Nominee:** *Bijlsma* (& Knutsen) for their unique new Liquefied Natural Gas tanker with two separate engines, one running on boil-off from its own LNG cargo, the other on diesel.

**Other entries:** Nine operators who have taken a variety of environmental measures, including switching to low-sulphur oil and installing NO<sub>x</sub> reduction technology.

**Winner in the Shippers category** was the Swedish freight logistics company *SCA Transforest AB* for their low-emission logistics policy. They have invested in emissions reduction for three vessels they operate on long-term lease; through catalytic reduction they have reduced emissions of NO<sub>x</sub> by 1,500 tonnes per year, and through the use of 1-per-cent sulphur fuel they have reduced SO<sub>2</sub> by 1,000 tonnes per annum. They have maximized loads by seeking return cargoes and increasing capacity, by lengthening the vessels. By doing this they have been able to reduce fuel consumption per tonne carried, and so emissions, by 15 per cent.

**Nominee:** *Volvo & Wallenius Wilhelmsen* for their collaboration to ensure high capacity and low emissions from their global fleet of car-carriers.

**Winner in the Port Authorities category** was *Port of Göteborg* for the pro-

vision of shore-side electricity. Connection to shore-side electricity allows ro-ro ships to switch off engines while in port, reducing air emissions from marine fuel combustion, and noise emissions from engine turnover. Emission reductions are currently 80 tonnes of NO<sub>x</sub> per annum, 60 tonnes of SO<sub>2</sub> and 2 tonnes of "solid matter" (i.e. primary particulates and soot). The source of the shore-side electricity is wind power.

**Nominee:** the *Port of Stockholm* for their policy of environmentally differentiated port dues, giving fee rebates to ships that use low-sulphur fuel and NO<sub>x</sub> reduction technologies.

**Other entries:** *Port of Göteborg* for vapour emission recovery equipment for tankers. *New Hansa* for encouraging 11 Baltic Sea ports to work together to reduce emissions.

*Further information:* [www.europa.eu.int/comm/environment/clean\\_marine/](http://www.europa.eu.int/comm/environment/clean_marine/)

# Shore-side electricity can reduce in-port emissions

Supplying shore-side electricity to ships at berth – a process known as “cold ironing” – is a cost-effective means of reducing emissions of air pollution, according to two studies.

While docked at the port, ships shut off their propulsion engines, but they use their auxiliary engines to power refrigeration, lights, pumps and other equipment. These auxiliary engines are usually powered by high-sulphur marine heavy fuel oil (HFO), or in some cases by lower-sulphur marine gas oil (MGO), resulting in significant emissions of air pollutants, including sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), particulates (PM), and volatile organic compounds (VOCs).

These pollutants contribute to several environmental problems, such as the acidification and eutrophication of ecosystems and increased concentrations of ground-level ozone. They also cause damage to people’s health, an aspect that is of special concern since many large ports are situated in or close to densely populated cities.

Emissions from vessels in port can be reduced in many different ways, e.g. by ensuring that vessels use low-sulphur fuels, which can greatly reduce emissions of both SO<sub>2</sub> and PM. Emissions of NO<sub>x</sub> can also be reduced significantly through the use of technology such as the Humid Air Motor (HAM) or flue-gas denitrification (SCR). These measures also have the advantage that they can drastically reduce total emissions from shipping – naturally on condition that they are also used when the vessels are at sea. However, despite the fact that these technologies are well known and have been shown to work effectively they are actually only applied by a tiny proportion of the world’s shipping.

One possible alternative measure that specifically aims to reduce emissions from vessels in port is to hook them up to shore-side electricity so that they no longer need to run their auxiliary engines.

This solution is not entirely without problems however – for example

it requires investments and certain modifications to be made in the ports and onboard vessels. Systems for supplying shore-side electricity are in themselves nothing new – they have been in use for decades in a few ports and for certain types of vessel. The real question is what is actually required to make such systems more widely accepted and applied, and whether it is a cost-effective method of reducing emissions.

Two new studies – one Swedish and one American – have analyzed this question.

The Swedish study<sup>1</sup> was carried out by MariTerm, concentrating on

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*The benefits associated  
with shore-side electricity  
supplies clearly  
outweigh the costs*

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shipping in the North Sea, and provides economic calculations for six such lines involving almost twenty vessels. The information on costs for shore-side electricity is based largely on practical experience from the Port of Göteborg.

The direct costs for shore-side electricity were found to be two to four times higher than the direct cost of generating electricity onboard by auxiliary engines running on heavy fuel oil. However, the study also evaluated the external costs that emissions of air pollutants give rise to through damage to health and the environment, and these are considerably lower for vessels that are connected to a shore-side electricity supply. Depending on the fuel (HFO or MGO) and the type of shipping service investigated, the external costs for onboard generation of electricity were found to be between 15 and 75

times higher than those for shore-side electricity connection. (The shore-side electricity was assumed to be generated by modern coal-fired power plants.)

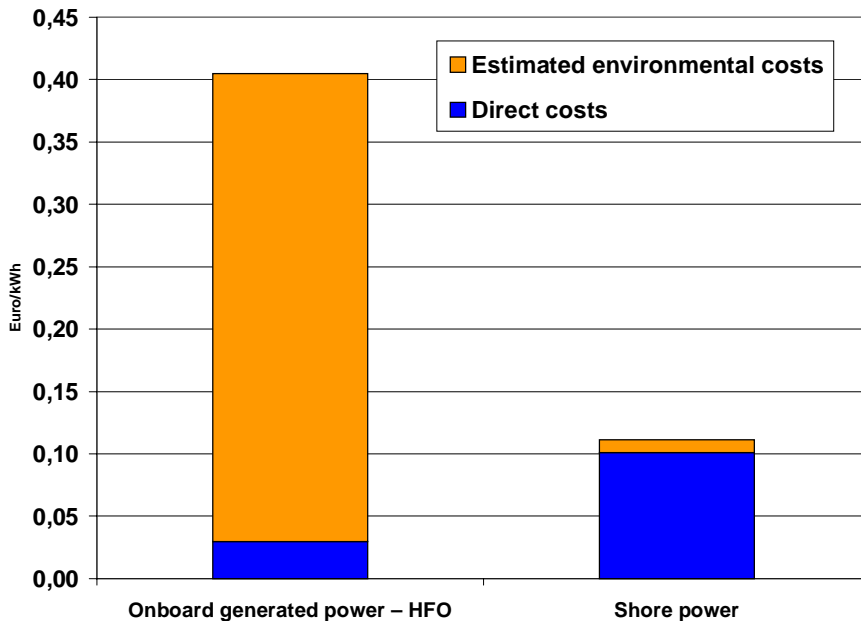
A comparison between direct electricity generation costs and estimated external costs of onboard generation and shore-side electricity, respectively, shows that the benefits associated with shore-side electricity supplies clearly outweigh the costs of these systems, as illustrated in the figure.

MariTerm points out that these calculations are based on several assumptions, and that they only apply to the six shipping services investigated. They also stress that the estimated costs for shore-side electricity connection tend to be at the “upper end”, while the estimated external benefits of reduced emissions are likely to be underestimates.

Experience from the Port of Göteborg, among others, has shown that the practicalities of handling shore-side electricity systems are simple, if modern high-voltage systems are used. The entire procedure for switching from onboard generated power to shore-side electricity is done in less than ten minutes, including the phasing-in of the new electricity supply and closing down of the onboard auxiliaries.

MariTerm reports that shore-side electricity can effectively reduce air pollutant emissions and noise from vessels in port, thus providing environmental and health benefits. It is also recommended that if a wide-scale application of shore-side electricity systems were to be envisaged, it would be useful to develop a common practice, or international standards, for such systems.

The US study<sup>2</sup> was carried out by ENVIRON on behalf of the Port of Long Beach, California. This report presents an analysis of the feasibility of various types of control tech-



Comparison of average external and internal costs for onboard and shore-side generation of electricity for the six different services investigated in the Mariterm study.

## State ferries switch to low-sulphur diesel

Washington State Ferries, the largest ferry fleet in the US, will reduce its emissions of sulphur dioxide by 90 per cent (just over 400 tons per year) following a decision to switch to diesel with a sulphur content of 350 ppm. At the same time it will reduce emissions of particulate matter by 75 tons, a 30-per-cent reduction. The added cost is reported to be about \$150,000 a year for the fleet.

The voluntary changes made by the state agencies came soon after the EPA announced the Clean Air Nonroad Diesel Rule and issued an advance notice of proposed rulemaking on new emission standards for diesel engines used in marine vessels.

Washington State Ferries is also beginning tests on diesel with a sulphur content that ranges from 15 to 30 parts per million. The sulphur content of the diesel that has been used so far is 3500 ppm. They will also be testing a 20-per-cent mix of biodiesel with the low-sulphur diesel.

Source: Environment News Service, 3 June 2004.



