

Acid News

NO. 3, OCTOBER 2000



MARITSA POWER PLANT, BULGARIA. © MICHAEL REINHARD

SO₂ EMISSIONS

All the worst offenders

TOPPING THE LIST of the 100 greatest emitters of sulphur to the atmosphere in Europe are two large coal-fired power stations in Bulgaria. Together they let out nearly 600,000 tons of sulphur dioxide a year – as much as the combined total from all the following countries: Austria, Belgium, Denmark, Finland, the Netherlands, Norway, and Sweden.

The figures come from the latest survey¹ of emission sources made by Mark Barrett of SENCO consultants at the instance of the Swedish NGO Secretariat on Acid Rain. This is an updated version of a previous survey made in the early nineties.

Although it is evident from comparison of the two that the emissions

from large installations have declined markedly in the intervening period, it is also clear that they are still far from negligible. According to the latest figures, the 100 largest emitters were still pouring out 8 million tons of sulphur dioxide a year, corresponding to 40 per cent of the total from all sources on land in Europe in 1997.

It may be noted that 81 of the plants on the list are power stations, and that all of them are coal-fired except for the Balti and Eesti plants in Estonia, which burn oil-shale. The rest are mainly smelters and refineries.

Although the survey covers essentially the whole of Europe, inadequate

data has meant that plants in Russia, Ukraine, and Turkey have had to be omitted from the list. There is however another list, in the report on the survey, in which plants from those countries are ranged among the worst hundred.

The data base that was built up in the course of the survey includes some 3000 large emitters. These 3000 let out at least 15 million tons of SO₂ a year, or about a three quarters of all the emissions from land-based sources in Europe. In revising the list, Barrett has had access to the IEA's (International Energy Agency's) new data base for coal-fired plants, for the years from 1995 to

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Acid News

is a newsletter from the Swedish NGO Secretariat on Acid Rain, whose primary aim is to provide information on the subjects of acid rain and the acidification of the environment.

Anyone interested in these problems is invited to contact the secretariat. All requests for information or material will be dealt with to the best of our ability. Acid News is distributed free of charge.

In order to fulfill the purpose of Acid News, we need information from everywhere – so if you have read or heard about something that might be of general interest, please write or send a copy to:

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

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

E-mail: info@acidrain.org

Internet: www.acidrain.org

Editor: Christer Ågren

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THE SECRETARIAT

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

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

In furtherance of these aims, the secretariat operates by

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

EDITORIAL

Past and future

NOW WE ARE into a new century. During the last ten or fifteen years the idea that something must be done to save the environment has sunk into people's consciousness in most parts of the industrialized world. In Europe and North America at least air pollution has become a general subject of conversation. Although what most immediately comes to mind in this connection is probably car exhausts and bad urban air, people are also starting to become aware of the damaging effects, for instance, of ozone at ground level.

This was not so in the summer of 1980, when four Swedish environmentalist groups got together to work out a way of spreading information about air pollution in general and the resulting acidification in particular – the latter, then, twenty years ago, being practically unheard of, at any rate outside Norway, Sweden, and Canada. Although some thirty countries had indeed, already in 1979, signed a convention for dealing with cross-border airborne pollution, it was clear that few of them realized the extent of the problem and were prepared to act. It was only in Scandinavia that it was generally agreed that acidification could only be solved by reducing the emissions of sulphur dioxide and nitrogen oxides to the air all over northern and central Europe.

In Europe, Norway and Sweden took the lead in trying to persuade the West Germans and the British in particular to restrict their emissions. In North America the Canadians did the same vis-à-vis the United States.

In May 1981 the four Swedish environmentalist associations sent out an invitation to their counterparts elsewhere to join them in a European Conference on Acid Rain in Göteborg. The two main aims there were to provide information generally about acidification, and to consider ways in which environmentalists could cooperate to bring about a reduction of harmful emissions. One outcome of this confer-

ence was the formation of the Swedish NGO Secretariat on Acid Rain in January of the following year, and the start of Acid News.

