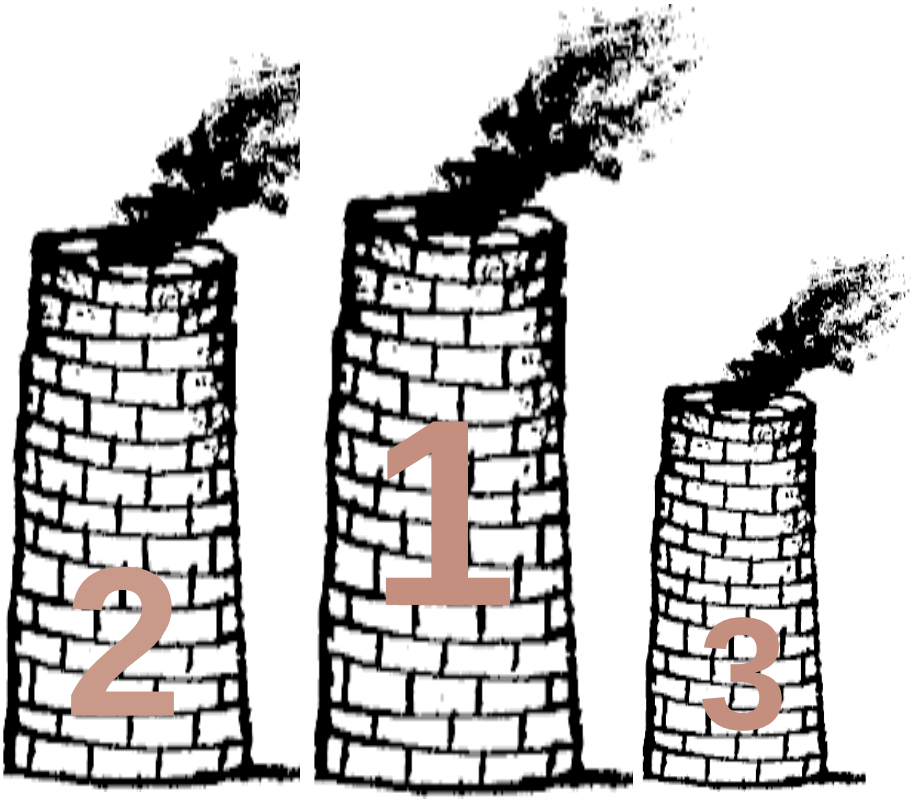
NO. 4, DECEMBER 2004

Acid News

In this issue:



Puentes, Spain
315,000 tons SO_2/year

Maritsa II, Bulgaria
332,000 tons SO_2/year

Krivoy Rog, Ukraine
213,000 tons SO_2/year

LARGE COMBUSTION PLANTS

Coal-fired stations top emission league

TOPPING THE LIST of the greatest emitters of sulphur into the atmosphere in Europe are two large coal-fired power stations in Bulgaria and Spain.

Together these two plants let out nearly 650 thousand tonnes of sulphur dioxide (SO_2) a year – as much as the combined total from all the following countries: Austria, Belgium, Denmark, Finland, Ireland, the Netherlands, Norway, Sweden and Switzerland. In third place comes Krivoy Rog in Ukraine, again a coal-fired power station.

The figures come from the latest survey of emissions from large point sources, prepared by Mark Barrett of SENCO consultants on behalf of the Swedish NGO Secretariat on Acid Rain.[1] This is an updated version of two previous surveys carried out in 1994 and 2000.

Although it is evident from a comparison of the surveys that the emissions from large installations have declined markedly over the last decade, it is also clear that they are still far from negligible. According to the

Continued on page 3

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 fullfill 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.

Shipping emissions in the spotlight

NEW SCENARIOS for future emissions of air pollutants have recently been produced under the EU's Clean Air For Europe (CAFE) programme (see page 10). The study also includes estimates of some health and environmental impacts expected to result from the projected levels of future emissions. For fine particles ($PM_{2.5}$) the study estimates changes in the loss of statistical life expectancy that can be attributed to changes in anthropogenic emissions. The results are alarming, to say the least.

Using the pollution levels for the year 2000, it is estimated that $PM_{2.5}$ will result in an average shortening of life expectancy by approximately nine months. As a result of expected reductions in emissions from land-based sources (e.g. power plants and road vehicles), this figure comes down to less than six months by 2020.

It should be noted that there is a significant variation between member states, and even by 2020 some countries (notably Belgium and the Netherlands) will still have life expectancy losses of about nine months.

Moreover, it is now clear that much wider areas of Europe are being affected by acidification and eutrophication than was previously thought (see page 17). According to the new estimates, the area of sensitive ecosystems in Europe exposed to excess acid deposition is approximately doubled, and the new figures for eutrophication are some 30 to 40 per cent higher than predicted in earlier estimates.

Consequently, the improvements that were expected to result from the Gothenburg Protocol and the EU NEC directive will be much less than anticipated. To arrive at a situation where critical loads would no longer be exceeded would thus require bigger emission reductions than was previously assumed.

Concentrations and depositions of air pollutants are significantly influenced by emissions from international shipping in the sea areas surrounding Europe. In order to compare ships with land-based large combustion plants on land, the Commission's consultants, BMT, who conducted a study of ship emissions in 2000, calculated the power consumption of the shipping in all European sea areas to be approximately equivalent to that of 390 fifty-megawatt units running continuously every day of the year.

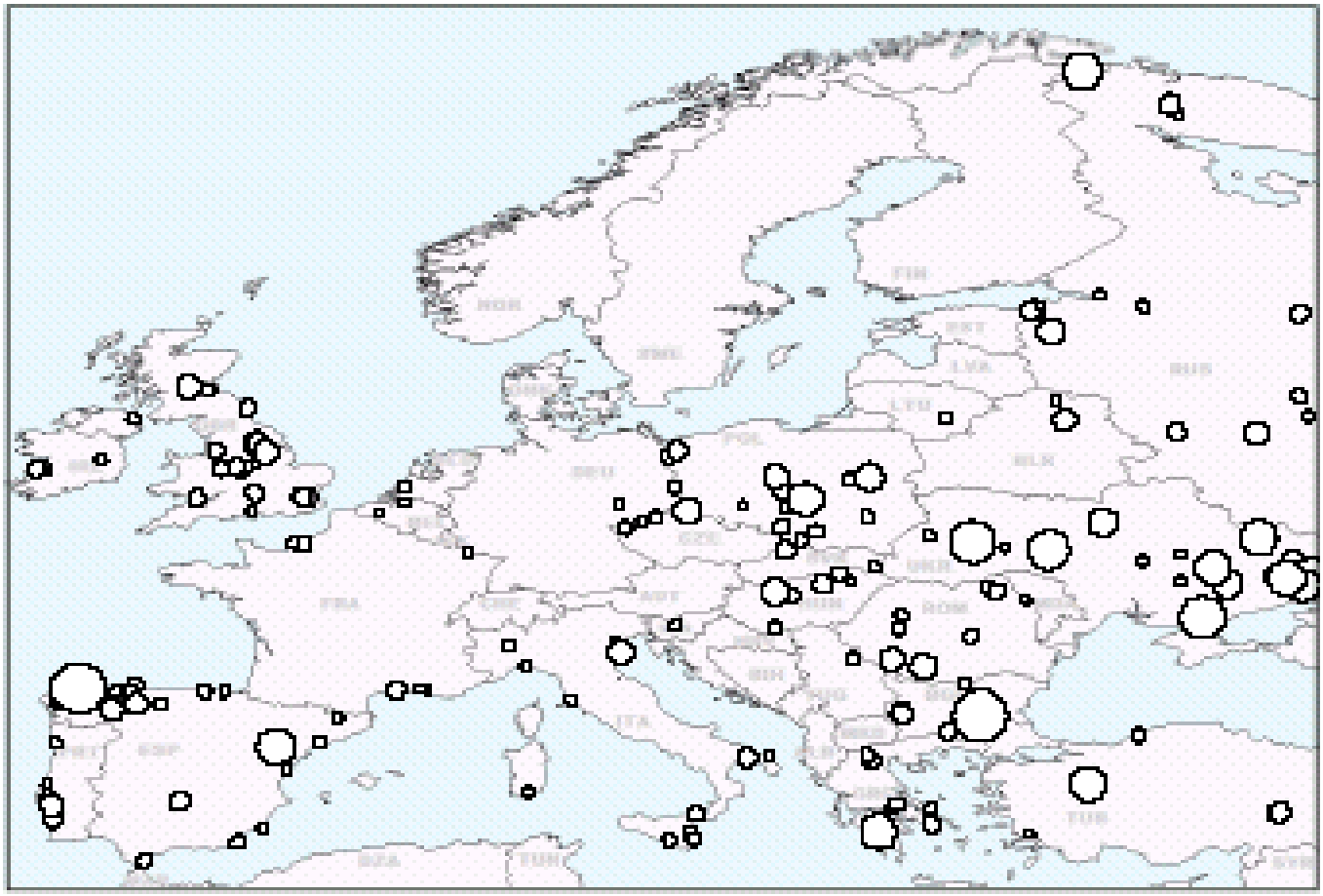
One crucial difference, however, is that emissions from land-based power plants – and from other land-based emission sources – have been regulated by environmental legislation for decades, while emissions from international shipping are still largely unregulated and uncontrolled. As a result, in contrast to the progress in reducing emissions from land-based sources, shipping emissions are expected to continue increasing.

Even after accounting for enforcement of MARPOL Annex VI, emissions of SO_2 from international shipping are expected to increase by more than 42 per cent by 2020, and those of NOx by two-thirds. In both cases, by 2020 the emissions from international shipping around Europe will have surpassed the total from all land-based sources in the 25 EU member states combined.

In order to meet EU environmental targets it will be necessary to drastically reduce emissions from shipping. The European Parliament has proposed measures that could reduce those emissions by 80 per cent – but this proposal was rejected by both the Commission and the Council.

The European Parliament has shown the way – it is now high time for the Commission and the member states to accept their responsibility and give joint backing to the Parliament's proposal.

CHRISTER ÅGREN



This is where the 200 largest emitters of sulphur dioxide are found in Europe. The size of the circles indicates relative emissions.

Continued from front page

latest figures, the 100 largest emitters were still pouring out 7.1 million tonnes of SO_2 a year, corresponding to 43 per cent of the total of 16.7 million tonnes from all land sources in Europe in 2001.

It can be noted that 89 of the 100 largest point sources of SO_2 are power stations, and that 70 of these are coal-fired. Eleven stations are fuelled with oil, and two – the Balti and Eesti plants in Estonia – burn oil shale. The remainder of the 100 largest are mainly refineries and metal production facilities.

One aspect that is of direct political importance is the age of the plants. It was found that around 90 per cent of the emissions of SO_2 from the largest coal-fired plants come from those that were commissioned before 1987. This is now relevant in view of the forthcoming review and revision of the EU directive for large combustion plants (LCP). If the reductions that are needed over the next five years to meet EU aims for air quality and acidification are to be achieved, something must obviously be done about the emissions from these plants.

The survey covers essentially the whole of Europe, including Turkey and the "European part" of Russia. The map above shows the 200 largest point sources of sulphur dioxide in the whole region. The table on

Continued on page 5

The EU LCP directive

Emissions from large point sources are regulated by EU legislation – primarily by Directive 1996/61/EC on Integrated Pollution Prevention and Control (IPPC), and Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants (LCP).

The latter sets emission limit values for sulphur dioxide, nitrogen oxides and dust, and article 7 of this directive states that by 31 December 2004, the Commission shall submit a report to the Parliament and the Council in which it shall assess among other things the need for further measures, and the technical and economic feasibility of such measures, and that the report shall be accompanied by related proposals.

Consequently, proposals for the revision of the large combustion plants directive should be tabled before the end of this year. Any such proposals are however likely to be considered in the context of the EU's Clean Air For Europe (CAFE) programme (see pp. 10-11). Based on work under this programme, by July 2005 the Commission is to deliver a communication to the Parliament and the Council, presenting its "thematic strategy" on air pollution.

The 100 largest emitters of sulphur dioxide in EU25 and accession countries (Bulgaria and Romania).

PS = Power station. Ind. = Industry. Ref. = Refinery. Oilsh. = Oil shale. For country codes, see map on previous page.