## First plugged-in container ship in LA

The world's first electrified container terminal was opened in June in Los Angeles. All ships docking at the new China Shipping terminal will be able to plug into an electricity supply system and turn their diesel engines off instead of continuously running them to generate electricity. It is expected that this will eliminate more than three tons of nitrogen oxides and 160 kg of diesel particulate matter for each ship that plugs in.

The electricity supply technology, called cold ironing, has been used by naval vessels, cruise ships and ferries, but this is the first use for container ships. The electrified system is part of a final settlement negotiated by three environmental organizations and two citizens groups who sued the Port and City of Los Angeles in 2001 alleging they had approved the China Shipping terminal without considering or mitigating harm to neighbouring communities.

Source: Environment News Service, 21 June 2004.

niques to reduce in-port emissions, but the focus is on analyzing the use of shore-side electricity in the Port of Long Beach.

After selection of twelve vessels – representing a cross-section of various vessel types, vessel ages, service routes, and port call frequency – a detailed cost-effectiveness study was carried out. This included among others the conceptual designs, including cost estimates, for providing the shore-side electrical power. Cost-effectiveness was calculated in terms of cost per tonne of emission reduction, treating each pollutant (SO<sub>2</sub>, NO<sub>x</sub>, PM, VOCs, and CO) as equally important.

Based on information such as a comparison with other Californian cost-effectiveness values and thresholds, the study selected US\$ 15,000 per tonne of pollutant removed as the threshold for cost-effectiveness. It was then found that five of the twelve study vessels would be cost-effective candidates for shore-side electrification, and that cold ironing these five vessels would eliminate about 90 per cent of the emissions generated by the twelve study vessels.

The five vessels share the characteristics of high hotelling power demand, frequent port calls, and, except in the case of a cruise ship, significant time at berth per call. These factors combine to result in significant annual energy consumption at

berth – which appeared to be the best single indicator of cost-effectiveness – and consequently greater potential for emission reduction. The analysis showed that cold ironing is generally cost-effective as a retrofit when the annual power consumption is 1.8 GWh or more. For a new vessel with cold ironing equipment installed, calling at a terminal with cold ironing capability installed during the construction of the terminal, cold ironing would generally be cost-effective if the vessel's annual power consumption exceeds 1.5 GWh.

It is concluded that cold ironing is generally cost effective with vessels that have a high annual power consumption at berth, and to use shore-side electricity for such vessels could cause a significant reduction in the emissions generated by the vessels in the Port of Long Beach.

CHRISTER ÅGREN

<sup>1</sup> **Shore-side electricity for ships in ports.** Case studies with estimates of internal and external costs, prepared for the North Sea Commission (July 2004). By MariTerm AB, Gothenburg, Sweden. Can be downloaded from [http://www.mariterm.se/mariterm\\_en/publikationer\\_en.html](http://www.mariterm.se/mariterm_en/publikationer_en.html)

<sup>2</sup> **Cold ironing cost-effectiveness** (March 2004). Prepared for the Port of Long Beach, California. By ENVIRON International Corporation, Los Angeles, USA. Can be downloaded from: [http://www.polb.com/pdfs/4\\_environment/Cold-Ironing-Report.pdf](http://www.polb.com/pdfs/4_environment/Cold-Ironing-Report.pdf)

## Handbook on greener public purchasing

The European Commission has released a handbook encouraging public authorities throughout the EU to integrate environmental considerations into public procurement procedures. The guidance follows a revision of EU procurement rules last year which clarified authorities' rights to set environmental conditions when buying products and services (see AN 1/04, p.8).

The Commission hopes that, by clarifying the existing legal possibilities, "green" public procurement will become more attractive to contracting authorities at all administrative levels throughout the union. The handbook is only available in English at present but will be translated into all official EU languages.

Further information: <http://europa.eu.int/comm/environment/gpp/guidelines.htm>



## Dirty Air, Dirty Power

Nationally, power plant pollution in the United States cuts short nearly 24,000 lives, including 2,800 from lung cancer, as well as causing 38,200 heart attacks each year. Each of those people whose lives were cut short lost an average of 14 years. These are the findings of a report from the consulting firm Abt Associates, produced on behalf of the environmental coalition Clear the Air, using standard EPA methodology.

The report compares the premature deaths that would result under the Bush administration's air pollution plan, the existing Clean Air Act, and a proposal sponsored by Senator Jim Jeffords to strengthen the Clean Air Act.

In general, it found that the administration's plan would provide the fewest benefits – even fewer than the existing Clean Air Act – eliminating 58 per cent of deaths related to power plant emissions by 2020, and the Jeffords' bill the most, eliminating nearly 90 per cent.

<sup>1</sup> **Dirty Air, Dirty Power.** Available at [www.cleartheair.org/dirtypower](http://www.cleartheair.org/dirtypower)

# Unhealthy air

## Outdoor pollution causes 13,000 deaths among children under the age of four in Europe each year

MINISTERS OF HEALTH and the environment and other high-ranking delegates from 52 countries agreed on a Children's Environment and Health Action Plan for Europe (CEHAPE) when the Fourth Ministerial Conference on Environment and Health in Budapest concluded on 25 June.

Under the plan, and the conference declaration, ministers agreed on a series of concrete measures to reduce the impact on children's health of air pollution, water, chemicals and related injuries.

Acknowledging that marked differences across the region and across age groups indicate the need for targeted action in specific countries, the ministers called for national plans to be developed by 2007. A range of measures was elaborated from which member states and local authorities can select the most appropriate, with an emphasis on prevention strategies as the most cost-effective. The table of child-specific measures on environment and health complements and expands the CEHAPE, covering up to 15 risk factors. None of the measures is binding, however.

Several important studies were

presented during the conference.

*The effects of air pollution on children's health and development: a review of the evidence* summarizes the epidemiological and toxicological literature published, for the most part, during the last decade.

This shows that there is a clear link between exposure to air pollution and infant deaths and respiratory diseases affecting children and adults. The researchers conclude that this knowledge is sufficient for a strong recommendation to reduce children's current exposure to air pollutants, particularly those related to transportation.

A one-per-cent increase in children's risk of mortality is due to respiratory effects attributed to air pollution exposure. Because exposure is so common, this small increase places large numbers at risk and, according to the authors, is the "tip of an iceberg hiding a far bigger problem" related to aggravated asthma episodes, as well as increased incidence and prevalence of coughs and bronchitis.

Many air-pollution-related deaths and illnesses in children are proved

**EDUCATIONAL GAME:** *Honoloko, the island of environment and health*, is a new educational game for 10 to 14 year-olds that has been developed jointly by the European Environment Agency (EEA) and WHO Europe. The aim is to raise awareness about health and environment. It is available for free at [www.honoloko.org](http://www.honoloko.org) or on CD-ROM and will be translated into the 25 languages of the EEA member countries as well as Russian. The game is also a key component of a new "kids' zone" that has been added to the EEA website at <http://ecoagents.eea.eu.int>

**NEW EU PLAN:** In the run-up to the conference in Budapest the EU Commission presented an Environment and Health Action Plan that covers the period 2004–2010. The plan is designed to develop an EU system integrating information on the state of the environment, the ecosystem and human health. It identifies 13 actions, which include initiatives on how to better understand the environment-health link and establish how environmental exposure leads to epidemiological effects. It also focuses on research activities, for instance on asthma/allergies, neuro-developmental disorders, cancers and endocrine disrupting effects.

Further information: [http://europa.eu.int/comm/environment/health/index\\_en.htm](http://europa.eu.int/comm/environment/health/index_en.htm)



## Warnings for nine out of fifteen members

On 8 July the European Commission sent first written warnings to nine member countries: Austria, France, Germany, Ireland, Italy, Luxembourg, Portugal, Spain and the United Kingdom.

The reason is their failure to draw up pollution-reduction plans for areas with high concentrations of nitrogen dioxide and particulate matter. The plans – which should have been submitted to the Commission by 31 December 2003 – must describe the measures the countries intend to take to ensure that concentrations of the two pollutants do not exceed the agreed limit values when they come into effect. The limit values for PM<sub>10</sub> must be met by 2005 and those for NO<sub>2</sub> by 2010 (Directive 1999/30/EC).

The countries now have two months in which to respond, after which the Commission has the right to issue a Reasoned Opinion (final written warning). If this has no effect the matter may be taken to the European Court of Justice. If the Court of Justice finds that the Treaty has been infringed, the offending member state is required to take the measures necessary to conform.

Source: Press release from the European Commission, 8 July 2004 (IP/04/872).

## Inadequate implementation criticized

France, Greece, Ireland, Italy, and Spain have the worst records for implementing EU environmental law, according to an annual report<sup>1</sup> from the Commission.

At the end of 2003, there were 88 cases in which environmental directives were not transposed in time. In 118 cases, the directives were not correctly transposed, and in 95 cases member states did not meet “secondary” obligations under the directives, such as deadlines for presenting plans, submitting data or designating protected areas.