	Plant	Country	Type	Main fuel	SO_2 kt	NOx kt	CO_2 Mt	PM kt
1	Maritsa II	BGR	PS	Coal	332	35	7	0.2
2	Puentes	ESP	PS	Coal	315	20	10	0.4
3	Megalopolis	GRC	PS	Coal	161	4	5	0.1
4	Teruel	ESP	PS	Coal	152	20	5	0.3
5	Belchatow	POL	PS	Coal	136	144	29	0.5
6	Adamow	POL	PS	Coal	96	16	3	0.1
7	Maritsa I	BGR	PS	Coal	96	9	2	0.0
8	Oroszlnany	HUN	PS	Coal	81	10	2	0.0
9	Turow	POL	PS	Coal	79	68	14	0.3
10	Craiova	ROM	PS	Coal	75	9	2	0.2
11	Porto Tolle	ITA	PS	Oil	73	10	8	0.0
12	Meirama	ESP	PS	Coal	71	9	4	2.7
13	Patnow	POL	PS	Coal	71	40	8	0.1
14	Cottam	GBR	PS	Coal	71	18	7	0.0
15	West Burton	GBR	PS	Coal	69	16	7	0.2
16	Longannet	GBR	PS	Coal	68	24	10	0.4
17	Compostilla	ESP	PS	Coal	62	35	7	5.9
18	Eggborough	GBR	PS	Coal	60	14	6	0.2
19	Drobeta	ROM	PS	Coal	60	8	2	0.0
20	La Robla	ESP	PS	Coal	57	23	4	1.6
21	Setubal	PRT	PS	Oil	57	14	4	0.4
22	Belfast West	GBR	PS	Coal	53	2	1	0.4
23	Turceni	ROM	PS	Coal	52	18	4	0.3
24	Ferrybridge	GBR	PS	Coal	48	16	7	0.2
25	Bobovdol	BGR	PS	Coal	47	12	2	0.1
26	Puertollano	ESP	Ref	-	44	0	3	0.0
27	Pomorzany	POL	PS	Coal	44	34	6	0.0
28	Krakow	POL	PS	Coal	44	22	5	2.0
29	Matra	HUN	PS	Coal	43	26	5	0.1
30	Didcot	GBR	PS	Coal	41	16	6	0.0
31	Eesti	EST	PS	Oilsh.	40	19	3	0.0
32	Sines	PRT	PS	Coal	39	21	9	0.3
33	Balti	EST	PS	Oilsh.	39	19	3	37.2
34	Taranto	ITA	Ind	-	38	25	8	2.5
35	Novaky	SVK	PS	Coal	38	13	3	0.3
36	Varna	BGR	PS	Coal	37	15	3	0.1
37	Alberto	ESP	Ind	-	36		1	0.4
38	Drax	GBR	PS	Coal	35	50	16	0.2
39	Rugeley	GBR	PS	Coal	34	15	4	0.1
40	High Marnham	GBR	PS	Coal	33	6	3	0.1
41	Kingsnorth	GBR	PS	Coal	33	17	7	0.2
42	Grain	GBR	PS	Oil	33	1	2	0.8
43	Moneypoint	IRL	PS	Coal	32	22	6	0.2
44	Rybnik	POL	PS	Coal	32	26	8	0.2
45	Ironbridge	GBR	PS	Coal	32	11	4	0.1
46	Aberthaw	GBR	PS	Coal	31	23	6	0.2
47	Lynemouth	GBR	PS	Coal	28	8	3	0.1
48	Fiddlers Ferry	GBR	PS	Coal	28	10	5	0.2
49	Escucha	ESP	Ind	-	28	2	1	0.4
50	Megalopolis	GRC	PS	-	28	4	3	0.1

	Plant	Country	Type	Main fuel	SO_2 kt	NOx kt	CO_2 Mt	PM kt
51	Govora	ROM	PS	Coal	27	3	1	0.0
52	Opountion	GRC	Ind	-	27	3	1	0.7
53	Ledvice	CZE	PS	Coal	27	14	3	26.9
54	San Filippo	ITA	PS	Oil	27	6	5	0.4
55	Escatron	ESP	PS	Coal	26	0	0	0.1
56	Lavrio	GRC	PS	Gas	26	7	3	0.0
57	Borsod	HUN	PS	Coal	25	6	1	3.0
58	Brasov	ROM	PS	Coal	25	3	1	0.0
59	Gibraltar	ESP	Ref	-	24	2	2	0.4
60	Amyntaio	GRC	PS	Coal	24	6	5	13.1
61	Lodz	POL	PS	Coal	24	15	3	0.1
62	San Martin	ESP	Ref	-	24	5	2	
63	Thessal./Dimitr.	GRC	PS	Coal	24	20	14	0.2
64	Soto De Ribera	ESP	PS	Coal	24	9	3	1.0
65	Gravenchon	FRA	Ref	-	24	5	3	0.1
66	Ostroleka	POL	PS	Coal	23	10	3	0.1
67	Elektrenai	LTU	PS	Oil	23	8	3	0.5
68	Tarbert	IRL	PS	Oil	23	5	2	0.1
69	Drakelow	GBR	PS	Coal	23	5	2	0.1
70	Almeria	ESP	PS	Coal	23	15	7	0.2
71	Schwedt	DEU	Ref	-	22	4	4	0.2
72	Maritsa III	BGR	PS	Coal	22	20	4	4.5
73	Suceava	ROM	PS	Coal	22	0	0	0.0
74	Gela/ Ref	ITA	Ref	-	22	4	4	0.1
75	Guardo	ESP	PS	Coal	22	12	2	0.1
76	Dunamenti	HUN	PS	Oil	22	8	3	0.0
77	Anllares	ESP	PS	Coal	22	15	0	0.1
78	Tisova	CZE	PS	Coal	22	9	2	12.3
79	Abono	ESP	PS	Coal	22	17	8	0.2
80	Zeran	POL	PS	Coal	22	15	3	0.0
81	Carregado	PRT	PS	Oil	20	5	2	0.3
82	Priolo Garg. N.	ITA	Ref	-	20	4	3	0.2
83	Skawina	POL	PS	Coal	20	14	2	0.1
84	Cockenzie	GBR	PS	Coal	20	11	3	0.1
85	Gonfreville/Ref	FRA	Ref	-	20	3	2	0.3
86	Tamynion	GRC	PS	-	19	2	1	
87	Siersza	POL	PS	Coal	19	16	3	0.1
88	Banhida	HUN	PS	Coal	19	4	1	0.0
89	Pecs	HUN	PS	Coal	19	6	1	4.0
90	Jänschwalde	DEU	PS	Coal	18	17	25	0.3
91	Krakow Leg	POL	PS	Coal	18	11	2	0.0
92	La Casella	ITA	PS	Oil	18	3	2	0.4
93	Fort Dunlop	GBR	PS	Gas	18	0	0	0.0
94	Republica I	BGR	PS	Coal	18	3	1	3.8
95	Giurgiu	ROM	PS	Coal	18	1	0	0.0
96	Kilroot	GBR	PS	Coal	17	8	3	0.3
97	Kardia	GRC	PS	Coal	17	16	10	0.1
98	Tilbury	GBR	PS	Coal	17	19	5	0.2
99	Sicilia	ITA	PS	Oil	17	7	3	0.4
100	Fawley/Ref	GBR	Ref	-	17	5	2	0.0

Continued from page 3

page 4, however, only refers to those countries that are directly affected by the EU's LCP directive, i.e. the 25 member states plus Bulgaria and Romania, which are both negotiating for EU membership.

In total, SENCO's database includes some 7,500 large point source emitters. These emit over 14 million tonnes of SO_2 a year, or about 88 per cent of all the emissions from land-based sources in Europe. A complete table is given in the report.

Even though the list of the highest emitting large point sources shows their ranking in respect of SO_2 emissions, the report also contains data on each plant's emissions of nitrogen oxides, carbon dioxide and particulate matter. The information shows that many of the "worst" SO_2 emitters are significant point sources of these pollutants as well.

Consequently, there is a great potential for multiple benefits from smart emission abatement strategies, e.g. the introduction of strict technology-forcing emission standards that are designed to promote both energy efficiency and a switch from the dirtiest fuels (e.g. coal) to cleaner, primarily renewable sources of energy.

In revising the list, reference has been made to several databases from other institutions, including the European Environment Agency's European pollution emission register (EPER), and the International Energy Agency's Coal Research coal power station database. It should be pointed out that differences in the age of the data, as well as operating changes, for instance in the sulphur content of the fuel and the number of operating hours per year, can make the ranking of the plants somewhat inexact.

CHRISTER ÅGREN

[1] **Atmospheric emissions from large point sources in Europe.** By Mark Barrett, SENCO, Sustainable Environment Consultants Ltd, UK. September 2004. Published by the Swedish NGO Secretariat on Acid Rain. Printed copies can be ordered free of charge from the publisher. Also available in pdf format at the secretariat's website: www.acidrain.org.

The "best" plants fired with fossil fuels

THE STUDY by Mark Barrett also includes an update to the list of the "best" plants fired with fossil fuels. This ranks the plants according to their combined emissions of SO_2 and NOx in relation to their output of useful energy (electricity and/or heat). Although this kind of assessment is somewhat unusual, it is better from the point of view of effects on the environment in that it rewards plants that use energy most effectively.

These figures show that a very large number of the existing plants that burn fossil fuel – some of them commissioned back in the 1980s – easily meet the emission limit values set in the EU's LCP directive for new post-2003 installations. There can therefore be no doubt as to the possibility of achieving emission levels, by the use of conventional technology, that are considerably lower than the current EU standards for SO_2 and NOx emissions from large combustion plants.

The best-performing plants usually appear in the following order according to fuel type: those fired with natural gas (1), oil (2) and, coal (3). Emission control techniques, such as flue-gas desulphurization or denitrification, may however change the order of ranking, which will also be affected if plants only produce electricity, or heat as well. In combined heat-and-power plants the output of useful energy is typically 100 to 200 per cent higher, with a subsequent reduction in emissions per output.

Some of the coal-fired plants on the list have such low combined emissions of SO_2 and NOx as to be comparable with gas-fired plants. (If the emissions of the greenhouse gas carbon dioxide are also taken into consideration, coal-fired plants will of course be worse than gas-fired from the point of view of the environment.)

All these coal-fired plants produce both heat and power, and are equipped for desulphurization and denitrification of the flue gases. Most of the best coal-fired plants are located in Germany, but they can also be found in Austria, Denmark, and the Netherlands – in other words, those countries with the strictest laws governing measures to control emissions.

In the EU's LCP directive, as well as in many countries' legislation, emissions are expressed as milligrams of pollutant per cubic metre of air (mg/m^3) in the flue gases, and the report also gives a list of the best plants with emissions expressed in this way. This list also compares plant performance as estimated according to the emission limit values of the LCP directive, see table below.

CHRISTER ÅGREN

The ten best power stations – flue gas concentrations of SO_2 and NOx.

					SO_2		NOx	
N	Plant	Country	Com.	Fuel	Em. mg/m^3	ELV mg/m^3	Em. mg/m^3	ELV mg/m^3
1	Malpensa Airport	Italy	1997	Gas	1	35	52	150
2	Charterhouse Street	UK	1994	Gas	1	35	69	150
3	Brandenberg	Germany	1997	Gas	0	35	69	150
4	Nord Rhein Neckar HKW	Germany		Gas	0	35	74	150
5	Mellach	Austria	1986	Coal	44	200	92	200
6	Schwandorf	Germany	1972	Coal	110	200	139	200
7	Rostock	Germany	1994	Coal	57	200	92	200
8	Hamburg/Hafen	Germany	1981	Coal	57	200	92	200
9	Avedöre	Denmark	1990	Coal	65	200	92	200
10	Berlin/Reuter West	Germany	1984	Coal	82	200	92	200

Com. = Year of commissioning. Em. = Emissions. ELV = Emission limit values in the EU LCP directive (2001/80/EC).

Slow transposition of the LCP directive

AFTER YEARS OF DISCUSSION the European Community approved the so-called LCP directive[1] in 1988. It regulated emission of sulphur dioxide, nitrogen oxides and dust from combustion plants with a rated thermal input exceeding 50 megawatts (MW).

The directive distinguished between "existing" (licensed before 1987) and "new" plants. For the latter category, emission standards were set, that for most of the largest plants would require the installation of effective desulphurization systems, as well as adequate devices that to some extent would reduce emissions of nitrogen oxides (NOx). For the existing plants, member states were required to draw up programmes to reduce total annual emissions to specified levels (national ceilings), leaving it up to each member state to determine such plans.

The Spanish Government strongly opposed this proposed directive, even before it had become a full member of the Community in 1986. After a difficult negotiation, the Spanish opposition resulted in the concession of exceptionally weak environmental conditions for new plants in Spain and to less stringent emission ceilings for existing plants.

Spain was allowed to use imported coal with SO_2 emission levels that were twice as high as the rest of the EC, and native coal with a desulphurization rate of only 60 per cent (as compared to 90 per cent for other member states). Under these conditions, Spain was allowed to authorize new plants with a generation capacity of up to 2000 MW in the case of plants burning native coal, and up to 50 per cent of the capacity of all authorized new coal-burning plants in the case of plants burning imported coal.

These exceptional conditions were applicable to plants authorized before the end of 1999 and put into operation before the end of 2005.

The Royal Decree 646/1991 for the transposition of the LCP directive was passed after the agreed deadline. It is important to highlight that if Spain was granted an exceptional treatment in the LCP directive, the aforementioned Royal Decree extended the margin of tolerance even further. Article 3.4, for example, allowed the administration to ignore domestic emission ceilings when substantial and unexpected changes in energy demand or in the availability of certain fuels occurred.

The domestic ceilings provided in the Royal Decree were based on 1980 emissions and it considered different milestones for the reduction of each pollutant. Three phases, ending in 1993, 1998 and 2003, were established for SO_2 reduction, whereas only two phases, ending in 1993 and 1998, were required for NOx. These phases are shown in the tables below.

Emissions from existing (pre-1987) large combustions plants in Spain. Estimated level of emissions in 1980 and emission ceilings for 1993, 1998, and 2003 (thousand tonnes).

SO_2	1980	1993	1998	2003
	2290	2290	1730	1440
NO_x	**1980**	**1993**	**1998**	
	366	368	277	

In order to comply with the regulations, it was agreed that the power producer ENDESA would be responsible for the emission reductions. ENDESA was mainly owned by the state, but also by a significant number of domestic coal companies.

A strategy was designed to install post-combustion desulphurization systems at the most polluting plants, i.e. Andorra (Teruel) and the most recent plants in Compostilla (León). The desulphurization efficiency of these systems was set at around 90 per cent. It was also decided to replace native coal with foreign coal for the As Pontes (La Coruña) plant, whose mine was about to run out of lignite with an acceptable level of sulphur.