There are 509 ongoing infringement procedures related to violations of EU environmental law, and 505 new complaints in the year 2003. Roughly a quarter of all infringement cases, the most serious type of case before the court, involve violations of air quality laws.

<sup>1</sup> **Fifth Annual Survey on the implementation and enforcement of EU environmental law.** Available at <http://europa.eu.int/comm/environment/law/as03.htm>

to be due to respiratory infections. Studies conducted in Europe report that the incidence of acute respiratory infections is up to 50 per cent higher in children living in the most polluted areas than among those in the least polluted areas. Exposure to ambient air pollution also causes increases in the incidence of upper and lower respiratory tract symptoms, many of which are symptoms of infection.

The researchers also recommend pregnant women to avoid areas with high levels of air pollution. It is suspected that air pollutants may harm unborn children.

“If my wife was pregnant I would definitely make sure that she spent her time in as clean an environment as possible,” said WHO expert Dr Michal Krzyzanowsky in a comment to the Swedish broadcasting company Sveriges Radio when the results of the study were presented.

Another study, that was also published in the *Lancet*, shows that every third mortality case among European children in the age group 0–10

is due to environmental factors such as outdoor and indoor air pollution, unsafe water, lead and injuries.

In total this means that there are 100,000 deaths and six million years of healthy life lost every year in children and adolescents. Outdoor pollution causes 13,000 deaths of children under the age of four each year through chest infections, asthma, low birth weight and impaired lung function. According to the WHO more than 5,000 of these lives could be saved if the levels of particulates in the air in these countries could be decreased to the EU limit value for PM<sub>10</sub> that needs to be reached by 2005.

The study also shows that the risks are unevenly distributed. The mortality rate is highest among children from countries that were part of the former Soviet Union, followed by eastern European countries. However, there are also significant health risks in western Europe.

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Further information: [www.euro.who.int/budapest2004](http://www.euro.who.int/budapest2004)

# Fossil fuels get largest subsidies

STATE SUPPORT to the energy sector in the EU's former 15 member countries amounted to 29.2 billion euros in 2001, according to a survey by the European Environment Agency.<sup>1</sup>

Around two-thirds of this amount, 21.7 billion euros, went on fossil fuel production and consumption. Almost half the total figure went on coal, and Germany alone supported its coal industry to the sum of 7.5 billion euros. Subsidies for oil and gas were highest in the Netherlands, UK and Italy.

Subsidies for renewable energy were much lower than for fossil fuels, standing at 5.3 billion euros in 2001. Total levels of support were greatest in Germany and Italy.

Aside from these subsidies there are also historical factors to consider. More mature fuels, such as natural gas, continue to benefit from the technological and industrial infra-

structure built up during previous decades.

The calculations do not take into account the fact that the different energy sources give rise to totally different external costs. For example, the costs to society of air pollutant emissions from coal-fired power plants are not included in the subsidies for energy from coal.

The EEA states that there is a lack of agreement on what constitutes an energy subsidy. The EU's sixth environmental action programme does, however, recommend: “reforms of subsidies with considerable negative effects on the environment and that are incompatible with sustainable development”.

<sup>1</sup> **Energy subsidies in the European Union: A brief overview.** EEA Technical report 1/2004. Available at [http://reports.eea.eu.int/technical\\_report\\_2004\\_1/en](http://reports.eea.eu.int/technical_report_2004_1/en)

## Warmer temperatures mean more ozone

A hundred million people in the US already live in counties with unhealthy levels of ground-level ozone. The situation is likely to be aggravated if the climate becomes warmer, since higher temperatures speed up ozone formation.

A study of the air quality in 15 cities in the eastern US, published by the Natural Resources Defense Council, shows that by mid-century, people living in these cities would see, on average, a 60-per-cent increase in the number of days when ozone levels exceed the health-based air quality standard set by the EPA (using an eight-hour measurement).

The deterioration in air quality examined in the report is due solely to rising summer temperatures predicted by climate change models and does not take into account reductions in ozone-forming pollution.

Further information: [www.nrdc.org/media/pressreleases/040804.asp](http://www.nrdc.org/media/pressreleases/040804.asp)



## Ambitious target

French emissions of greenhouse gases must be reduced by 75 per cent by 2050. This is laid down in an energy bill that was adopted by the French parliament on 1 June. It is the most ambitious plan so far agreed by a European government, though it has been criticized by Green representatives for concentrating too much on nuclear power and not enough on renewable energy, and for failing to respect the polluter pays principle.

Source: *T&E Bulletin* 130, July 2004.

## One-tonne challenge

The government of Canada has calculated that each Canadian produces more than five tonnes of greenhouse gas emissions every year. Half of it comes from car driving. Now it is asking Canadians to take on a new challenge – the One-Tonne Challenge.

Further information, including a Greenhouse Gas Calculator is available online at [www.climatechange.gc.ca/onetonne/calculator/english/](http://www.climatechange.gc.ca/onetonne/calculator/english/)

# Dramatic increase in ice melting

NEW RESEARCH published by the Geological Survey of Greenland and Denmark shows that the Greenland ice-sheet is shrinking by 10 metres a year – ten times faster than previously expected.

Enormous quantities of water are bound up in the ice-sheet over Greenland, which has a total volume of almost three million cubic kilometres. If all this ice were to melt it would raise the level of the world's oceans by nearly seven metres – sufficient to put large areas of cities such as London and New York under water and have even more catastrophic consequences in poorer countries.

Researchers at the Hadley Centre for Climate Prediction in the UK have previously shown that if the annual mean temperature over Greenland

rises by more than 2.7°C the rate of melting would outpace the annual snowfall. And the greater the warming, the faster the snow melts. Most climate models predict that the temperature near the poles will rise more than the global average, and a local rise in temperature of 8°C over Greenland is not considered improbable.

The scientists on the Greenland survey admit they have no way of setting any kind of timetable for a rise in water levels or forms of climate change, and insist that further monitoring will have to take place over the next few years to get a clearer picture. But they do admit that their findings are worrying and suggest a much more serious picture for global sea levels than had been available until now.

## Marine biodiversity threatened by increasing levels of CO<sub>2</sub>

SINCE 1800 IT IS estimated that the oceans have taken up approximately 120 billion tonnes of carbon generated by human activities, while some 20 to 25 million tonnes of carbon dioxide are being added to the oceans each day. Without this sink the level of carbon dioxide in the atmosphere would have risen much more than it has already done.

However, this massive uptake of carbon dioxide by the oceans – unparalleled over the last 20 million years – could disrupt marine food chains and alter ocean biogeochemistry, according to researchers at a symposium held in Paris in May.

The precise mechanisms and eventual effects are largely unknown. One thing that is clear is that the higher level of CO<sub>2</sub> shifts the balance in such a way that the carbonate ion concentrations decrease in sea water. The scientists concluded that by 2050 the oceans would be more acidic globally, and would also be more stratified in the high latitudes.

Acidification makes it more difficult for shell-forming organisms and coral-building animals to deposit chalk. For coral reefs this can pose a serious threat, since they are already stressed by rising water temperatures and other human influences. Stratification affects the transport of oxygen and nutrients between water at different depths.

The biological effects of this have so far attracted little attention. But changes are “clearly underway and their effects may be large and may seriously destabilize marine ecosystems,” the delegates concluded.

The researchers also warn against measures that are intended to artificially increase the uptake of carbon dioxide by the oceans – the effectiveness and risks of such sequestration have not been thoroughly assessed.

Source: *Environment News Service* 19 July 2004. The report “*The Ocean in a High-CO<sub>2</sub> World*” is available at: <http://ioc.unesco.org/iocweb/co2panel/HighOceanCO2.htm>



There is no real evidence of industry relocation in response to weak air pollution standards in third-world countries. Labour costs and access to market are much more important than environmental legislation, according to a recent study.

## Air pollution laws no harm to competitiveness

THERE IS VIRTUALLY no evidence that EU air pollution legislation has significantly damaged the competitiveness of European industry. The finding, which comes in a study ordered by the Commission, is a response to the growing tendency of EU industry to say it is being disadvantaged by environmental legislation compared with non-EU competitors.

The study looks at the various claims that EU controls could be damaging industry and says they are all unfounded. Though the study focused solely on air pollution, it finds no evidence of EU firms being disadvantaged when compared with the US and Japan. Although there are differences between the countries in terms of industrial environmental expenditure as a percentage of gross value, all the costs are so small as to be unlikely to have any effects on competitiveness.

In the case of third-world countries where air pollution standards may be weak or entirely lacking, there is no real evidence of industry relocation in response. In any case, it is clear that labour costs and access to market are much more important than environmental legislation, the study concludes.

The study also finds that, in general, air pollution legislation costs

less in practice than is predicted before it is passed. And though there is some evidence of increased costs, these are usually small in relation to wider price effects or other factors. As an example, it cites EU vehicle emission controls introduced since 1993, which were predicted would increase new car prices by up to 20 per cent, but since then prices have fallen by 7 per cent in real terms.

“To date there is very limited evidence for there being significant competitiveness effects resulting from air pollution legislation on a general level,” write the authors of the report. And even though it may not be possible to draw any reliable conclusions regarding future legislation, most signs indicate that environmental requirements will be stiffened in every country and that the effect for the EU would not be so significant as to have a major impact on international competitiveness.

Adapted from **T&E Bulletin**, May 2004. The study: *A Comparison of EU Air Pollution Policies and Legislation with Other Countries. Review of the Implications for the Competitiveness of European Industry*. By AEA Technology Environment and Metroeconomica, on behalf of the European Commission, DG Enterprise. January 2004. Available at [http://europa.eu.int/comm/enterprise/environment/reports\\_studies/](http://europa.eu.int/comm/enterprise/environment/reports_studies/)

## Blackout cleared the air

The wide-reaching electricity blackout that affected the eastern US in August last year cleared the air considerably. On 15 August, one day after many power plants shut down, the concentrations of sulphur dioxide and ground-level ozone had fallen by 90 and 50 per cent respectively, while the concentration of particulates fell by 70 per cent and visibility was improved by around 20 miles (32 km).

“What surprised us was not so much the observation of improved air quality during the blackout, but the magnitude of the observed improvement. The improvement in air quality was so great that you could not only measure it, but could actually see it as a much clearer, less hazy sky,” comments Lackson Marufu, one of the researchers who presented the results.

Source: **Environment News Service**, 10 June 2004.

## China's emissions increase – stronger incentives needed

Emissions of sulphur dioxide in China fell slightly between 2000 and 2002, but rose by just over 15 per cent between 2002 and 2003: from 19.3 to 22.2 million tonnes. The increase reflects the fact that coal-fired power generation was increased by just over 15 per cent in the same period in an attempt to stave off recurring electricity shortages.

According to the State Environmental Protection Administration, SEPA, weak pollution control policies for thermal power plants are one of the main reasons for the rise in emissions. These plants often emit more sulphur dioxide than they are permitted to, since the fine per tonne of emissions is less than half the cost of controlling emissions.

To reduce emissions SEPA has decided on a package of measures that includes the building of more desulphurization facilities at power plants and ensuring that fines imposed on polluters will be gradually raised to a level higher than the costs of desulphurization. A pollution licensing system will also be introduced in the power and industry sector in order to enhance control over the total amount of emissions. Outdated power plants will be shut down. It is said that by 2020, this will limit sulphur dioxide emissions nationwide to less than 7.84 million tonnes.

Source: **Car Lines** No.3, June 2004.

# Fair prices a key issue

Flawed pricing for energy and transport is a major reason why many environmental targets are still a long way off, according to a new report from the European Environment Agency.

Transport and energy are among the sectors that give rise to the greatest environmental impact within the EU, according to a report from the European Environment Agency, EEA.

## Energy – renewable target still a long way off

Energy use is still increasing within the EU. In particular the domestic sector's demand for electricity and transport are rising in line with increasing wealth and the growing number of smaller households.

Energy use is not however increasing at the same rate as gross domestic product. Between 1995 and 2001, energy use rose by 7 per cent while GDP increased by 16 per cent.

The renewable share of gross electricity consumption in the 25 EU countries (EU25) grew from 12 per cent in 1990 to 14 per cent in 2001. A substantial further increase is needed to meet the EU indicative target of 21 per cent by 2010.

Large-scale hydropower schemes provide most of the electricity currently produced from renewable sources, about 85 per cent, but they will not contribute to future increases due to environmental considerations and a lack of available sites. Future growth in renewable electricity needs to come from other renewable energy sources, such as wind, biomass, solar and small-scale hydropower.

“Creating favourable conditions for renewables is a key requirement for increasing their market share,” writes the EEA, recommending among other things that the EU should set policy targets beyond 2010 to provide long-term investment security; implementing support schemes; and getting the prices right by fully including external costs in energy prices.

## Transportation – air travel growing fastest of all

Demand for transport, especially road transport, is growing rapidly. Freight volumes are growing by 3 per

cent a year, faster than the economy, for which the figure is around 2 per cent for the 15 “old” EU member states. Passenger transport is increasing at the same rate as the economy.

Air travel – driven primarily by tourism – is showing the fastest increase of all modes of passenger transport. The growth rate is 6–9 per cent per year in both the old and new EU member states.

The market shares of modes such as rail and bus travel are increasing only marginally, if at all.

“Decoupling transport demand from economic growth has been a key aim of EU transport policy for several years but has yet to show results,” writes the EEA, and continues: “Adjusting policy so that the market share taken by each transport mode reflects its environmental impact would mean establishing a closer link between the prices paid by users and the total internal and external costs of transport.” EEA statistics show that fuel prices have remained within the same price range for more than 20 years.

## Air quality – further action is needed

Despite reductions in emissions of both ozone precursors and fine par-

ticulates – by 30 and 36 per cent respectively from 1990 to 2001 – it is estimated that up to 45 per cent of Europe's urban population remains exposed to particulate concentrations (PM<sub>10</sub>) exceeding limit values, and up to 30 per cent to ozone concentrations above target levels for protecting human health.

Ozone limits are exceeded mainly in central and southern European countries; for PM<sub>10</sub> limits are exceeded mainly in parts of Europe with a dry or continental climate.

Concentrations of nitrogen dioxide (NO<sub>2</sub>) exceeding the annual limit value are recorded almost exclusively at urban monitoring stations, especially those near heavy road traffic.

“Further action is needed to bring down pollution, especially as limits and targets may be tightened in response to growing evidence of health impact at concentrations below the current values,” comments the EEA.

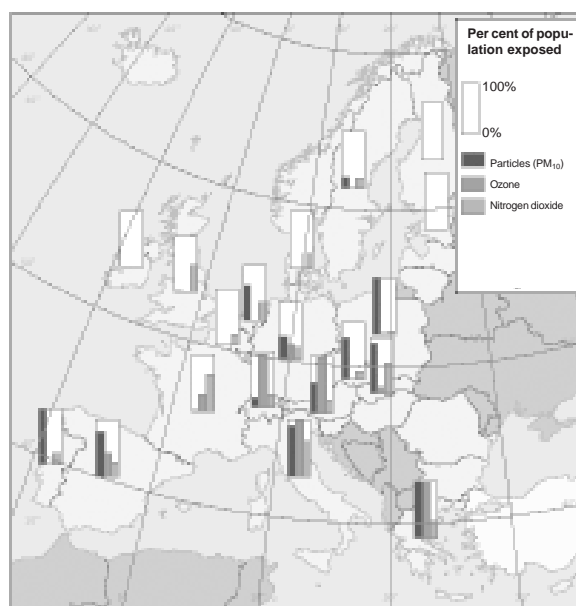
The EEA report also considers other issues that are linked to air quality, for example it shows that the evidence of climate change is growing, both on land and in the oceans: glaciers are receding and marine species are being disturbed. The report also gives an environmental perspective on the economic and social situation in Europe, including trends in demography and resource use.

PER ELVINGSON

**EEA Signals 2004. A European Environment Agency update on selected issues.** 36 pp. ISBN 92-9167-669-1. Available at <http://reports.eea.eu.int/signals-2004/en>

**Per cent of urban populations exposed to concentrations of particulates (PM<sub>10</sub>), ozone and nitrogen dioxide above limit and target values.**

Source: EEA Signals 2004.



## Effects are already discernible

- More frequent and more economically costly storms, floods, droughts and other extreme weather.
- Wetter conditions in northern Europe but drier weather in the south that could threaten agriculture in some areas.
- More frequent and more intense heatwaves, posing a lethal threat to the elderly and frail.
- Cold winters could disappear almost entirely by 2080. Melting glaciers, with three-quarters of those in the Swiss Alps likely to disappear by 2050.
- Rising sea levels for centuries to come.

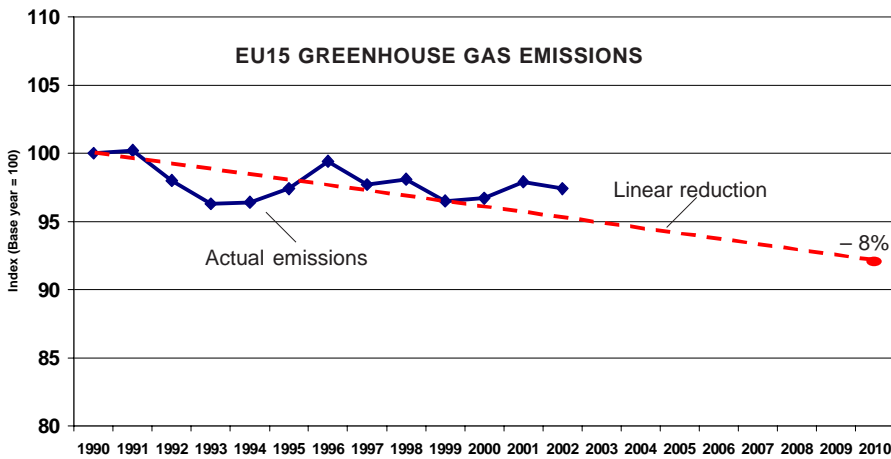
These are among the impacts of global climate change that are already being seen in Europe or are projected to happen over the coming decades as global temperatures rise, according to a new report<sup>1</sup> from the European Environment Agency (EEA).