But the privatization of ENDESA, reductions in EU support for the use of native coal and the modification of the electricity system's legal framework (with the implementation of Law 54/1997) aborted a great proportion of the plan.

Only the measures planned for Andorra were implemented. The new electricity legislation put an end to subsidies associated with costs arising from environmental improvements implemented at the power stations. This led to a freely competitive supply that didn't take into account environmental efforts but only economic factors, i.e. who produced the cheapest electricity.

Since Royal Decree 646/1991 was passed, and especially since electricity demand rocketed due to strong economic growth as well as a policy of low electricity prices aimed at combating inflation, a concern for the evolution of emissions from power plants emerged.

Also, on 22 June 2000 the Council of the EU approved a draft new directive on large combustion plants that replaced directive 88/609/EEC. Once more the Spanish Government was the slowest to cooperate but could not prevent the new LCP directive from being approved by a qualified majority.

The new LCP directive (2001/80/EC) was eventually adopted in October 2001. The deadline for transposition was 27 November 2002, but Spain did not adhere to the agreed date. The directive was however transposed into the Royal Decree 204/2004 of 12 March 2004.[2]

It can be deduced from all this that the attitude of the successive Spanish governments has not promoted protection of the environment and public health. They have opposed the approval of strict EU directives and transposed them slowly and reluctantly. Even today the implementation of these regulations is questionable, and this has implications for the environment and human health both in Spain and in neighbouring countries.

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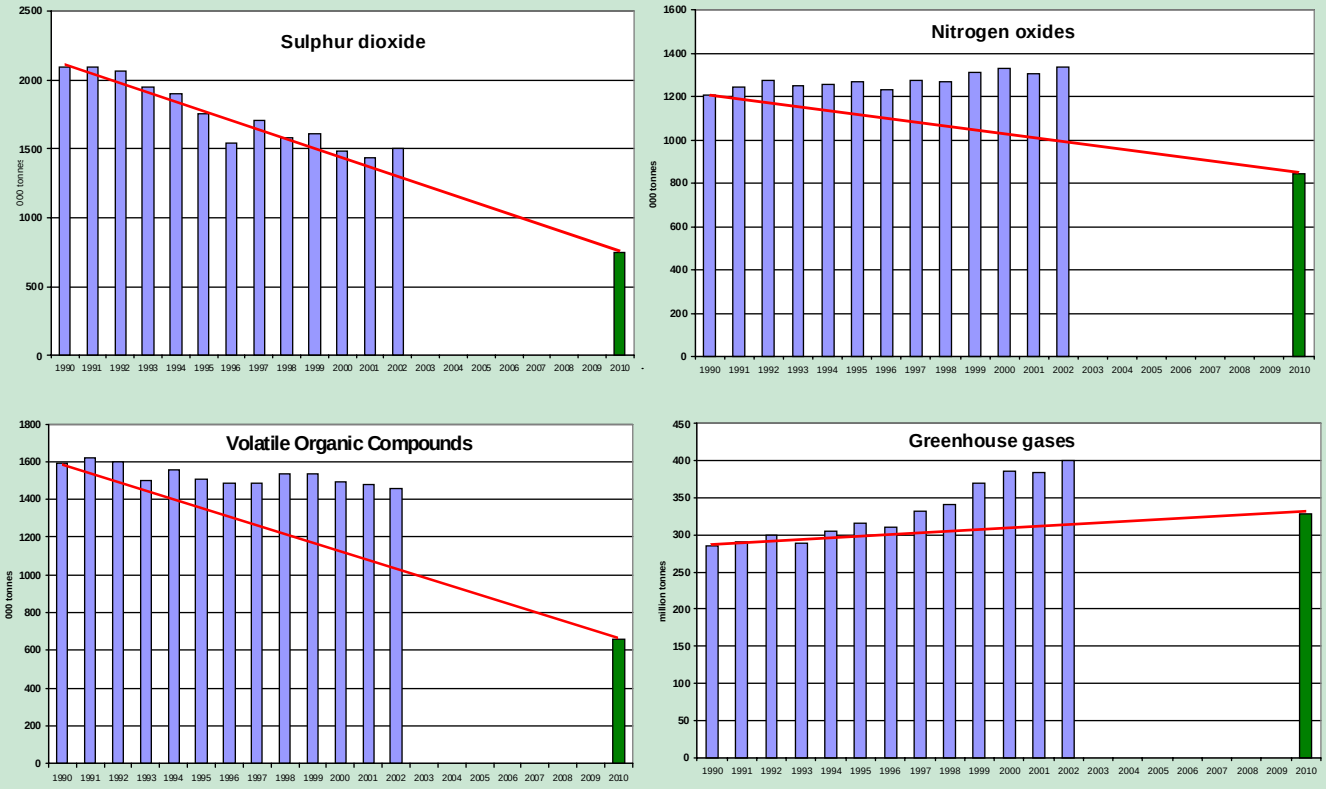
ECOLOGISTAS EN ACCIÓN, SPAIN.

TRANSLATED BY ELENA VALDEHITA.

[1] Directive 88/609/EEC on the limitation of emissions of certain pollutants into the air from large combustion plants.

[2] BOE (official government bulletin) of 20 March 2004.

Spanish emissions 1990 to 2002, and targets for 2010.



Sources: Emissions data 1990-2002 from EMEP Technical report MSC-W 1/2004 (see p. 20), except for greenhouse gas data, which comes from EEA Technical report 2/2004. The 2010 targets refer to the EU NEC directive for SO_2, NOx and VOCs, and directive 2002/358/EC for greenhouse gases.

SPAIN

Most targets still a long way off

Major reductions in air pollutant emissions will be needed in the next few years if Spain is to meet its international undertakings.

SPAIN HAS TAKEN many steps to address air pollutant emissions and strengthen its air quality management system, reports the OECD in its environmental performance review presented on 1 October. It mentions, for example, that emissions of sulphur dioxide from the energy sector have been reduced since 1990. Misdirected subsidies, such as the compulsory purchase of domestic coal by electricity producers, are set to decrease, and significant efforts have been made to develop cogeneration and renewable energy sources, in particular wind power.

However, despite this and other advances, there is much left to do.

Spanish emissions of sulphur dioxide have, admittedly, fallen by 35 per cent over the period 1990–2001, but when measured per capita and per unit of GDP they are still three to five times as high as those of France, Germany and Italy.

The EU directive on national emission ceilings (NEC) also requires that emissions of SO_2 are reduced by 66 per cent over the period 1990–2010. Achieving this will require a halving of the current level of emissions. According to the report the forthcoming implementation of the EU directive on large combustion plants (LCP) will require substantial investments and lead to the closure of a number of older power plants that burn coal or oil.

Emissions of nitrogen oxides (NOx) *rose* by 11 per cent between 1990 and 2001, which is problematic since the NEC directive says that Spain must *reduce* emissions by 24 per cent between 1990 and 2010. Of the current emissions, 56 per cent come from mobile sources. Power plants account for 23 per cent and emissions from this sector have risen most, by 21 per cent since 1990.

Emissions of volatile organic compounds (VOCs) have remained relatively static since 1990, with rising emissions from solvent use balanced by falling emissions from transportation. According to the OECD review, Spain faces a "considerable challenge" to meet the NEC target of a 59-per-cent reduction by 2010.

The OECD emphasizes the importance of reining in emissions of NOx and VOCs in order to counter the high levels of ground-level ozone that affect the country every summer, the severity of which has increased in recent years. Levels of nitrogen dioxide and particulates (PM_{10}) also

Road pricing back on Dutch agenda

The Dutch government has launched a new debate on introducing nation-wide road pricing for all vehicles. In a policy paper on transport policy up to the year 2020, issued on 30 September, it called road pricing "inevitable" and pledged to avoid previous mistakes by working to win public support for the idea.

Road pricing has been high on the agenda in the Netherlands before. The previous government proposed such a system in 2001, only for parliament to reject the idea the following year. Independent experts again recommended national congestion charging in 2003.

The new policy paper avoids proposing specific technologies for road pricing and focuses instead on the need to generate "broad public support". The transport ministry is creating a stakeholder "platform" to start a public debate and to make recommendations next spring.

Source: **Car Lines**, No.5, 2004.

Common position on flourinated gases

At the Council meeting in October the EU environment ministers decided to ban the use of fluorinated gases (F gases) in a number of products, for example double glazing, fire extinguishers and recreational items. The legislation will also outlaw F gas leakage from cooling equipment, air conditioning systems, etc.

The use of F gases in air conditioning systems in motor vehicles is regulated separately by amending the existing directive on EU vehicle type-approval (70/156/EEC). The text agreed by ministers in principle will phase out HFC134a, the currently used refrigerant, from 2011 onwards for new vehicle models and from 2017 for all new vehicles. Before the phase-out starts, vehicle air conditioners should not leak more than 40 grams of HFC134a per year.

The European Commission originally proposed starting in 2009, leading to an almost total ban by 2013.

regularly exceed the EU standards for the protection of people's health that will come into force in a few years' time, primarily in urban areas.

A further challenge for Spain is to tackle emissions of greenhouse gases, which have increased by 32 per cent since 1990. The burden sharing agreement reached as part of the EU's commitment to the Kyoto Protocol permits Spanish emissions to rise by a maximum of 15 per cent over the period 1990–2010.

A key culprit in many of the negative trends is, according to the report, transport growth. The road traffic volume in Spain (in vehicle kilometres) has increased by 49 per cent since 1990. Increased energy demand is also a significant factor in the extent of emissions. Total energy end use has risen on average by 3.4 per cent each year since 1990. Renewable energy sources account for just 6.5 per cent of the supply.

Current subsidies on domestic coal are estimated at 47 dollars per tonne (2001). Spanish coal production fell by 28 per cent during the 1990s and this decline is expected to continue as the subsidies are reduced. The coal is of low quality and high costs mean that extraction is not competitive.

The report states that environmental expenditure has gone up since the last OECD review in 1996, but still remains below EU and OECD averages. Moreover, Spain is one of the EU countries with the greatest number of complaints concerning alleged poor implementation of EU environmental directives.

The report suggests that Spain should consider "neutral fiscal reform", which could, for example, see a rise in energy tax compensated by a drop in labour tax. It notes that Spain makes little use of environmental taxes or other economic instruments.

It also suggests a general review of energy, transport and water prices "from the point of view of environmental and economic efficiency". The recommendations include phasing out environmental subsidies and making better use of economic instruments to encourage the efficient management of resources and reductions in pollutants.

At the international level the country is urged to fulfil the agreements it has signed and ratify the Gothenburg Protocol under the Convention on Long-range Transboundary Air Pollution.

PER ELVINGSON

Environmental Performance Reviews: Spain. 37.00 euros. 214 pp. ISBN 9264108637. Can be ordered from OECD, www.oecd.org/bookshop (a read-only copy can be downloaded free of charge). Printed copies are available from national distributors or from OECD, c/o Turpin Distribution Services Ltd., Stratton Business Park, Pegasus Drive, Biggleswade, Bedfordshire, SG18 8QB, UK.

Brown coal protests in Germany

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In May some 50 Greenpeace activists chained themselves to excavators and other equipment at the site of a new lignite power station in western Germany being built by the power company RWE.

Lignite is the lowest grade of coal, used almost exclusively as fuel for steam-electric power generation. RWE burns large quantities of lignite, which produces high levels of carbon dioxide per kilowatt-hour of electricity produced. RWE is planning to upgrade existing lignite-fuelled power stations and invest in new ones to make up for capacity lost due to the government's abolition of nuclear power. Greenpeace Germany is calling for a halt to all new brown coal power stations.

Many countries defaulting on agreements to reduce emissions

SEVERAL COUNTRIES are sometimes significantly failing to comply with the protocols of the Convention on Long-range Transboundary Air Pollution. This is apparent from the last review conducted by its Implementation Committee.[1] The failure concerns not only the obligatory emission targets but also the obligation to report.

Despite the sharp reprimands that were issued last year by the convention's Executive Body (which includes representatives from all the member countries), several countries have still not reduced their emissions as required by the protocols.[2] Among them are Greece, Ireland, Norway and Spain. And despite repeated reminders from the convention's secretariat, some of these – notably Ireland, Greece and Spain – have not compiled or submitted the basic information needed by the committee to carry out its monitoring function.

The committee has examined the following six countries for non-compliance with emission targets.

GREECE. The latest reported data shows emissions of nitrogen oxides (NOx) to have been higher in recent years than they were in 1987, the base year for the 1988 NOx protocol. In 2002 they rose to 331,000 tonnes, compared to 285,000 tonnes in 1987. In spite of several reminders, Greece has not provided the information requested by the Executive Body. Growing concern is expressed at the continuing failure of Greece to take effective measures to reduce its emissions so that they do not exceed the 1987 levels. The committee is also deeply concerned at the prospect of Greece failing to comply even by 2010, by which time it will have been in non-compliance for thirteen years, and at its not having indicated a year by which it expects to achieve compliance.

ITALY. It was noted in the previous review that Italy had failed to make the 30-per-cent reduction in volatile organic compounds (VOCs) in relation to the base year of the VOC protocol, for the target year 1999. The latest data does however show that Italy complied with its obligation in 2002.

IRELAND. Emission data shows the country's emissions of NOx to have been above the level for the base year 1987 during all seven years from 1996 to 2002. The committee concluded that Ireland had not demonstrated that it will be able to shorten the period of nine years that it previously anticipated it would remain in non-compliance.

LUXEMBOURG. Earlier data had indicated that Luxembourg had been in non-compliance with the VOC protocol, but updated emissions data shows that this was not the case.

Inadequate reporting is a serious matter

NORWAY. According to its own new data and projections, Norway continued to fail its obligation under the VOC protocol. The committee noted with disappointment that Norway has been in non-compliance since 1999, and that it has not demonstrated that it will shorten the time period of seven years that it has anticipated it will remain in non-compliance.

SPAIN. Emissions of NOx were reported to have been above the level of the base year (1987) in all nine years from 1994 to 2002. In that last year they were 26 per cent higher than in the base year. Spain also failed to comply with the VOC protocol – it is far from achieving the required 30-per-cent reduction. In 2002 its emissions were only three per cent lower than in the base-year. The committee noted with disappointment that Spain has not answered its request for information, and expressed concern that there was no indication when Spain would achieve compliance with either of the protocols.

The committee also followed up Slovenia's non-compliance with regard to the 1994 Sulphur Protocol. The problem relates to excessive emissions from the 360 MW Trbovjle power plant, which uses brown coal with a sulphur content of up to three per cent. Slovenia plans to retrofit the plant with flue-gas desulphurization, effective as of October 2005, but the emission standards were to be achieved from 1 July 2004.

As to the obligation to report on emission data, the committee noted that despite a general improvement there are still some notable failures; Luxembourg, the European Community and France being pointed out for not having submitted any information in response to the Executive Body's decision from last year.

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

This inadequate reporting is a serious matter, as the information that is being asked for is essential not only for tracking compliance with agreed commitments, but also to provide information for the forthcoming reviews and possible revisions of the protocols under the Convention.

The report, with its conclusions and recommendations, will be considered by the Executive Body of the Convention at its coming meeting in Geneva on 29 November to 3 December.

CHRISTER ÅGREN

[1] **The seventh report of the CLRTAP Implementation Committee** (EB.AIR/2004/6 and Add.1). Can be downloaded from www.unece.org/env/eb/welcome.html

[2] Under the 1988 NOx Protocol, countries agreed to restrict their NOx emissions to 1987 levels after 1994. The obligation of the 1991 VOC Protocol is for most countries to reduce their VOC emissions by 30 per cent by 1999, as compared to a base year, which in most cases is 1988.

Scenarios to illustrate future emissions

Current air quality legislation inadequate to protect health and the environment.

THE FIRST SCENARIOS showing the expected trends in emissions of air pollutants up to 2020 have now been revealed under the EU's Clean Air For Europe programme (CAFE).

The CAFE programme concentrates primarily on those air pollutants that are already covered by EU air quality standards, of which the Commission has mentioned two as needing especial attention: particulates and ground-level ozone.

One of the main items of the programme is integrated assessment modelling, which is done with the aid of the RAINS computer model – in other words, essentially the same as that used a few years ago in putting together the NEC directive. This model is now being used to develop scenarios for likely trends in emissions for the target years 2010, 2015 and 2020, from the base year 2000.

There is still a great deal of uncertainty as to how the member states will fulfil their commitments under the Kyoto Protocol to reduce emissions of greenhouse gases. Their actions will greatly affect the extent to which fossil fuels will be used in the EU, and thus the emissions of air pollutants covered by the CAFE programme. To be on the safe side, various so-called baseline scenarios are therefore being used, illustrating the impacts of different assumptions regarding future use of fossil fuels within the EU.

Consequently, three energy scenarios are being investigated.

The main scenario provides a consistent EU-wide view of energy developments, including certain measures needed for implementation of the Kyoto Protocol.

There is also a similar scenario, but without any climate policy measures. (These first two scenarios have both been developed using the PRIMES energy model.)

The third scenario consists of a compilation of the member countries' own official national energy projections.

The first results of the computer modelling were revealed at a seminar in Brussels on 27 September.

Based on the main energy scenario, and assuming full implementation of current air quality legislation, emissions of sulphur dioxide (SO_2) in the 25 EU member countries will fall by 55 per cent by 2010 and by two-thirds by 2020, as compared to the base year 2000.

Even by 2020 some countries still have life expectancy losses of about nine months

Emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) will be reduced by about one-third by 2010 and by nearly half by 2020, while those of ammonia (NH_3) are expected to remain more or less the same up to 2020. (See figures on next page.)

While there still remain some uncertainties as regards the emissions of primary particulate matter (PM), the RAINS model estimates that between 2000 and 2020, emissions of the coarse fraction (PM_{10}) will come down by about 40 per cent and those of the fine fraction ($PM_{2.5}$) by 44 per cent.

Concentrations and depositions of air pollutants are also influenced by emissions from international shipping in the sea areas surrounding Europe. In contrast to the progress in reducing emissions from land-based sources, shipping emissions are expected to continue increasing.

Even after accounting for enforcement of MARPOL Annex VI, which sets limits on the sulphur content of marine fuels for the Baltic Sea, the North Sea and the English Channel, emissions of SO_2 from international shipping are expected to increase by more than 42 per cent by 2020, and those of NOx by two-thirds. In both cases, by 2020 the emissions from international shipping around Europe will have surpassed the total from all land-based sources in the 25 EU member states combined.

The scenarios presented also included preliminary estimates of some health and environmental impacts expected to result from the projected levels of future emissions.

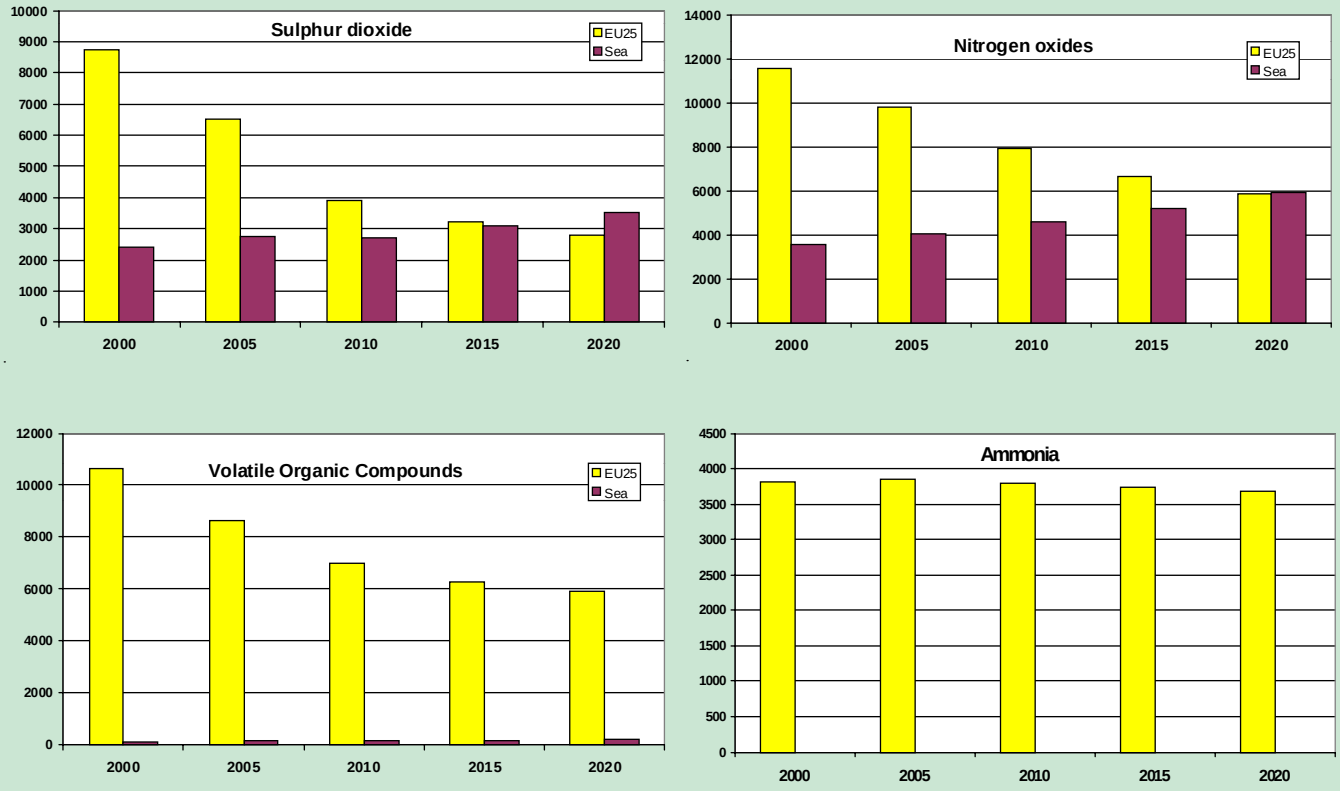
For $PM_{2.5}$ the RAINS model estimates changes in the loss of statistical life expectancy that can be attributed to changes in anthropogenic emissions. It should be noted that these calculations only refer to impact on the population over 30 years of age, thus underestimating the total impact.

Using the pollution levels for the year 2000, it is estimated that $PM_{2.5}$ will result in an average shortening of life expectancy by approximately nine months in the EU25. This figure comes down to less than six months by 2020. There is however a significant variation between countries, and even by 2020 some of them (notably Belgium and the Netherlands) will still have life expectancy losses of about nine months.

When it comes to the impact on health from ground-level ozone, the RAINS model estimates the number of premature deaths associated with ozone levels above a cut-off level of 35 parts per billion (ppb). Since there is medical evidence of health impact even below 35 ppb, the use of this cut-off level results in an underestimation of the impact. The number of premature deaths estimated as above will also gradually decrease up to 2020 as a result of decreased emis-

Projected emissions up to 2020 based on the main energy scenario, and assuming full implementation of current air quality legislation.

Emissions of SO_2 in EU25 (yellow columns) will fall by two-thirds by 2020, as compared to the base year 2000. Those of NOx and VOCs will be reduced by nearly half, while those of NH_3 are expected to remain more or less the same. In contrast, emissions of SO_2 from international shipping (dark red columns) are expected to increase by more than 42 per cent by 2020, and those of NOx by two-thirds. (Unit: kilotonnes)



sions of the ozone precursors NOx and VOCs.

The analysis of environmental impact includes ozone damage to vegetation, and acidification and eutrophication of various types of sensitive ecosystems. (See article on page 17.)

Following the publication of the baseline scenarios, a number of policy options for the further abatement of emissions will now be studied, for example in respect of cost-effectiveness. Some selected main scenarios will also be subjected to more detailed analyses for costs and benefits.

CHRISTER ÅGREN

The full presentations of the baseline scenarios and the estimated health and environmental impacts are available as PowerPoint files from the website of IIASA: www.iiasa.ac.at/rains/index.html

More information on the CAFE programme can be found on the website of the Commission's environment directorate: http://europa.eu.int/comm/environment/air/cafe/index.htm

Clean Air for Europe – the CAFE programme

Launched in May 2001, CAFE is a programme for technical analysis and policy development leading to the adoption of a thematic strategy for air pollution under the EU's Sixth Environmental Action Programme. The aim is to develop a long-term, strategic, integrated policy to protect against negative effects of air pollution on health and the environment. The Commission is to present its proposal for a thematic strategy before 22 July 2005, in which it will outline the environmental objectives for air quality and the measures it deems necessary to achieve the above aims.

The activities of the programme include:

1. Developing, collecting and validating scientific information relating to the effects of outdoor air pollution, making inventories and projections of emissions and air quality, assessing air quality, doing studies of cost effectiveness and carrying out integrated assessment modelling – all leading to new and/or revised objectives in respect of air quality and pollutant deposition, and identifying the measures required for reducing emissions.

2. Supporting the implementation of existing legislation and reviewing its effectiveness, especially in view of the daughter directives on air quality and the directive on national emission ceilings, and developing new proposals for measures to abate emissions.

3. Ensuring that the measures are taken that will be needed to achieve the objectives for air quality and pollutant deposition cost-effectively.

4. Determining at regular intervals an integrated strategy to define appropriate air-quality objectives for the future and cost-effective measures for meeting those objectives.

5. Disseminating the technical and policy information emerging from implementation of the programme.

A steering group comprising representatives of the member states and stakeholders meets two or three times a year to advise the Commission on the strategic direction of the programme.

Major emission reductions needed in the coming decades

The "low-carbon scenario" presented by the Commission, with reductions of 60–80 per cent in developed countries by 2050, is unlikely to meet the EU's climate targets, however.

IN MARCH the European Council – the heads of government of the EU member states – agreed that it would consider "medium and longer term emission reduction strategies, including targets" at its meeting in spring 2005.

As part of its remit to provide background information for decisions by the European Council, the Commission conducted a web-based stakeholder consultation this autumn on the climate policy of the EU after 2012, when the Kyoto Protocol expires.

In its discussion paper[1] the Commission states that the EU's target is to limit average global temperature increases to no more than 2°C of pre-industrial levels. This will require major reductions in emissions of greenhouse gases, particularly in developed countries, which according to the climate convention bear the largest responsibility for rectifying the problem.

The Commission describes a so-called low-carbon scenario in which industrialized regions would need to reduce emissions between by 20 and 45 per cent in 2025 with respect to 1990, depending on the region and the effort sharing principles of different commitment schemes. In 2050, the world's developed countries would need to cut emissions of greenhouse gases by 60 to 80 per cent.