The global warming rate is now almost 0.2°C per decade, but the EEA points out that Europe is warming faster than the global average. The temperature in Europe has risen by an average of 0.95°C in the last hundred years and is projected to climb by a further 2.0–6.3°C this century as emissions of greenhouse gases continue building up.

The summer floods of 2002 and last year's summer heatwave are recent examples of how destructive extreme weather can be.

The serious flooding in 11 countries in August 2002 killed about 80 people, affected more than 600,000 and caused economic losses of at least US\$15 billion. In the summer 2003 heatwave, western and southern Europe recorded more than 20,000 excess deaths. Crop harvests in many southern countries were down by as much as 30 per cent. Melting ice reduced the mass of the Alpine glaciers by one-tenth in 2003 alone.

<sup>1</sup> **Impacts of climate change in Europe: An indicator-based assessment.** EEA Report 2/2004. Available at [http://reports.eea.eu.int/climate\\_report\\_2\\_2004/en](http://reports.eea.eu.int/climate_report_2_2004/en).



Emissions of greenhouse gases in EU15 countries were 2.9 per cent below base-year level in 2002. Assuming a linear reduction it should have been 4.8 per cent.

## Decline after two years of increases

EMISSIONS of greenhouse gases in EU15 countries rose by 0.2 and 1.3 per cent respectively in 2000 and 2001, but fell by 0.5 per cent between 2001 and 2002. The fall in 2002 took total EU15 emissions to 2.9 per cent below their level in the base year used for calculations (1990 in most cases).

Under the Kyoto Protocol, however, the EU's 15 pre-2004 member states have committed themselves to an 8-per-cent reduction between the base year and 2008–2012. If this is to be linear the reduction in 2002 should have been 4.8 per cent (see diagram).

Assuming a linear reduction, only four countries – France, Germany, Sweden and the UK – are on track, without resorting to the Kyoto Protocol's trading mechanisms, which allow reductions to be made in other countries to comply with the national targets.

The other EU15 member countries look set to miss their emission targets, some by a substantial margin. This is the case for Spain, Portugal, Ireland, Austria, Italy, Denmark and Greece. Spain faces a greater challenge to meet its target than any other member state. Its emissions in 2002 were 39.4 per cent above its base year level – well over double the 15-per-cent increase it is allowed between the base year and 2008–2012 under the EU agreement.

Some countries that are a long way off their commitments already have concrete plans to fulfil at least part of their commitment by means of the flexible, market-based mechanisms allowed under the Kyoto Protocol.

The Netherlands, for instance, considers it is on track to meet its target of cutting emissions by 6 per cent by 2008–2012 if its planned investments in foreign emissions-saving projects are taken into account. In 2002 its actual emissions were 0.6 per cent above their base year level. Austria and Denmark have also earmarked considerable budgets for such projects but have not yet provided information on the emissions savings they anticipate.

The reasons for the decrease in emissions in 2002 include warmer weather in most EU countries, which reduced the use of fossil fuels for heating. Slower economic growth in manufacturing industries, particularly the steel industry in Italy and the UK, also lowered fossil fuel use, and a continuing shift from coal to gas and specific measures to reduce greenhouse gas emissions were the other main reasons.

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Source: **Annual European Community greenhouse gas inventory 1990–2002 and inventory report 2004.** European Environment Agency, Technical report 2/2004. Available at [http://reports.eea.eu.int/technical\\_report\\_2004\\_2/en](http://reports.eea.eu.int/technical_report_2004_2/en)

# Eight national plans approved

Whether trading will be an effective way of reducing emissions is a subject of debate, however.

EIGHT EU COUNTRIES had their National Allocation Plans for trading carbon dioxide emissions approved by the Commission on 7 July. Five plans – from Denmark, Ireland, the Netherlands, Slovenia and Sweden – have been accepted unconditionally. Another three – from Austria, Germany and the UK – have been approved on condition that technical changes are made.

The National Allocation Plans (NAPs) have to outline the number of emission allowances that member states intend to allocate to their industries. The Commission's examination was based on established criteria, the most important being to ensure that the plan fits in with the country's overall strategy to reach its Kyoto target – i.e. that allowances are not allocated too generously to domestic industry.

The decision by the Commission in July clears over 5,000 plants out of an estimated 12,000 in the twenty-five EU countries. They will receive over 40 per cent of the allowances expected to be put into circulation.

Whether the ability to trade emissions will be an effective way of reducing emissions is a subject of debate, however. There are fears that the Commission has accepted overly large allocations to the industries that are affected, with the result that



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the prices of emission rights will be so low that many companies will choose to buy them instead of reducing emissions.

The final plans from eleven countries are currently being considered by the Commission, along with three drafts. The Commission is expected to complete examination of these by the end of September. Greece and Italy received first written warnings on 7 July for failing to submit NAPs, although Italy's plan has since been submitted. Two other the member

countries – Cyprus and Malta – have not delivered plans yet, but have been granted a little more time.

The Commission has sent final written warnings to all EU15 member states except Austria, Germany, France and Sweden for not fully transposing the Emissions Trading Directive into national law, as required by 31 December 2003.

PER ELVINGSON

Information: [http://europa.eu.int/comm/environment/climat/emission\\_plans.htm](http://europa.eu.int/comm/environment/climat/emission_plans.htm)

## EU Emissions Trading Directive

Under the Emissions Trading Directive, member states have to set limits on emissions from energy-intensive plants by allocating them CO<sub>2</sub> emission allowances. When trading starts next year, companies that do not use all their allowances will be able to sell them to companies that have difficulty keeping their emissions within the allocated allowances. The first trading period, 2005–2007, is regarded as a test period in preparation for the worldwide trade that is expected to begin under the Kyoto Protocol in 2008.

## Allocations too large?

The UK Department for Food, Environment and Rural Affairs (DEFRA) has commissioned the consulting firm Ecofys to examine 18 National Allocation Plans (NAPs) that have been submitted to the EU Commission.

DEFRA's conclusion is that the entire system of emissions trading within the union could result in competitive distortion due to differences in the ambition levels of the various countries. "The UK believes that the very narrow scope used in France and possibly Spain and Italy is inconsistent with the Emissions Trading Directive", it reported in a statement, while recommending that these plans

are rejected by the Commission.

DEFRA is also seeking greater transparency from the Commission on how it reaches its assessments of the NAPs. According to the consultants' report the results of most of the NAPs that were examined will be a decrease in emissions from the relevant operations in comparison with the business-as-usual scenario, but only four countries – the UK, Germany, Latvia and Lithuania – require cuts to an extent that are consistent with the commitments in the Kyoto Protocol.

Source: DEFRA press release, 19 August 2004 ([www.defra.gov.uk/environment/climatechange/trading/eu/nap/ecofys.htm](http://www.defra.gov.uk/environment/climatechange/trading/eu/nap/ecofys.htm))

# Vehicles must be more fuel-efficient

RULES ARE NOW being proposed in California that will force manufacturers to reduce emissions of carbon dioxide from new vehicles by one-third in just over ten years. Under a law that came into effect in 2002 the California Air Resources Board (ARB) has extended the current exhaust emission legislation to include greenhouse gases.

This means that – just as for other exhaust gases – standards will be introduced that require manufacturers to meet a fleet average emission requirement. One standard applies to passenger cars and another to light commercial vehicles.

By the time the first phase is fully implemented in 2012 it is estimated that emissions from passenger cars and light commercial vehicles will have fallen by 25 per cent and 18 per cent respectively, and following the second phase the corresponding figures will be 34 and 25 per cent. The levels have been set so that vehicle manufacturers can achieve them without compromising on the size or performance of vehicles.

By way of comparison, the agreement reached between the EU Commission and vehicle manufacturers meant that the latter promised to reduce emissions from passenger cars sold within the EU by 25 per cent over 13 years (1995–2008). Because the EU and US use different test cycles the absolute levels (in g/km) are not however directly comparable.

According to estimates by the ARB, the purchase price of vehicles is likely to rise as a consequence of the new standards by an average of around 300 dollars during the first phase and just over 600 dollars in the second phase (slightly more for light commercial vehicles). This added cost will however be saved over the life of the vehicle due to reduced running costs.

The environmental effect of introducing the standards, according to the California Air Resources Board, will be that the emissions of greenhouse gases from traffic are slightly lower in 2020 than they are today,



"I support the proposals and will fight any legal challenges," comments Arnold Schwarzenegger, governor of California.

but the continuing rise in traffic will gradually outweigh the improved fuel efficiency of individual vehicles – so that by 2030 emissions will have returned to the current level again.

It is expected that the bill currently under consideration will be passed following an open hearing on 23 September. The vehicle industry has already announced that it will take legal action to try to prevent its introduction. Governor Arnold Schwarzenegger has however taken a stand in support of the bill and has promised to fight for its implementation.

Further information: California Air Resources Board (ARB), [www.arb.ca.gov](http://www.arb.ca.gov)

**BACKGROUND:** California is the only state authorized under the federal Clean Air Act to set its own pollution standards. Other states must comply with federal standards unless they choose to adopt Californian standards, which are usually stricter.

## Czech Republic introduces kilometre taxes

With effect from 2006, heavy goods vehicles will pay to use the road network in the Czech Republic. Initially, this will only apply to vehicles heavier than 12 tonnes, but the weight limit will be reduced to 3.5 tonnes according to the ministry of transport. The toll is expected to be roughly 0.10–0.13 euro/km. The government in Slovakia is considering the introduction of a similar system in 2006.

Source: T&E Bulletin 129, June 2004.

# Tax break for filters in Germany

THE PROPOSAL to give tax breaks to diesel-driven passenger cars fitted with particulate filters that was presented in April by Germany's Minister for the Environment, Jürgen Trittin, was withdrawn following protests by the country's vehicle industry.

But after talks with Chancellor Schröder in June the industry has now taken a positive stance on the early introduction of filters. The government will therefore proceed with its proposal for tax breaks. The total discount, in the form of reduced vehicle tax, will amount to a maximum of 600 euros per car (the precise figure depends on factors such as the vehicle's environmental class).

Thanks to the tax discount the German vehicle industry reckons that all new diesel-driven passenger cars can be fitted with particulate filters as early as 2008. According to estimates by Umweltbundesamt, the German environmental authority, the added cost per vehicle is of the order of 200–400 euros.

Several environmental organizations feel however that the threshold has been set too low. In order to qualify for the discount, particulate emissions must be lower than 8.5 mg/m<sup>3</sup> – a level that can in some cases be achieved without a filter. A more reasonable level, which is easily attained with the aid of a filter, is 2.5 mg/m<sup>3</sup> according to Verkehrsclub Deutschland (VCD).

The limit of 2.5 mg/m<sup>3</sup> is around a tenth of the limit value for diesel cars that will come into force under EU 2005 (see factsheet in this issue). Germany and several other EU countries – including Sweden, Denmark, Italy, France and Austria – now want the Commission to speed up work on the new exhaust emission requirements, Euro 5, and to make these strict enough to compel the widespread fitting of particulate filters.

Tax breaks for particulate filters are also being discussed by the government of the Netherlands.

PER ELVINGSON

# Air emission control in the power generation sector

MANY PEOPLE will know that significant improvements have been made in reducing air pollution from power stations in the United Kingdom. This has been through the burning of natural gas instead of coal, the use of “cleaner” coal and through the fitting of flue-gas desulphurization (FGD). However, there is still a long way to go as environmental pressures in Britain and Europe impose even tighter restrictions on future emissions.

Power generation has always been an important source of key air pollutants in the UK. In 2001 power generation emissions of sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), particulate matter (PM<sub>10</sub>) and carbon dioxide (CO<sub>2</sub>) contributed to 66, 23, 10 and 29 per cent respectively of the UK total emissions from all sources.

## Progress since 1990

The reduction in emissions between 1990 and 2001 is a success story and shows a significant “decoupling” between emissions and electricity demand for all of the four pollutants.

Figure 1 shows how emissions for some important pollutants have fallen while electricity demand has continued to rise. SO<sub>2</sub> and PM<sub>10</sub> in particular have been reduced by over 77 per cent compared with their 1990 levels.

The reduction in emissions per GWh generated has been driven by a number of initiatives and policies including:

- Specific environmental policies (e.g. sulphur content of liquid fuels and the EU directive on Large Combustion Plants).
- Other environmental policies (Integrated Pollution Control (IPC) implementation and effects on technical equipment uptake).
- Specific energy policies (gas use in the power stations, Non-Fossil Fuels Obligation (NFFO) and renewables) alongside the move to a competitive market and the lifting of restrictions on natural gas use for electricity production.

These driving forces have resulted in a number of specific measures, outlined in Table 1, that have acted to reduce emissions for a number of pollutants.

## A change in generation mix

At the start of the decade, coal was the dominant fuel, followed by nu-

clear power and oil. However, since 1990 the UK electricity sector has undergone a radical restructuring that has introduced competition in both generation and supply. The main effect of this has been the rapid increase in the use of gas (the ‘dash for gas’). Nuclear generation also increased significantly in the early

Figure 1. Emission reduction from major power producers between 1990 and 2001.

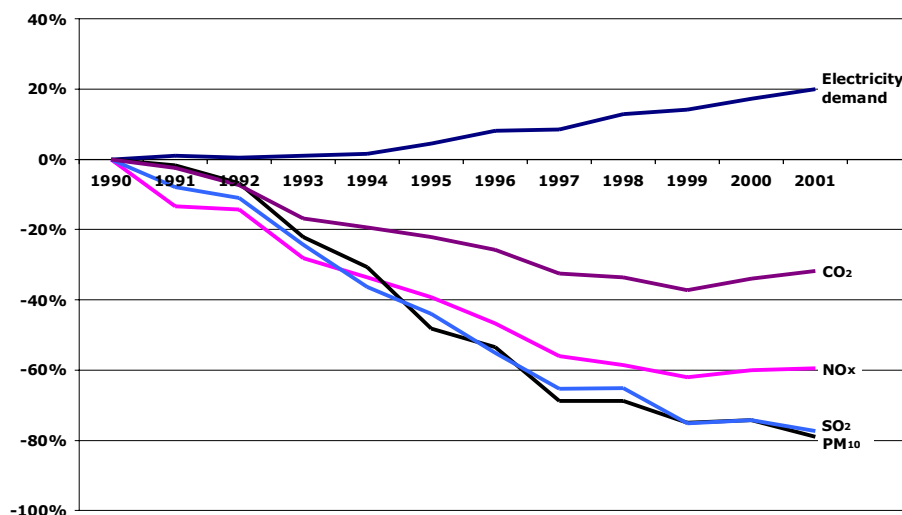
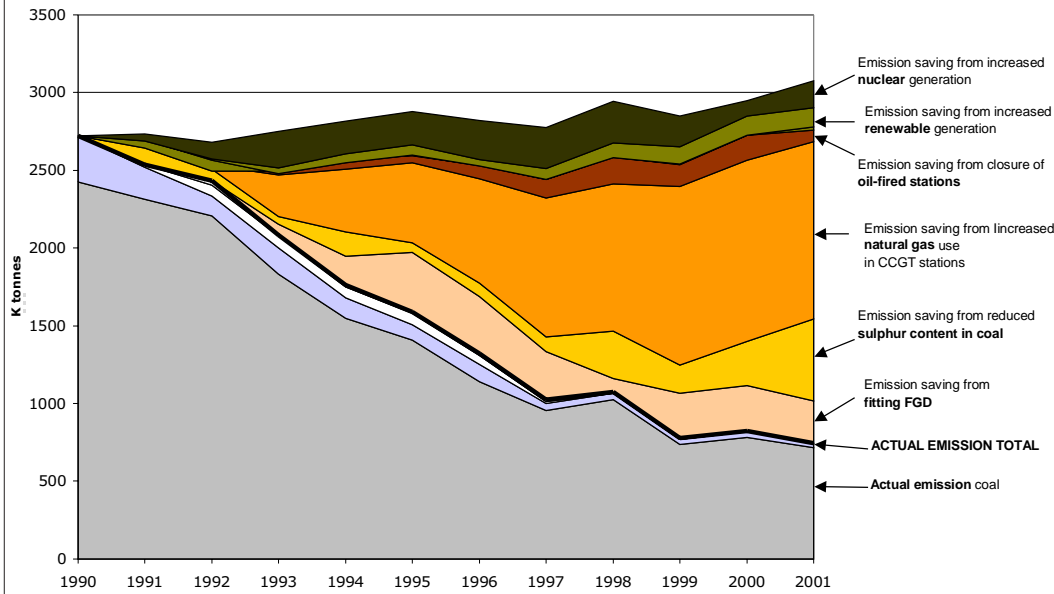


Table 1. Measures affecting emission reductions by major UK power generators.