According to this scenario it would be possible to stabilize the level of greenhouse gases in the atmosphere at around 550 ppm CO_2-equivalents. However, more recent research shows that this level is far too high to meet the target of 2°C maximum. Climate Action Network Europe, the umbrella organization of the environmental movement, considers that there would be a risk of failing to achieve the target even with a CO_2-equivalent value of 450 ppm.[2]

CAN Europe believes that the emission target for the EU should be to cut emissions by 80 per cent by 2050, and that this reduction needs to be

divided into several medium-term legally binding targets with absolute reductions in EU domestic emissions of at least 30 per cent by 2020.

The Commission also considers the issue of climate commitments from developing countries.

Emissions from these countries are still relatively small, measured per capita, but are growing. The Commission argues for a staged approach, in which the timing and level of their involvement will need to vary in accordance with their sustainable development needs, capacity and level of development.

CAN Europe wants to see a similar strategy, in which developing countries are successively set binding commitments, in parallel with the reductions in emissions by the rich nations. The level and the character of the mitigation actions for a single country would be determined by reference to an agreed level of per capita emissions, ability or capacity to act (including measures such as per capita income) and historical responsibility.

When it comes to possible measures within the European Union, CAN Europe presents a long list, including the need to see binding reductions of at least one per cent per year in energy use and increased support for renewable energy. Nuclear power is not regarded as an option for a sustainable energy system.

Fair pricing is also considered to be important. EU should adopt full-pricing for non-renewables in a progressive schedule and remove all subsidies from fossil fuels and introduce a common EU tax on aviation kerosene.

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[1] Action on Climate Change Post-2012. A Stakeholder Consultation on the EU's Contribution to Shaping the Future Global Climate Change Regime. Can be downloaded, together with other background information, from http://europa.eu.int/comm/environment/climat/future_action.htm

[2] EU Public Consultation on Future Commitments Post 2012 on Climate Change – CAN Europe. Available at www.climnet.org

FACTS

Emission targets after 2012 will be an important issue at COP10, the tenth conference of the parties to the UN climate convention, which will take place in Buenos Aires in December.

The Kyoto Protocol is generally regarded as being just the first step in addressing the serious global threat of climate change. Under the Protocol, the EU has committed itself to reducing its emissions of greenhouse gases by 8 per cent between 1990 and 2012.

A new website has been launched to gather reports, news and opinions on forthcoming climate targets: Future international action on climate change network: www.fiacc.net

CLIMATE CONVENTION

Russian Kyoto ratification triggers new negotiations

THE KYOTO PROTOCOL will come into force early next year. This became clear when it was ratified by Russia in November. Once the Russian ratification has been formally accepted there is a waiting period of 90 days before the protocol comes into effect.

Avoiding serious climate change will, however, require reductions in global emissions that are much greater than those prescribed by the Kyoto Protocol. The protocol includes various flexible mechanisms and allows credits to be given for so-called carbon sinks. This, combined with the fact that the US has pulled out of the agreement, means that the net result could be zero change in emissions from the industrialized countries over the period 1990–2012, or even an increase, instead of the reduction of 5.2 per cent that was predicted when the protocol was signed in 1997.

The Kyoto Protocol rules that negotiations on the next period of undertaking should begin by 2005 at the latest. The discussion will start at COP10, the tenth conference of the parties to the climate convention, which will be held in December.

EU EMISSIONS TRADING

Eight new plans approved

ON 20 OCTOBER the EU Commission approved eight national allocation plans (NAPs) for trading in carbon dioxide emissions within the union, which means that 16 out of 25 countries have now been given the green light for their plans.

Under the trading system, which will start on 1 January, the member states must allocate how much carbon dioxide companies may emit, and those plans must be approved by the Commission. The scheme involves some 12,000 installations in total, including power stations and energy-intensive industries.

The first round of eight NAPs was approved by the Commission in July (see AN 3/04). The eight that received the go-ahead in the second round were Belgium, Estonia, Latvia, Luxembourg, Portugal, Slovakia, France and Finland. The last two plans must however be modified before they can be applied.

The assessment of the plans from Cyprus, Hungary, Italy, Lithuania, Malta, Czech Republic, Poland and Spain is in progress. Of the 25 nations in the union, only Greece has failed to turn in its plan so far.

The most important criteria of the Commission's examination are designed to ensure that each plan fits in with the respective country's overall strategy to reach its Kyoto target. In total, the Commission reports that it has forced cuts of 48 million tonnes of allowances from the 16 approved plans – around one per cent of the total amount proposed. However, many critics consider that the Commission has accepted excessively high allowances, which could mean that trading has a limited effect on emissions.

Further information: http://europa.eu.int/comm/environment/climat/emission_plans.htm

UK increases number of allowances

On 27 October the UK government announced that it had decided on an upward revision in the number of allowances it intends to distribute for the first trading period. This, despite the fact that the UK has criticized other countries for being too free with their allowances and the fact that the country's NAP had already been approved by the EU Commission.

The explanation given was that the trading sector's projected business-as-usual emissions have been increased by 56 million tonnes. The allowances will now be raised by 20 million tonnes to 756 million tonnes. It is not yet clear whether the UK's NAP will be subjected to a new examination by the Commission.

Source: www.defra.gov.uk/news/2004/041027a.htm

ENERGY EFFICIENCY

EU needs to raise ambitions

A RECENT REPORT[1] reveals that Central and Eastern European countries are using at least twice the energy used by the previous 15 EU member states for each unit of economic output.

Slovakia is the worst performer in the study, with an energy spending of more than five times (5.2) the EU15 average. The Czech Republic comes second, using nearly five times as much, while Poland and Hungary scored 3.7 and 3.0, respectively. Best among the five countries analyzed was Slovenia, with an energy use 1.9 times the EU15 average.

The report – which has been produced by WWF along with six other environmentalist NGOs – highlights the fact that in the EU accession process, negotiations have focused mainly on market liberalization and new investment in power generation and transmission infrastructure, with insufficient attention given to the huge and cost-effective opportunities to increase energy efficiency.

In some cases, existing policies for energy efficiency were scrapped as a result of accession to the EU. The Czech Republic, for example, abolished a tax reduction scheme meant to encourage the purchase of the most efficient appliances on the market.

The report also points out that despite massive financial resources from structural funds there is little indication that energy efficiency will be prioritized. To date, structural funds have largely been used for investments in new infrastructure, electricity and gas interconnections, rather than energy efficiency programmes.

WWF wants to see the annual one-per-cent energy efficiency target of the draft Directive on End-Use Efficiency and Energy Services increased to at least two per cent in order to explore the huge cost-effective potential of energy saving even further.

[1] **Ending Wasteful Energy Use in Central and Eastern Europe**. Can be downloaded in pdf format from www.panda.org/epo.

EU TEST STANDARDS

Air pollution from cars understated

CURRENT TEST CYCLES for new vehicles do not reflect how cars are used under real driving conditions and so underestimate their actual emissions. This may help to explain why urban air quality is not improving as fast as vehicle data suggest it should, says a report[1] from the European Environment Agency (EEA).

The problem is compounded by the fact that many diesel car owners are modifying their engines to increase power (so-called chip-tuning), which increases fuel consumption and seems to boost particulate emissions by a factor of three. A recent report estimates that as many as half of new diesel cars may have been modified in this way.

According to the EEA the statistics on greenhouse gas emissions for new cars are also misleading. The downward trend appears greater than it really is – emissions from air conditioning and other in-car equipment not covered in testing could in reality cancel out around half of the improvement. The growing use of heated seats, air conditioning and the like could be adding an extra 16 to 28 g/km to new car CO_2 emissions, the agency says.

Other key messages from the report include:

❑ Aviation is the fastest-growing transport mode and its impacts on the climate will soon exceed those of passenger vehicles.

❑ Rail and bus fares are rising faster than the cost of private car use, giving cars an advantage over public transport.

❑ Transport infrastructure, especially road and high-speed rail networks, is continuing to expand and thus further fragmenting the landscape.

[1] **Ten key transport and environment issues for policy-makers. TERM 2004: Indicators tracking transport and environment integration in the European Union**. EEA Report 3/2004. Published by EEA, Kongens Nytorv 6, 1050 Copenhagen K, Denmark. Available in pdf format at http://reports.eea.eu.int/TERM2004

EU KILOMETRE TAXES

Still no agreement by Council

WHEN TRANSPORT MINISTERS from the EU member states met in October they failed for the third time to reach agreement on revision of the "Eurovignette" directive. Until a revised directive is in place the member states are prevented from introducing effective distance-related road taxes on heavy vehicles.

The review proposal that the Commission put forward in June last year contained several new elements, including the opportunity for the member states to charge a kilometre tax on large parts of their road networks, and setting the lower vehicle weight limit for the tax at 3.5 tonnes. However, the Commission also wanted the revenues to be earmarked for the building of new infrastructure, and in particular roads forming part of the trans-European network, TEN. (See AN 3/03, p. 21.)

The main objection among the ministers in the Council was to the earmarking of tax revenues. Most of the states situated on the periphery of the EU want the tax to be based on road investments in each country and want revenues to be earmarked solely for road investment.

The more centrally located states, and those with a stronger environmental interest, would rather avoid earmarking and instead link the tax level to the external marginal costs of road traffic. Earmarking has also attracted strong criticism from T&E, the European Federation for Transport and Environment, which says that the proposal favours road transport and is economically illogical.

Markus Liechti at T&E believes that the proposed directive has such severe shortcomings that the Commission should draw up a new one:

"Several states clearly support true pricing and want to see more progress. This sends a clear signal to the new transport commissioner, Jacques Barrot, who said in the European Parliament that transport should pay for all its costs to create a level playing field between transport modes."

BANKWATCH

Unsustainable lending to new member states

THE EU has stated that the new member states "…have the opportunity to make progress towards an economic development that is sustainable and avoids the type or scale of environmental problems now faced in western Europe".

However, a recent study by Bankwatch (a coalition of environmental organizations) shows that the new member states are at risk of repeating the same mistakes as in the west, and with the support of the EU. Instead of promoting environmentally sound transport alternatives, grants and loans from EU funds and the European Investment Bank are being used to create car-dependent societies in the new member states.

The Bankwatch study indicates that heavy investments from the EU funding mechanisms in the new member states are being directed mainly at the trans-European corridors, while the allocation of public resources for the basic maintenance and safety of domestic infrastructure falls far below required levels.

According to Bankwatch it will be crucial to give high priority to sustainable transport options during the forthcoming 2007–2013 programming period for Structural and Cohesion Funds. The study sets out eighteen recommendations for the European institutions to help ensure that their transport investments in the region are in line with the EU's Sustainable Development Strategy.

Source: **Heading down dead ends: Transport sector financing in central and eastern Europe**. Available at www.bankwatch.org/publications/studies/2004/dead_ends-transport_study_09-04.pdf. For hard copies, send a request to press@bankwatch.org

Growing support for stricter requirements

Many countries were in favour of compulsory regulation of CO_2 emissions from cars when environment ministers met recently.

It is perfectly possible to build fuel-efficient cars. The hybrid Toyota Prius HSD uses 4.3 litres of petrol per 100 km, which is equivalent to 104 g of carbon dioxide per kilometre.

MORE AND MORE member states are now warming to the idea that the EU should introduce compulsory rules to reduce emissions of carbon dioxide from new cars. This became apparent when ministers of the environment discussed sustainable road transport at the council meeting on 14 October. The ministers also want to see a prompt stiffening of the standards governing emissions of nitrogen oxides and particulates from road vehicles.

The use of standards to compel vehicle manufacturers to limit emissions of carbon dioxide from new vehicles has been discussed increasingly often in the EU over the past year. This follows growing indications that the automotive industry has difficulty in fulfilling the undertaking given in an agreement with the Commission – that average emissions from new cars sold in the EU should not exceed 140 grams of carbon dioxide per kilometre by 2008–2009.

Moreover, the industry has not shown any interest in discussing a new undertaking after 2008. The Commission has proposed a ceiling of 120 g/km as a target for 2012 (the EU still has 120 g/km by 2010 as its official target).

The environment ministers suggested that the Commission should negotiate new covenants with the automotive industry setting a more stringent ceiling of 120 g/km. But a lot of ministers said a voluntary basis was perhaps not enough – the Commission should also be prepared to legislate on this if the industry proves recalcitrant. Light duty commercial vehicles may also be covered by the agreement and/or rules, which only apply to passenger cars at present.

To reduce pollution from road traffic, the environment ministers discussed the next round of EU emission limits for light and heavy road vehicles. They were in favour of more stringent standards for particulate matter and nitrogen oxides, however neither a timetable nor levels were specified in council conclusions. The meeting also revealed growing support for a general introduction of particulate filters on diesel vehicles.

PER ELVINGSON

NEWS IN BRIEF

California regulates CO_2 from vehicles

In September the California Air Resources Board adopted new rules that will require automotive makers to cut average emissions of carbon dioxide and other greenhouse gases from new cars and trucks by 34 and 25 per cent respectively by 2016 (see AN 3/04, p.19). The regulation is also expected to cut smog-forming pollution by about five tonnes per day by 2020.

The California Legislature will now review the rules, which could come into effect in 2006. The auto industry is expected to challenge the standards in the courts.

At least seven other states, including New York, Massachusetts, New Jersey, Vermont, Connecticut, Rhode Island and Maine, as well as the nation of Canada, are expected to consider adopting the regulation for their own use. If all these states and Canada adopt the rule it will triple the number of cars required to comply.

Further information: The California Air Resources Board, www.arb.ca.gov.

Austria brings in filter subsidies too

Austria is the latest country to introduce tax incentives to reduce emissions of particulates from diesel passenger cars. From January 2005 it will offer a tax bonus of 300 euros for cars emitting less than 5 mg/km, while cars emitting more will have to pay a 150-euro penalty, rising to 300 euros in 2006. The EU standard that comes into force in 2005 (Euro 4) permits diesel vehicles to emit up to 25 mg/km of particulates.