Scenario	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	CO <sub>2</sub>
<b>Technical abatement measures (e.g. IPC)</b>	Reduced sulphur in flue gas using FGD (Flue Gas Desulphurization).	Improved NO <sub>x</sub> efficiency per GWh electricity through use of Low NO <sub>x</sub> Burners.	FGD and particulate abatement (ESP, filters and cyclones).	Efficiency improvements.
<b>Increased use of renewable electricity and nuclear power</b>	Reduced use of high-sulphur fuels such as coal and oil.	Reduced fossil fuel demand and therefore reduced NO <sub>x</sub> .	Reduced fossil fuel demand and therefore reduced PM <sub>10</sub> .	Reduced demand on fossil fuels combustion.
<b>Increased gas use and CCGT</b>	Reduced use of high sulphur fuels such as coal and oil.	Better NO <sub>x</sub> efficiency per GWh electricity produced than for coal or oil combustion.	Reduced use of high particulate forming fuels such as coal and oil.	Better CO <sub>2</sub> efficiency per GWh electricity produced.
<b>Reduced sulphur content of coal and fuel oil</b>	Reduced emissions from conventional oil and coal plants.	–	–	–
<b>Closure of fuel oil stations</b>	Reduced emissions.	–	Reduced use of high particulate forming fuels such as coal and oil.	–



**Figure 3. Contributions to SO<sub>2</sub> emission reduction from major power producers.**



1990s. The main losers as a result of these changes have been the UK deep-mined coal industry and the use of oil in power generation. The winner, however, has been the UK air pollution climate. Burning natural gas produces only trace levels of sulphur and PM<sub>10</sub> and significantly reduced NO<sub>x</sub> and CO<sub>2</sub> compared to burning coal and oil.

**How the emissions of sulphur have been reduced**

Emissions of sulphur dioxide have decreased dramatically since 1990.

This reduction has been thanks to the specific measures outlined in Table 1. The emissions of SO<sub>2</sub> from UK power stations fell from 2,723 kilotonnes in 1990 to 743 kilotonnes in 2001.

The black line in Figure 3 shows the actual annual emission estimates for power stations for 1990–2001. Overlaid are the estimated additional emissions had the measures identified **not** been taken up. For simplicity's sake this analysis assumes that measures taken up would otherwise have resulted in 1990 efficiency and sulphur content levels for their com-

ponent of the generation demand. Table 2 shows the estimated savings calculated for the different measures that are shown in Figure 3.

**The future**

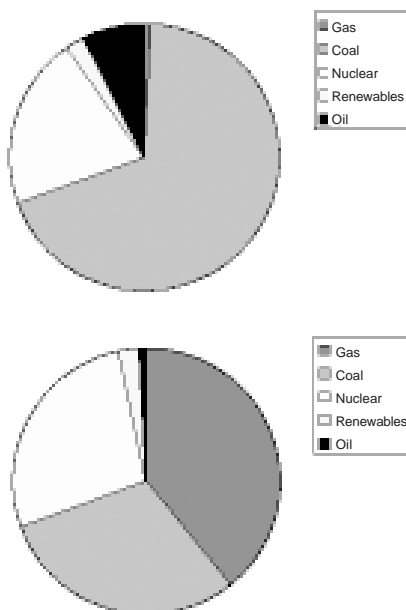
Despite these significant emission savings more still has to be done to enable the UK to meet its international targets for SO<sub>2</sub> and NO<sub>x</sub> as well as for CO<sub>2</sub> under the Kyoto Protocol. For SO<sub>2</sub> the target in the EU NEC directive (2001/81/EC) requires the UK to achieve total emissions from all sources in 2010 of 585 kilotonnes. Currently the UK total for 2001

stands at 1,125 kilotonnes. This target represents a further reduction for the UK as a whole of 540 kilotonnes of SO<sub>2</sub> per year by 2010. Some of this reduction is expected to be met by further reductions of emissions in the power sector, which is still the dominating UK source of this pollutant.

JUSTIN GOODWIN

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**Figure 2. UK generating mix in 1990 (above) and 1999 (below).**



**Table 2. Emission savings from measures for 2001 and cumulative savings from 1990–2001.**

Measure	Sulphur dioxide emission saving (kilotonnes)	
	Saving in 2001 <sup>1</sup>	Total saving between 1990 and 2001 <sup>2</sup>
Fitting FGD	273	2,252
Increased gas (CCGT) generation	1,141	7,183
Increased renewable generation	125	720
Coal sulphur reduction	526	1,936
Increased nuclear generation	171	2,070
Closing fuel oil stations	76	851
Fuel oil sulphur content	20	102
<b>Total</b>	<b>2,332</b>	<b>15,113</b>

<sup>1</sup> These savings are the total hypothetical saving for 2001 only. They are calculated based on a 1990 generation mix and efficiency, replacing the actual emission from the measure and as a result are likely to illustrate the upper limit.

<sup>2</sup> These savings are the totals of all savings from 1990–2001. They are calculated based on a 1990 generation mix and efficiency, replacing the actual emission from the measure and as a result are likely to illustrate the upper limit.



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RENEWABLE ENERGY

## Difficult to fulfill agreed aims

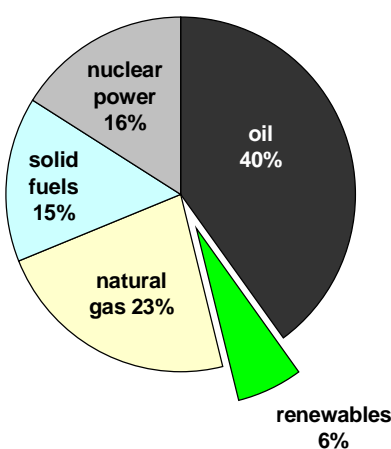
Commission does not want to suggest new targets for the period beyond 2010.

UNLESS ADDITIONAL measures are taken the EU countries will fail to meet their targets for renewable energy use by 2010, according to the Commission, which also wants to carry out a wider review in 2005 before suggesting new targets for the period after 2010.

In a communication<sup>1</sup> presented in May the Commission evaluated two EU targets for increasing the share of energy from renewable sources:

**OVERALL ENERGY USE:** The renewable energy share in the EU15 should reach 12 per cent by 2010. At best, with full application of adopted legislation, a 10-per-cent share can be achieved, assesses the Commission. Extra actions in the heat sector are needed to reach 12 per cent. The renewable share was 5.2 per cent in 1995 and 6 per cent by 2001 – to be compared with 40 per cent for oil, 23 for natural gas, 15 for solid fuels and 16 per cent for nuclear power.

**ELECTRICITY:** The share from renewable sources should reach 22 per cent by 2010. With existing national policies and measures it is projected that the EU15 will achieve a share of only 18–19 per cent, according to the Commission. The level in 1997 was 14 per cent. The directive also gives an indicative target for each mem-



**Far from target.** Only 6 per cent renewables in the EU15 energy mix 2001.

ber country. The analysis shows that 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. The directive also applies to the ten new member countries. Indicative national targets are given in the accession treaty.

The Commission reports that only a few member states have until now implemented an attractive framework for renewable energy sources. It is stressed that more support is not

only needed for renewable energy in order to reach the targets, but that it is equally important to use energy more efficiently and to create a level playing field in the energy sector, by including external societal benefit/costs in their energy policy framework.

Before a thorough evaluation has been carried out the Commission does not want to suggest any targets for the period beyond 2010. The EU Parliament and various stakeholders have proposed a target of 20 per cent renewable energy for the EU25 by 2020. The Commission's proposal is not expected until 2007.

The Commission's unwillingness to suggest targets for 2020 right now has met with sharp criticism, one of the reasons being that it creates uncertainty among investors. "Targets are the foundation on which other renewable policies are built. The current target expires in 2010, so a new longer-term 2020 target remains an urgent need," says Mark Johnston, campaigner at Friends of the Earth Europe.

PER ELVINGSON

<sup>1</sup> The share of renewable energy in the EU. COM(2004)366 final. Available at [http://europa.eu.int/comm/energy/index\\_en.html](http://europa.eu.int/comm/energy/index_en.html)

# 10 per cent renewables in China 2010

AROUND 3,600 DELEGATES from 154 countries gathered in Bonn, Germany, this June for the Renewables 2004 conference, the first major follow-up conference on renewables since the World Summit on Sustainable Development in 2002.

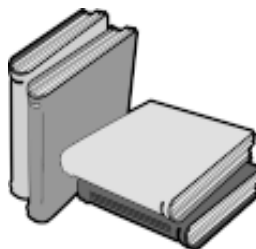
The conference resulted in three documents: A political declaration, containing definitions of common political objectives for promoting the role of renewable energies; Policy Recommendations, giving practical advice on how to promote renewable energies; and an International Action Programme, under which governments, international organizations and stakeholders have committed to a plethora of activities that are geared towards the increased use of renewable energies.

At the conference 165 of the proposals for voluntary measures were endorsed while many further submissions were being screened. The Action Programme contains some significant new financial commitments – from individual countries and from the World Bank and the Global Environment Facility. Probably most outstanding was the Chinese goal of expanding renewable energy to 10 per cent by 2010 and the Philippine goal of doubling renewable energy use by 2013. The implementation of the programme will be reviewed within the framework of the United Nations Commission on Sustainable Development in 2006 and 2007.