Two out of every three new cars sold in Austria today are diesels, the highest proportion in the EU. The Netherlands and Germany are planning to introduce similar tax incentives from next year.

Increase in Swedish transport taxation

Taxes on road vehicles in Sweden are to rise next year as part of the country's drive to make Sweden an "ecologically sustainable society". The annual road tax for cars will rise by an average of 35 euros for petrol- and 10 euros for diesel-driven vehicles, while taxes on petrol will rise by 0.015 euros per litre and 0.030 euros per litre on diesel. The increases will be offset by reductions in the basic rate of Swedish income tax.

Air pollution may cause lifelong lung deficits

A new study provides the most definitive evidence yet that routine exposure to dirty air during childhood actually harms lung development, leading to a permanently reduced ability to breathe.

BY THE AGE OF 18, the lungs of many children who grow up in polluted areas are underdeveloped and are unlikely ever to recover, according to the results of the Southern California Children's Health Study, the longest investigation ever into air pollution and children's health.[1]

The study provides the most definitive evidence yet that routine exposure to dirty air during childhood actually harms lung development, leading to a permanently reduced ability to breathe. Underpowered lungs are known to cause a wide range of health problems.

Between 1993 and 2001, scientists have tracked levels of major pollutants in twelve Southern California communities while monitoring the pulmonary health of 1,759 children as they progressed from 4th grade to 12th grade (10 to 18 years old).

The twelve communities included some of the most polluted areas in the greater Los Angeles basin, as well as several low-pollution sites outside the area.

The team from the University of Southern California Keck School of Medicine had previously found that children who were exposed to air pollution scored more poorly on respiratory tests.

In the latest study, they tested the same children at the age of 18 when the lungs have almost completely matured.

Children breathing dirty air were nearly five times more likely than children in less polluted communities to grow up with weak lungs, they found. In the highest pollution areas 7.9 per cent of the 18-year-olds had lung capacities that were less than 80 per cent of what they should have been. Among teenagers subjected to the least-polluted air, only 1.6 per cent had underperforming lungs.

"This is some of the most convincing evidence that air pollution has chronic effects," said W. James Gauderman, associate professor of preventive medicine and lead author of the study. One surprise for the researchers was that the damage appeared even at low pollution levels and that such a large proportion of children were affected – not just risk groups such as asthma sufferers.

Low lung function is second only to smoking as a risk factor for all-cause mortality

The pollutants for which a correlation was found between concentration and deficits in lung development were nitrogen dioxide, acid vapour, particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$) and elemental carbon. The strongest correlation was observed with small particulates.

"These are pollutants that all derive from vehicle emissions and the combustion of fossil fuels," Gauderman said.

The definition of clinically low lung function is when a person has less than 80 per cent of the lung function expected for his or her age. This is viewed as a significant deficit with both short and long-term implications.

"If a child or young adult with low lung function were to have a cold, they might have more severe lung symptoms, or wheezing," Gauderman said. "They may have a longer disease course, while a child with better lung function may weather it much better."

Potential long-term effects are more alarming. "Low lung function has been shown to be second only to smoking as a risk factor for all-cause mortality," Gauderman said.

Lung function increases steadily as children grow, peaking at about age 18 in women and sometime in the early twenties in men. Lung function stays steady for a short time and then declines by 1 per cent a year throughout adulthood. As lung function decreases to low levels in later adulthood, the risk of respiratory diseases and heart attacks increases.

Researchers are unsure how air pollution may retard lung development. Gauderman believes chronic inflammation may play a role, with air pollutants irritating small airways on a daily basis. Scientists also suspect that pollutants might inhibit the growth of alveoli, the tiny air sacs within the lungs where the exchange of oxygen and carbon dioxide takes place.

The research team will continue to follow the study participants into their early twenties, when their lungs will mature and stop developing entirely. The team aims to find out if the participants begin to experience respiratory symptoms and if those who moved away from a polluted environment show benefits.

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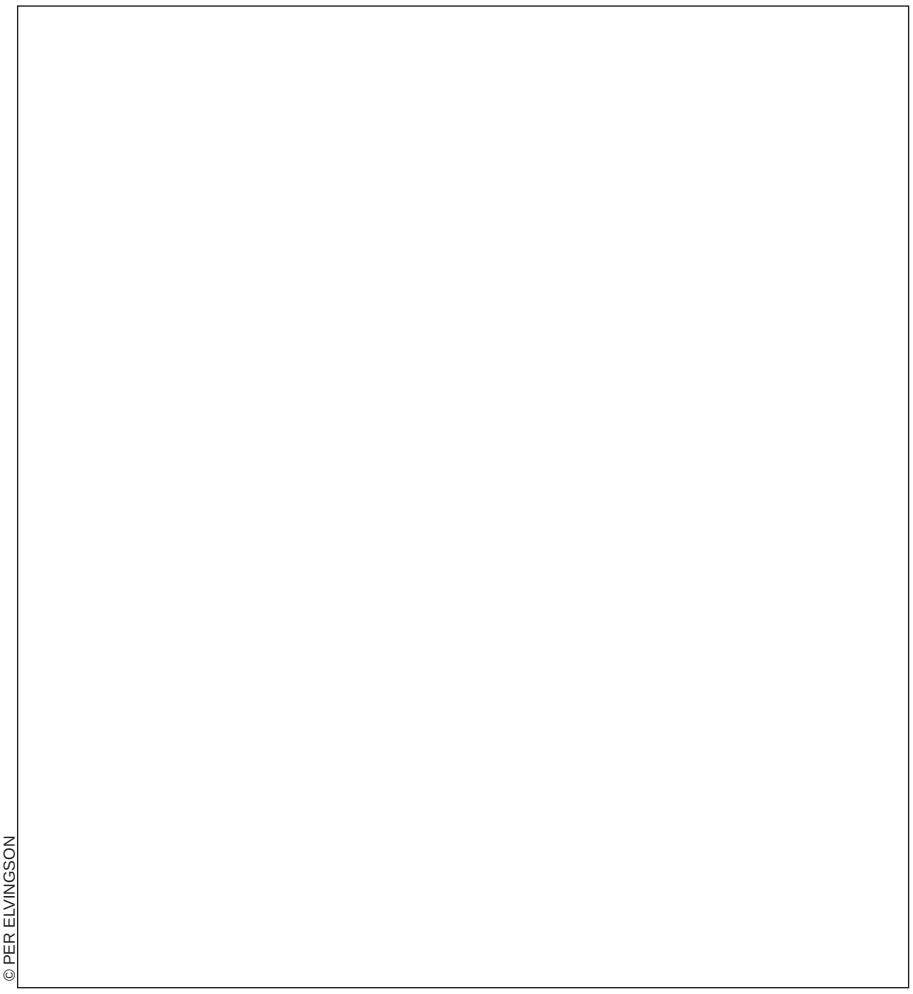
[1] New England Journal of Medicine. Volume 351:1057-1067, 9 September 2004. Number 11. See also press release from the University of Southern California, 8 September 2004.

Larger areas at risk

Acidification problems in Europe have been underestimated. The new figures are approximately twice those that were used in international negotiations a few year ago.



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MUCH WIDER AREAS of Europe are being affected by acidification and eutrophication than has previously been thought. According to a recent report[1] from EMEP[2], the areas where critical loads are still being exceeded are actually much larger.

Wherever the fallout of pollutants exceeds the critical loads, there is a high risk that damage will sooner or later occur to the environment. Awareness of this is what has guided international agreements for cutting emissions of air pollutants under the Convention on Long-range Transboundary Air Pollution (CLRTAP), the latest being the Gothenburg Protocol of 1999. This kind of information has also served as a basis for the EU directive on national emission ceilings (NEC) for four air pollutants that was adopted in 2001.

The calculations for both the Gothenburg protocol and the EU NEC directive are derived from maps drawn to a relatively coarse scale (on a grid system made up of 150 x 150 kilometre squares). Estimates of deposition levels were calculated by EMEP, using their "old" computer model, and no account was taken of the fact that depositions of acidifying and eutrophying pollutants will vary according to the way in which the ground is being utilized – the fallout is greater for instance over forest areas than over open ground.

One important factor influencing the new estimates of exceedance is the switch to a new European model for calculating air pollutant concentration and deposition levels, the so-called Unified EMEP model.

Calculations based on this improved model result in higher levels of deposition generally, as compared to the "old" model. Moreover, the new model applies land-cover specific deposition figures, which are more appropriate for comparison with the ecosystem-specific critical loads data, since this accounts for enhanced deposition on forests.

For the last few years the mapping of critical loads has been carried out using a spatial resolution of 50 x 50 instead of 150 x 150 km squares (the latter being nine times as large as the new ones). This has resulted in the emergence of areas with higher sensitivity that had previously been suppressed because of their insignificance in a larger square.

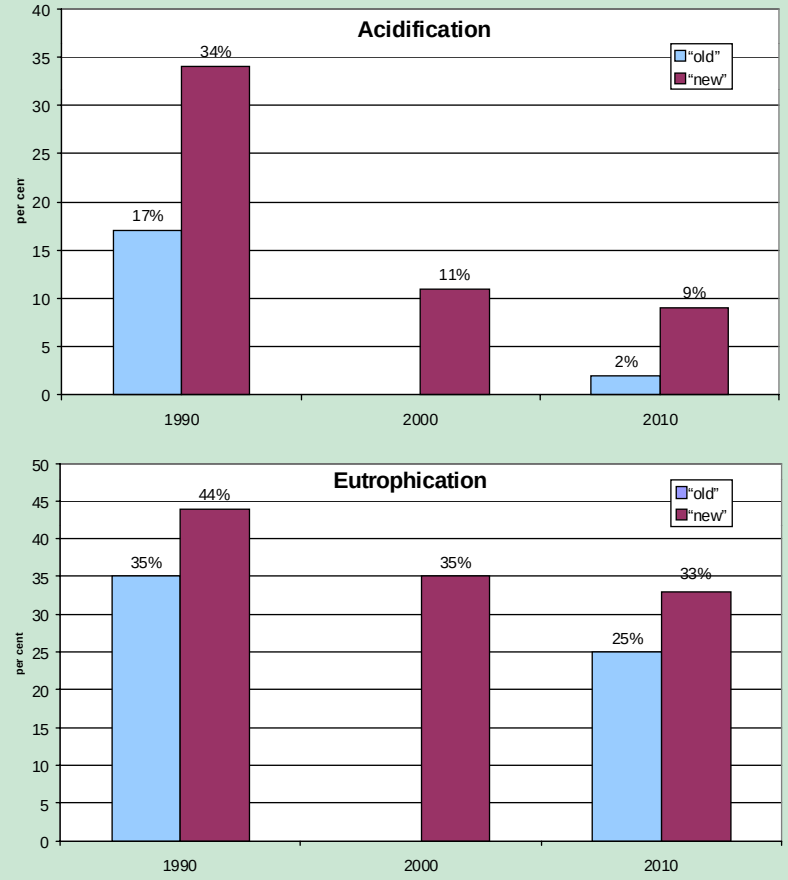
The new Unified EMEP model also provides data with a grid resolution of 50 x 50 kilometres. Better resolution has not only made it possible to pick out sensitive areas, it has also meant that the areas of ecosystem where the critical load is being exceeded can be better shown.

Additionally, many countries have updated their critical loads data, and in some cases this improved data indicates a higher level of sensitivity than the older data. Finally, estimates of emissions have become better with time. This is true for both historic (e.g. 1990) values and projections of future (e.g. 2010) emissions.

According to the new estimates, the area of sensitive ecosystems in Europe where the critical load for acidification has been exceeded shrank from 34 per cent in 1990 to 11 per cent in 2000. Assuming that the European emissions of sulphur and nitrogen compounds fall off as envisaged in the Gothenburg Protocol, the figure can be expected to drop to 9 per cent by 2010.

These new figures are approximately twice those that were used in international negotiations – where

Old and new figures for the percentage of ecosystem area in Europe where critical loads for acidification and eutrophication were being exceeded in 1990 and 2000, with projections for 2010.



Larger areas at risk

Continued from previous page

critical loads were assumed to have been exceeded on 17 per cent of the total area in 1990, falling to 4 per cent in 2010.

The area of ecosystems in Europe where the critical loads for eutrophication were being exceeded is now estimated to have been 44 per cent in 1990 and 33 per cent in 2000. By 2010, the figure is still expected to be 33 per cent. The new figures for eutrophication are some 30 to 40 per cent higher than previously assumed.

International efforts to stem the emissions of air pollutants have clearly yielded results in the form of a gradual reduction in the exceedance of critical loads. The fact that the improvement has been slower as regards eutrophication than it has been for acidification is due to the relative lack of success in dealing with emissions of the nitrogen compounds (nitrogen oxides and ammonia).

It appears from the new estimates by EMEP that environmental improvements due to the Gothenburg Protocol and the EU NEC directive will be much less than anticipated. To arrive at a situation where critical loads would no longer be exceeded would consequently require bigger emission reductions than was previously assumed.

It should also be noted that these calculations result in maps showing only the general extent by which the critical loads are being exceeded at a given time. The data gives no information as to the state of the environment in each area – in fact soil and water have become so acidified in places that it will take decades, in some cases centuries, before they are fully restored.