Further information: [www.renewables2004.de](http://www.renewables2004.de)

## Neutral conference

Participants flying to Bonn for the conference enjoyed a carbon-neutral flight, as the greenhouse gas emissions generated by their air travel have been calculated and will be offset by a solar energy project being developed in India. The German government, which hosted the meeting, bought the emissions rights through a small-scale Clean Development Mechanism (CDM) project under the Kyoto Protocol – emissions rights that will not subsequently be used.



## Recent publications

### Biofuels for Transport – An International Perspective (2004)

In the absence of strong government policies, the International Energy Agency (IEA) projects that the worldwide use of oil in transport will nearly double between 2000 and 2030. This book looks at recent trends in biofuel production and considers what the future might hold if such alternatives were to displace petroleum in transport. It takes a global perspective, assessing regional similarities and differences as well as the costs and benefits of the various initiatives being undertaken around the world.

216 pp. 75 euros. ISBN 92-64-01512-4. Can be ordered from IEA at [www.iea.org](http://www.iea.org) (a summary is available free of charge).

### Renewable Energy – Market and Policy Trends in IEA Countries (2004)

In recent years renewable technologies have been promoted in response to concerns about energy security and the environment, and as a solution to electricity access problems in developing countries. This book examines policies and measures that have been introduced in IEA countries to increase the cost-effective deployment of renewables, reviews the objectives behind these policies, and evaluates the results. The aim is to identify best practices in order to assist governments in making policy decisions.

672 pp. 100 euros. ISBN 92-64-10791-6. Can be ordered from IEA at [www.iea.org](http://www.iea.org) (a summary is available free of charge).

### EU Enlargement and the Environment. Institutional Change and Environmental Policy in Central and Eastern Europe

Edited by J. Carmin and S. D. VanDeveer. This volume focuses attention on key environmental and institutional changes associated with eastern expansion of the European Union, assessing and challenging prevailing views about the outcomes and processes of this historic development.

360 pp. £19.99. Paperback. ISBN 0415351863. Published by Routledge, [www.routledge.com](http://www.routledge.com).

### Emissions trading in international civil aviation (2004)

The contribution of international avia-

tion to the greenhouse effect is increasing. This study from Öko-Institut – commissioned by the German Federal Environmental Agency – investigates how the contribution of aviation can be reduced or limited. It shows that an emissions trading system is both possible and sensible. It is important, however, that the total climatic impact of aviation be covered, for otherwise misdirected control might be the result.

154 pp. ISBN 3-934490-19-0. Available at [www.oeko.de/dokum.php?setlan=1&vers=&id=186](http://www.oeko.de/dokum.php?setlan=1&vers=&id=186).

### Economic Instruments to Reduce the Environmental Impact of International Transport (2004)

Proceedings from the April 2004 seminar on economic instruments, hosted in Brussels by the European Federation for Transport and the Environment (T&E).

53 pp. T&E Report 2004/01. Can be obtained from T&E, Bd de Waterloo 34, B-1000 Brussels, Belgium. Also available in pdf format at [www.t-e.nu](http://www.t-e.nu).

### Bioelectricity Vision: Achieving 15% of Electricity from Biomass in OECD Countries by 2020

A report by WWF and the European Biomass Industry Association (AEBIOM), evaluating the potential for sustainable power production from biomass and its contribution to the reduction of emissions of carbon dioxide in the medium term, with a focus on OECD countries.

62 pp. Available free of charge at [www.panda.org/news\\_facts/publications/europe/index.cfm](http://www.panda.org/news_facts/publications/europe/index.cfm)

### Renewables in Russia: From Opportunities to Reality (2003)

Report demonstrating that renewable energy can offer a real means to address some of Russia's energy and economic challenges. 120 pp. 100 euros. Available in paperback or pdf from OECD online bookshop, [www.oecd.org](http://www.oecd.org).

### News from Miljöfordon.se

Newsletter (free of charge) giving the latest news about the market for clean vehicles in Sweden. Subscription form and other information available at [www.miljofordon.se/english](http://www.miljofordon.se/english)



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# THE DAY AFTER TOMORROW

Professor Stefan Rahmstorf comments on the Hollywood movie about an upcoming major climatic disaster.

THE FILM SHOWS A DISASTROUS and abrupt climate change. Due to man-made global warming, the Larsen B ice shelf breaks up. This event is used to introduce the main paleo-climatologist character, Jack Hall, who is drilling out there and narrowly escapes.

Later, in the north, melt water inflow brings the North Atlantic Current to a halt, causing severe cooling. This happens in a matter of days. A super-storm is triggered by the oceanic shutdown. This covers much of the northern hemisphere in a few giant cyclones. It causes the flooding of Manhattan, hailstones in Tokyo, tornados in Los Angeles, and several days of severe snowstorms covering the entire northern continent.

In the eye of these super-cyclones extremely cold air is sucked down from the upper troposphere to the surface and shock-freezes the Manhattan skyscrapers. When the super-storm clears after some days, most of the northern hemisphere is snow-covered and doomed to a new ice age.

Obviously it is easy to dismiss much of this scenario as unrealistic and exaggerated. It is. To portray the dramatic effects of a major climatic disaster within a short time span, the filmmakers simply took known weather extremes – tornados, storm surges, cyclones, hail storms and blizzards – and amplified those.

On the other hand, it is remarkable to what extent the filmmakers

have tried to include some realistic background. Early in the film a UN climate conference in Delhi is shown where Jack Hall gives a talk about the possible risk of a shutdown of the North Atlantic Current. I gave a very similar talk at a UN conference in Buenos Aires in 1998 – I even showed the same diagram. In the film, Hall states that a shutdown might occur in a hundred years, or a thousand, or not at all. Many real climatologists have said the same thing.

The politics of climate change is also presented well. It is chillingly realistic how the head of the US delegation responds to Hall's presentation. Thus small scenes with few sentences of dialogue are cleverly used to introduce a number of key ideas and conflicts.

I think it would be a mistake and not do the film justice if scientists simply dismiss it as nonsense. For this type of movie aimed at a very broad audience it is actually quite subversive and manages to slip in many thought-provoking things. I hope the film will stir up interest in the subject, and that people might take more notice when real climate change and climate policy are discussed in future.

This is a condensed version of a text available at Stefan Rahmstorf's website: [www.pik-potsdam.de/~stefan/tdat\\_review.html](http://www.pik-potsdam.de/~stefan/tdat_review.html). Prof. Rahmstorf's research on ocean currents and climate change was presented in Acid News 2/04.



## Coming events

For the latest news and direct links, please visit [www.acidrain.org](http://www.acidrain.org) (choose "Coming events" in the left-hand column).

**EU Transport, Telecom and Energy Council.** Luxembourg. 7 October 2004.

**EU Environment Council.** Luxembourg. 14 October 2004.

**3rd International Nitrogen Conference.** Nanjing, China. 12-16 October. *Information:* <http://n2001.esa.org/n2004.html>

**3rd AIRNET Annual Conference.** Prague, Czech Republic. 21-23 October 2004. *Information:* <http://airnet.iras.uu.nl/>

**CLRTAP/EU Workshop on Review and Assessment of European Air Pollution Policies.** Gothenburg, Sweden. 25-27 October 2004. *Information:* [asta.ivl.se](http://asta.ivl.se)

**Instruments to reduce air pollution.** Brussels, Belgium. 11-12 November. Joint workshop under the CAFE programme and the LRTAP Convention. *Info:* [europa.eu.int/comm/environment/air/cale](http://europa.eu.int/comm/environment/air/cale)

**Clean Air for Europe (CAFE) Steering Group.** Brussels, Belgium. 18-19 November 2004. *Information:* <http://europa.eu.int/comm/environment/air/cale>

**European Wind Energy Conference.** London, UK. 22-25 November 2004. *Information:* [www.ewea.org/06b\\_events/events\\_2004EWEC.htm](http://www.ewea.org/06b_events/events_2004EWEC.htm)

**EU Transport, Telecom and Energy Council.** Brussels, 29 November 2004.

**Executive Body under the Convention on Long-range Transboundary Air Pollution.** Geneva, Switzerland. 29 November - 3 December 2004. *Information:* [www.unece.org/env/lrtap](http://www.unece.org/env/lrtap)

**Better Air Quality (BAQ) 2004.** Agra, India. 6-8 December 2004. *Information:* [www.baq2004.org](http://www.baq2004.org)

**EU Transport, Telecom and Energy Council.** Brussels, 9-10 December 2004.

**EU Environment Council.** Brussels, Belgium. 20 December 2004.

**COP10 - Tenth Conference of the Parties to the Climate Convention.** Buenos Aires, Argentina. 6-17 December 2004. *Information:* [unfccc.int/cop10](http://unfccc.int/cop10)

**Acid Rain 2005.** Prague, Czech Republic. 12-17 June 2005. *Information:* [www.acidrain2005.cz](http://www.acidrain2005.cz)