CHRISTER ÅGREN

[1] **Transboundary acidification, eutrophication and ground level ozone in Europe**. EMEP Status report 1/2004. Available at www.emep.int

[2] EMEP stands for the "Co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe", under the Convention on Long-range Transboundary Air Pollution.

Mapping of ecosystem sensitivity

THE EFFORTS of the last few decades to reduce air pollutant fallout in Europe, which have resulted in a number of important international agreements as well as EU legislation, have depended to a large extent on the mapping of critical loads.

Critical loads are scientific estimates of the amounts of pollutants that various ecosystems can tolerate without being harmed – sometimes also referred to as the limits on what "nature can tolerate".

Based on reports from the various countries, the Coordination Center for Effects (CCE) under the Convention on Long-range Transboundary Air Pollution produces Europe-wide critical load maps, and in a new report[1] the CCE provides updated European such maps for acidity and nutrient nitrogen (see figures 1 and 2).

The report also contains preliminary maps and tables showing the extent to which the critical loads for deposition of acidity and eutrophication were exceeded in the year 2000 (see figures 3 and 4), and what can be expected in 2010 if every country fulfils its undertakings in accordance with the Gothenburg protocol.

Due to a number of developments, including improvements in the scientific input, the estimate of ecosystems' exposure to depositions exceeding their critical loads have changed significantly over the last few years. It appears from these changes in methodology and input data that the real extent of the problem had previously been underestimated. (See article on previous page.)

Moreover, the CCE can now produce maps showing the sensitivity of various ecosystems to acid deposition. In the past, all ecosystems were lumped together in a single map.

By using so-called dynamic modelling it is possible to illustrate not only where ecosystems are at risk, but also the time that will be needed for recovery. In order to improve such

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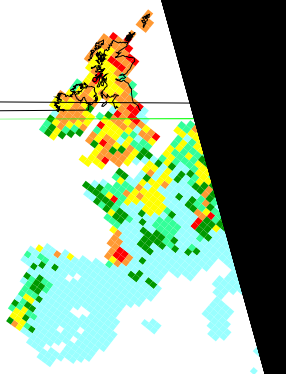
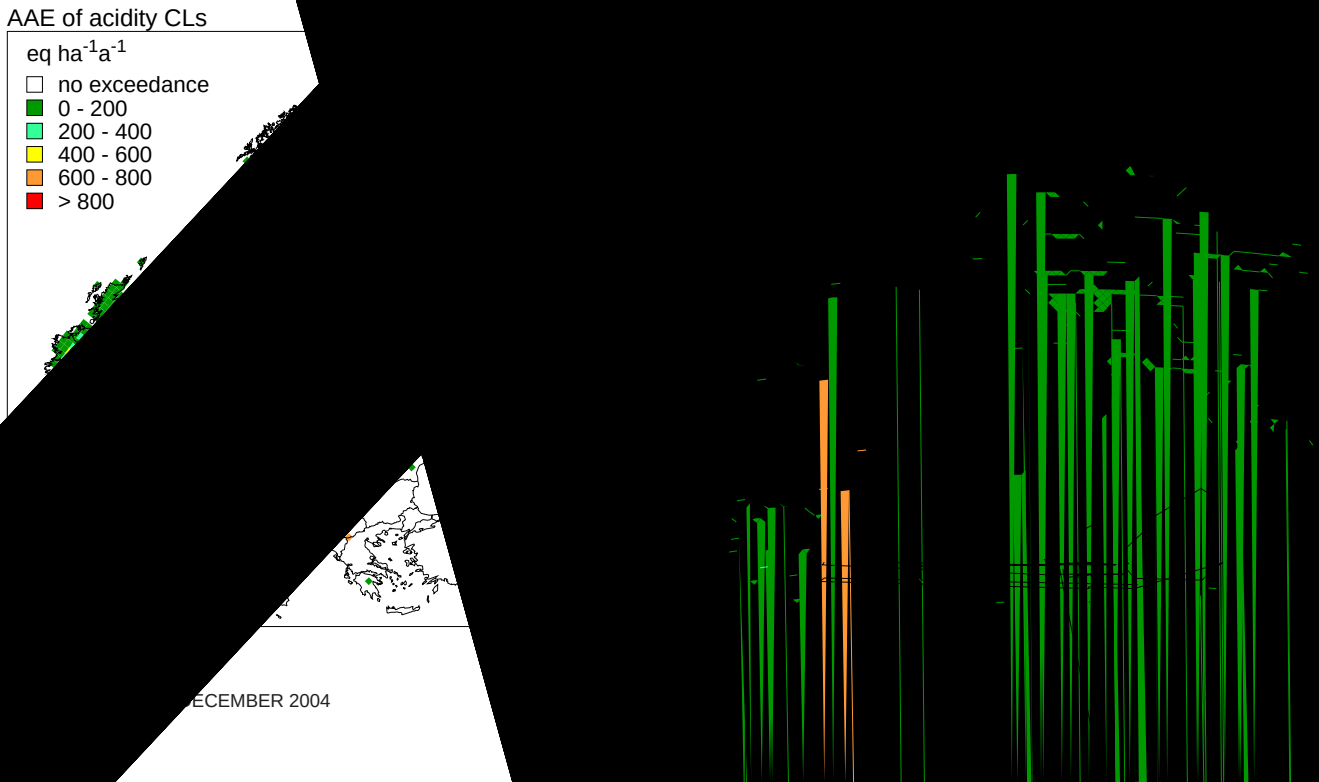


Figure 3. Areas where the
exceeded in 2000.



Break in downward trends?

THE STEADY REDUCTION in acidifying emissions in Europe is now starting to level out. At least this appears to be the case judging by the figures for the last two years.[1]

Since the early 1980s the total European emissions of sulphur dioxide (SO_2), the most significant acidifying pollutant, from land-based emissions sources have fallen by just over 70 per cent, from around 53 million tonnes in 1980 to 15 million tonnes in 2000.

Reports for the period 2000 to 2002, however, show largely unchanged emissions from land-based sources, with minor reductions in some countries and increases in others. The countries where emissions have risen include Poland, Spain, Russia and Ukraine – the latter by a full 29 per cent (300,000 tonnes) between 1999 and 2002.

Emissions of nitrogen oxides (NOx), volatile organic compounds (VOCs) and ammonia also fell in Europe in the 1990s, although not by as much as emissions of SO_2. While the first two had dropped by about a third since 1990, emissions of ammonia only fell by a quarter.

As with SO_2, the downward trend has also flattened out for these three pollutants. Reports for the period 2000 to 2002 show largely unchanged total emissions from land-based sources. In the case of NOx and VOCs, small reductions in most countries were negated by respective increases in Russian emissions of 200,000 and 300,000 tonnes over the same period.

Since 1980 the emissions of sulphur dioxide have fallen by over 70 per cent

The Convention's EMEP programme is not confined to keeping track of emissions. Its main task is to model the ways in which emissions from one country are affecting the environment in others.

In the eighties and nineties the calculations were based on grid squares measuring 150 x 150 kilometres, but over the last few years a model has been developed for 50 x 50 km squares. This new, so-called, Unified EMEP model is the one now in use, and it has been further modified and improved since last year.

An overview of calculations for source-receptor relationships, covering acidifying, eutrophying and photo-oxidant pollution is presented in another recent EMEP report.[2]

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Shipping emissions not updated

It is important to note that EMEP has still not updated information regarding emissions from international shipping. The report uses estimates made by Lloyd's Register during the nineties, and the levels are assumed to have remained constant from 1980 onwards. More recent estimates indicate however that ships' emissions have increased considerably since 1990, and are likely to go on doing so (see AN 3/02, p.8 and p.10 in this issue).

[1] The data reported by individual countries to the Convention on Long-range Transboundary Air Pollution is compiled by EMEP (the cooperative programme for monitoring and evaluating the long-range transmissions of air pollutants in Europe), and published both in printed form and on the EMEP website. Figures for other pollutants, such as particulates and POPs (persistent organic pollutants), are also given. The title of this year's report is **Inventory Review 2004: Emission data reported to CLRTAP and under the NEC Directive.** Technical Report MSC-W 1/2004. By V. Vestreng et al. Available at the EMEP website: www.emep.int

[2] **Transboundary acidification, eutrophication and ground-level ozone in Europe**. EMEP Status Report 1/2004. Also available at the EMEP website (see above).

European emissions of sulphur dioxide, nitrogen oxides (as NO_2), ammonia, and volatile organic compounds. Thousands of tonnes a year.

	Sulphur dioxide			Nitrogen oxides (NO_2)			Vol. Org. Compounds			Ammonia		
	1980	**1990**	**2002**	**1980**	**1990**	**2002**	**1980**	**1990**	**2002**	**1980**	**1990**	**2002**
Austria	360	80	36	246	212	204	437	298	193	52	57	53
Belgium	828	362	153	442	334	284	*274*	*274*	264	*89*	99	83
Cyprus	28	46	51	13	18	22	*14*	*14*	16	*8*	*8*	6
Czech Republic	2257	1881	237	937	544	318	*275*	441	203	*156*	156	72
Denmark	452	177	25	*307*	283	200	*194*	164	124	*138*	133	101
Estonia	287	252	88	*70*	68	40	*81*	88	38	*24*	24	9
Finland	584	260	82	295	300	208	*210*	224	151	39	38	33
France	3214	1326	537	2024	1897	1352	*2734*	2499	1542	795	779	778
Germany	7514	5326	611	3334	2845	1499	3224	3591	1478	835	735	614
Greece	400	493	485[1]	*306*	290	331[1]	*255*	255	268[1]	*79*	79	*73*
Hungary	1633	1010	359	273	238	180	215	205	155	157	124	65
Ireland	222	186	96	73	118	125	*111*	111	81	*112*	112	119
Italy	3440	1748	709[1]	1585	1919	1317[1]	2032	2041	1467[1]	441	428	442[1]
Latvia	*96*	96	12	*83*	83	41	*152*	152	89	*38*	38	11
Lithuania	311	222	43	152	158	51	100	108	72	85	84	51
Luxembourg	24	15	3[2]	23	23	17[2]	*15*	19	15[2]	*7*	7	7[2]
Netherlands	490	191	71	583	579	406	579	490	243	234	232	136
Poland	4100	3210	1564	1229	1280	805[1]	1036	831	576[1]	550	508	328[1]
Portugal	253	229	205	158	222	265	*189*	255	271	*96*	96	93
Slovakia	780	542	102	*197*	216	102	*252*	252	87	*63*	63	29
Slovenia	234	196	71	51	63	58	*39*	44	49	*24*	24	19
Spain	2913	2098	1507	1068	1206	1339	1392	1591	1459	285	327	379
Sweden	491	106	58	404	324	242	528	503	295	*54*	54	55
United Kingdom	4852	3721	1002	2580	2771	1582	2100	2419	1186	*361*	361	296
Sum EU25	**35763**	**23773**	**8107**	**16433**	**15991**	**10988**	**16438**	**16869**	**10322**	**4722**	**4566**	**3852**
Albania	*72*	*72*	*58*	*24*	*24*	*29*	*31*	*31*	*34*	*32*	*32*	*32*
Belarus	740	637	143	234	285	137	549	533	229	*142*	*142*	128
Bosnia & Herzegovina	*482*	*482*	*419*	*79*	*79*	*55*	*51*	*51*	*42*	*31*	*31*	*23*
Bulgaria	2050	2008	940[1]	*416*	361	188[1]	*309*	217	123[1]	*144*	144	56[1]
Croatia	150	180	58[2]	60	88	77[2]	*105*	105	80[2]	*37*	37	23[2]
Iceland	18	24	*27*	21	26	*28*	8	13	*10*	*3*	*3*	*3*
Norway	136	52	22	191	224	213	173	294	345	20	20	22
Macedonia	*107*	*107*	166	*39*	*39*	37	*19*	*19*	*17*	*17*	*17*	*16*
Moldova	308	265	15	*115*	100	25	105	157	28	53	49	27
Romania	1055	1311	*912*	523	546	*319*	829	772	*638*	340	300	*221*
Russia	7323	4671	2130	*3634*	3600	2566	*3410*	3668	2777	1189	1191	600
Serbia & Montenegro	406	508	382	*192*	*211*	*158*	*142*	*142*	*129*	*90*	*90*	*79*
Switzerland	116	42	19	170	154	94	323	279	143	77	72	67
Ukraine	3849	2783	1329	1145	1097	587	*1626*	1369	*282*	*729*	729	378[1]
Sum Non-EU	**16812**	**13142**	**6620**	**6843**	**6834**	**4513**	**7680**	**7650**	**4877**	**2904**	**2857**	**1675**
Sum Europe	**52575**	**36915**	**14727**	**23276**	**22825**	**15501**	**24118**	**24519**	**15199**	**7626**	**7423**	**5527**
Int. ship: Baltic Sea	*228*	*228*	*228*	*352*	*352*	*352*	*8*	*8*	*8*	-	-	-
Int. ship: Black Sea	*57*	*57*	*57*	*86*	*86*	*86*	*2*	*2*	*2*	-	-	-
Int. ship: Mediterran.	*1189*	*1189*	*1189*	*1639*	*1639*	*1639*	*34*	*34*	*34*	-	-	-
Int. ship: North Sea	*454*	*454*	*454*	*648*	*648*	*648*	*15*	*15*	*15*	-	-	-
Int. ship: N.E. Atlantic	*901*	*901*	*901*	*1266*	*1266*	*1266*	*25*	*25*	*25*	-	-	-
Sum internat. shipping	**2829**	**2829**	**2829**	**3991**	**3991**	**3991**	**84**	**84**	**84**	**-**	**-**	**-**
Sum Europe + ships	**55404**	**39744**	**17556**	**27267**	**26816**	**19492**	**24202**	**24603**	**15283**	**7626**	**7423**	**5527**
Turkey	*1030*	*1590*	*2112*	364	644	951[2]	359	463	726[2]	*321*	*321*	*321*

[1] 2001 data. [2] 2000 data. *Italics* = Expert estimates.

Climate-related damage increasing

The warm, dry summer of 2003 increased defoliation among broadleaf trees.

AN INVESTIGATION of forest damage in Europe in 2003[1] showed that the average degree of crown thinning was on a par with previous years, although there were differences between regions and species of tree. Many countries pointed the finger at extremes of climate, particularly summer drought, as the cause of the damage.

The pan-European programme for monitoring forest condition in Europe has been in progress since 1986 and has involved an increasing number of participating countries. In 2003 crown condition was assessed on 5,915 plots forming part of the 16 x 16 kilometre transnational grid that covers 33 countries all over Europe.

Of the trees investigated, 22.7 per cent had lost more than 25 per cent of their leaves or needles, a figure that is close to the mean values for the previous years. The mean defoliation for all species was 19.8 per cent.[2]

Of the main species, European oak (*Quercus robur)* and Sessile oak (*Q. petraea)* had by far the highest mean defoliation, at 25.9 per cent, followed by beech (*Fagus sylvatica),* 20.3 per cent, Norwegian spruce (*Picea abies),* 19.6 per cent, and Scots pine (*Pinus sylvestris),* 18.7 per cent.

During the period 1990–2003 the largest increase in mean defoliation occurred on Holm oak (*Quercus ilex* and *Q. rotundifolia),* from 13.8 to 22.3 per cent. The mean defoliation of beech has also increased since 1990. The broadleaf trees reveal a sharp increase in defoliation from 2002 to 2003, which presumably reflects the summer heat and drought of the last year.

Large areas are exposed to ozone levels that exceed the limit at which damage can occur

In contrast, Scots pine showed a recovery since the mid 1990s, particularly in Belarus, Poland and parts of the Baltic states. The crown condition of this species was better in 2003 than at the beginning of the time period.

Norwegian spruce had also shown some recovery since the mid 1990s, but to a lesser extent. It now has approximately the same mean defoliation as in 1990.

The main causes for changes in defoliation reported by the countries are biotic stressors and weather extremes, including exceptionally high summer temperatures and drought.

Defoliation was rarely attributed to deposition of air pollutants by the countries concerned. Measurement of the ozone concentrations over Europe in summer, however, show that large areas of the continent are exposed to levels that exceed the limit at which damage can occur to forest trees. The critical load for acid deposition is also exceeded over large areas (see article on p. 17).

The report also presents the results of national surveys. Some of these were, however, carried out using different methods, so comparisons between different countries should be made with great care.

PER ELVINGSON

[1] **Forest Condition in Europe – 2004 Technical Report**. By M. Lorenz et al. Available in pdf format at www.icp-forests.org/pdf/trLI2004.pdf. Printed copies can be ordered from the Programme Coordinating Centre (PCC), c/o Federal Research Centre for Forestry and Forest Products (BFH), Leuschnerstr. 91, D-21031 Hamburg, Germany.

[2] The threshold for damage due to defoliation was previously set at over 25 per cent. There is a gradual move away from this assessment now on the basis that the 25 per cent threshold for defoliation does not necessarily identify trees damaged in a physiological sense. Mean defoliation is instead used as a measure of the health of the forest.

CLIMATE NEWS IN BRIEF

Sharp CO_2 rise

In recent years, the amount of atmospheric carbon dioxide has increased by an average of 1.5 parts per million (ppm) each year. But measurements at the Mauna Loa observatory in Hawaii have shown that in 2002 and 2003 the increase was more than two ppm. Most climate researchers who have commented believe that two years of observations cannot be considered to represent a new trend – natural events are known to cause the level to fluctuate. However, there are also those who see this as a sign that the Earth's systems are becoming less able to absorb carbon dioxide, which could lead to imminent, rapid global warming.

Source: **BBC News**, 11 October 2004.

Large and rapid changes in the Arctic

The thickness of the Arctic ice sheet has decreased by 25 per cent in the last 40 years and the temperature has risen by roughly twice as much as the global mean temperature. Melting permafrost has meant that oil pipelines, roads and buildings in Alaska and Canada have become unstable and some buildings have had to be abandoned. The thinning ice sheet has also led to severe erosion of shorelines.

According to a research report[1] from the Arctic Climate Impact Assessment (ACIA), continuing warming will result in a dramatic reduction in snow cover and sea ice. The summer ice cover may have almost disappeared by the end of this century. Polar bears are at risk of dying out since they are dependent on hunting seals out on the ice. Inuit seal hunting has already suffered. Less ice and snow, melt water run-off and increasing flows of greenhouse gases from melting permafrost could further influence the global climate.

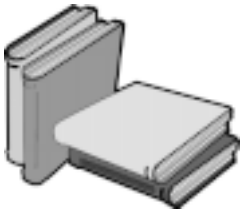
[1] **Impacts of a Warming Arctic**. Available in pdf format at http://amap.no/acia/.

Less to eat for whales

The disappearance of Antarctic ice in the winter has resulted in an 80 per cent drop in the number of krill, a shrimp-like crustacean that is a major source of food for whales, seals and penguins. Krill feed on algae under the ice sheet in the ocean but warmer temperatures over the last 50 years have meant there is less ice and fewer krill. Krill numbers are now only about one-fifth of what they were in the mid-70s, according to new findings.

Source: **Planet Ark** (Reuters), 5 November 2004.

Recent publications



Gletscher im Treibhaus (2204)
By W. Zängl and S. Hamberger. A photographic journey through time, in which the authors revisited old postcard scenes in the Alps and took new photos that reveal the extent of melting of the glaciers in recent decades. The text, which also takes up the climate issue, is entirely in German, but the visual material, comprising 460 photographs, tells its own clear story.

39.80 euros. 272 pp. ISBN 3-934427-41-3. Published by Tecklenborg Verlag, Siemensstraße 4, 48565 Steinfurt, Germany. Internet: www.tecklenborg-verlag.de

A Guide to European Union Funding for NGOs: "Accessing Europe's Largest Donor" (2004)
10th Edition. A guidebook for organizations seeking to learn more about EU funding. 39.00 euros. 250 pp. Published by the European Citizen Action Service (ECAS), rue de la Concorde 53, B-1050 Brussels, Belgium. Website: www.ecas.org

Renewable Energy in Europe – Building Markets and Capacity (2004)
Compiled by EREC, the European Renewable Energy Council. The book presents an overview of the latest technological, financial and economic information on renewable energy technologies. It explains how renewable energy sources could play a more significant role in the EU's future energy balance.

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

World in Transition – Towards Sustainable Energy Systems (2004)
A book that underscores the urgent need to transform global energy systems so that the world's population has access to energy based on renewable sources. This is necessary to protect the global climate and to free those in developing countries who are trapped by energy poverty. Such an approach would also yield a peace dividend by reducing dependence upon regionally concentrated oil reserves.

£60.00. 264 pp. ISBN 1-85383-882-9. Published by Earthscan/J&J, in association with the German Advisory Council on Global Change. Order address as above.

Making Sense of Hydrogen: The Potential Role of Hydrogen in Achieving a Clean, Sustainable Transportation System (2004)
The promise of the hydrogen economy is far from reality and in danger of being hijacked by energy interests keen to keep consumers reliant on fossil fuels, according to this report, published by the National Association of State Public Interest Research Groups (PIRGs) in the US. It specifically focuses on the potential use of hydrogen in cars and trucks, which has been touted as a "zero-emission" replacement for the petrol-powered internal combustion engine.

The study can be downloaded (500 kB) from http://newenergyfuture.com/reports/Hydrogen10_04.pdf

Biomass and Agriculture: Sustainability, Markets and Policies (2004)
Proceedings of an OECD Workshop held in June 2003, which covered two broad themes: the contribution of agricultural biomass to sustainability, and the policy approaches for developing this sector. According to the report a significant shift could take place this century from a fossil fuel to a biomass-based economy. To aid this process it suggests creating carbon markets which would provide credits to biomass producers for displacing fossil fuels.

75.00 euros. 568 pp. ISBN 9264105557. Can be ordered from OECD, www.oecd.org/bookshop. Printed copies are available from national distributors or from OECD, c/o Turpin Distribution Services Ltd, Stratton Business Park, Pegasus Drive, Biggleswade, Bedfordshire, SG18 8QB, United Kingdom.

European Integration of Rail Freight Transport – Round Table 125 (2004)
While the expanding long-distance export market is favourable to rail transport, railways have been steadily losing market share to road hauliers. The reasons for this are numerous and range from a lack of sophisticated computer technology to a shortage of commercial know-how. This report from the European Ministers of Transport (ECMT) takes a look at how the European railway landscape is being reshaped as the rail networks now open up to competition.

40.00 euros. 118 pp. ISBN 92-821-1319-1. Can be ordered from the OECD, see above.

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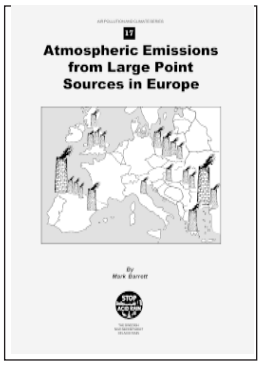


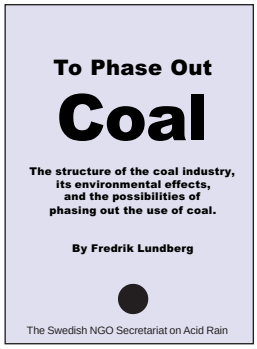
Atmospheric emissions from large point sources in Europe

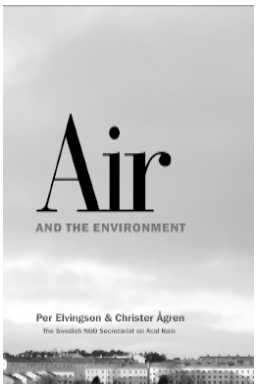
This report identifies and lists the 200 largest emitters of sulphur dioxide and the 200 "best" fossil-fuelled power stations, in terms of SO_2 and NOx emissions per useful output. Topping the list of the greatest emitters of sulphur to the atmosphere in Europe are two large coal-fired power stations in Bulgaria and Spain, respectively.

By Mark Barrett, SENCO. Published by the Swedish NGO Secretariat on Acid Rain, October 2004. (Summarized on pp. 1-5 in this issue of Acid News.)

To phase out coal

It would not only be quite possible to do away with the use of coal in Europe, but it would also be the least expensive and simplest way to drastically cut emissions of greenhouse gases as well as other harmful pollutants, according to this study made by Fredrik Lundberg on commission from the Swedish NGO Secretariat on Acid Rain, 2003.





Air and the Environment

This book is about the pollutants that are infecting our air. Seeing that they amount to no more than a few hundredths per cent of the atmosphere, they might seem to be of no consequence, yet their effects on humans and the environment are considerable – causing changes in the world's climate, damaging health, threatening rare animals and plants with extinction, acidifying lakes, accelerating the weathering of ancient monuments, to mention only some of the more obvious effects.

The identities of these pollutants, how they arise, and what they are doing to us and our environment, as well as what can be done to counteract their spread, are described in detail in this book, which also underlines the fact that it will actually pay to cut down the emissions from various sources that give rise to them. Especially important but often overlooked are the connections between aspects of the matter that tend to be treated separately, their effects, causes and what can be done about them.

174 pp. By Per Elvingson and Christer Ågren, published by the Swedish NGO Secretariat on Acid Rain, 2004.

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

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Coming events

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

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

Energy and Development. Noordwijk, The Netherlands. 12-15 December. *Info*: www.energyfordevelopment.org

Monitoring Ambient Air: Implications and Implementation of the New Directives and Standards. London, UK, 15-16 December. *Info*: www.aamg-rsc.org

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

Integrated Assessment Modelling for Air Pollution. A seminar on the RAINS methodology. Laxenburg, Austria, 20-21 January 2005. *Information*: www.iiasa.ac.at/rains/meetings.htm

CAFE Steering Group: Thematic Strategy on Air Pollution. Brussels, Belgium, 21-22 February 2005. *Info*: http://europa.eu.int/comm/environment/air/cafe/.

European Pellets Conference, 2-3 March. **Innovative Public and Commercial Buildings,** 3 March. Both in Wels, Austria, forming part of the World Sustainable Energy Days. *Information*: www.esv.or.at

Environment Council. Brussels, Belgium, 10 March 2005.

5th International Conference on Urban Air Quality. Valencia, Spain. 29-31 March. *Info*: www.urbanairquality.org

Mondial Bioenergie Conference and Exhibition. Paris, France. 31 March – 3 April. *Info*: www.itebe-expo.com

CAFE Steering Group: Implementation issues. Brussels, Belgium, 11 April 2005. *Information*: http://europa.eu.int/comm/environment/air/cafe/.

CAFE Steering Group: Thematic Strategy on Air Pollution. Brussels, Belgium, 10-11 May. *Information*: http://europa.eu.int/comm/environment/air/cafe/.

Acid Rain 2005. 7th International Conference. Prague, Czech Republic. 12-17 June 2005. *Info*: Acid Rain, CHMI, Na Sabatce 17, 143 06 Prague, Czech Rep. Website: www. acidrain2005.cz.

Environment Council. Luxembourg, 24 June 2005.