It was a number of events during a few years at the end of the seventies and the beginning of the eighties that really laid the foundation for the work of improving air quality that is now going on. It may therefore be worth considering in retrospect: What was the state of knowledge at that time, and what was known or merely surmised. What sort of forecasts had been made of the trend, for instance, of emissions. What was activating political moves, then and later. What were environmentalists' expectations then, and how have they altered over the years.

Most interesting of course will be to see what advances have been in the course of these twenty years. But it will also be important to try and determine why some activities and measures have been more successful than others.

There are still government officials, scientists, environmental journalists, and environmentalists who have been engaged all the time. Others may have changed their main occupations, yet still continue to maintain a concern for air quality. It is their collective impressions that we want to recall in Acid News – hence the special section in this issue chronicling the course of events and giving personal views on developments over the past two decades. We hope that these items will in their way give answers to the questions listed above, and so lead to more effective ways of attacking the problems of air pollution and acidification.

We intend to continue along this line in coming issues of Acid News, and invite contributions from all readers. We shall also be glad to hear what impressions they may have got from the special section on pages 11-18.

CHRISTER ÅGREN

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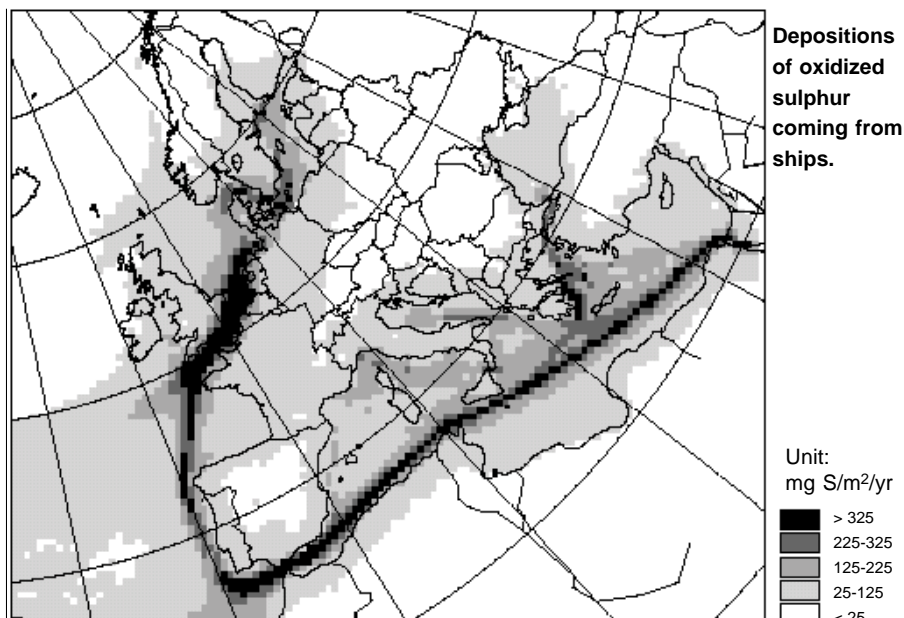
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Technological efficiency, fuel conversion, and diminished industrial activity have brought down emissions of carbon dioxide at least to West German levels.

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ACID IMPORTS

In many countries most comes from shipping

SHIPPING HAS BECOME the largest single source of acid fallout over many countries in Europe.

The study¹ revealing this shows that although most of the sulphur emitted from ships plying in international trade gets deposited over the sea, nevertheless 10 per cent or more of the sulphur deposition over a surprising number of countries stems from that source.

As regards nitrogen deposition resulting from emissions of nitrogen oxides (nitrogen-oxide nitrogen), the proportion is still greater. In the Mediterranean area, 38 and 24 per cent of this kind of deposition over Malta and Cyprus, for instance, can

be traced to emissions from ships in international trade. Around the North Sea, Denmark has the highest proportion, 20 per cent.

In sensitive coastal regions, the emissions from shipping contribute notably to overstepping of the critical loads, as regards both acidification and eutrophication. They also contribute to the formation of ground-level ozone, especially in the Mediterranean region.

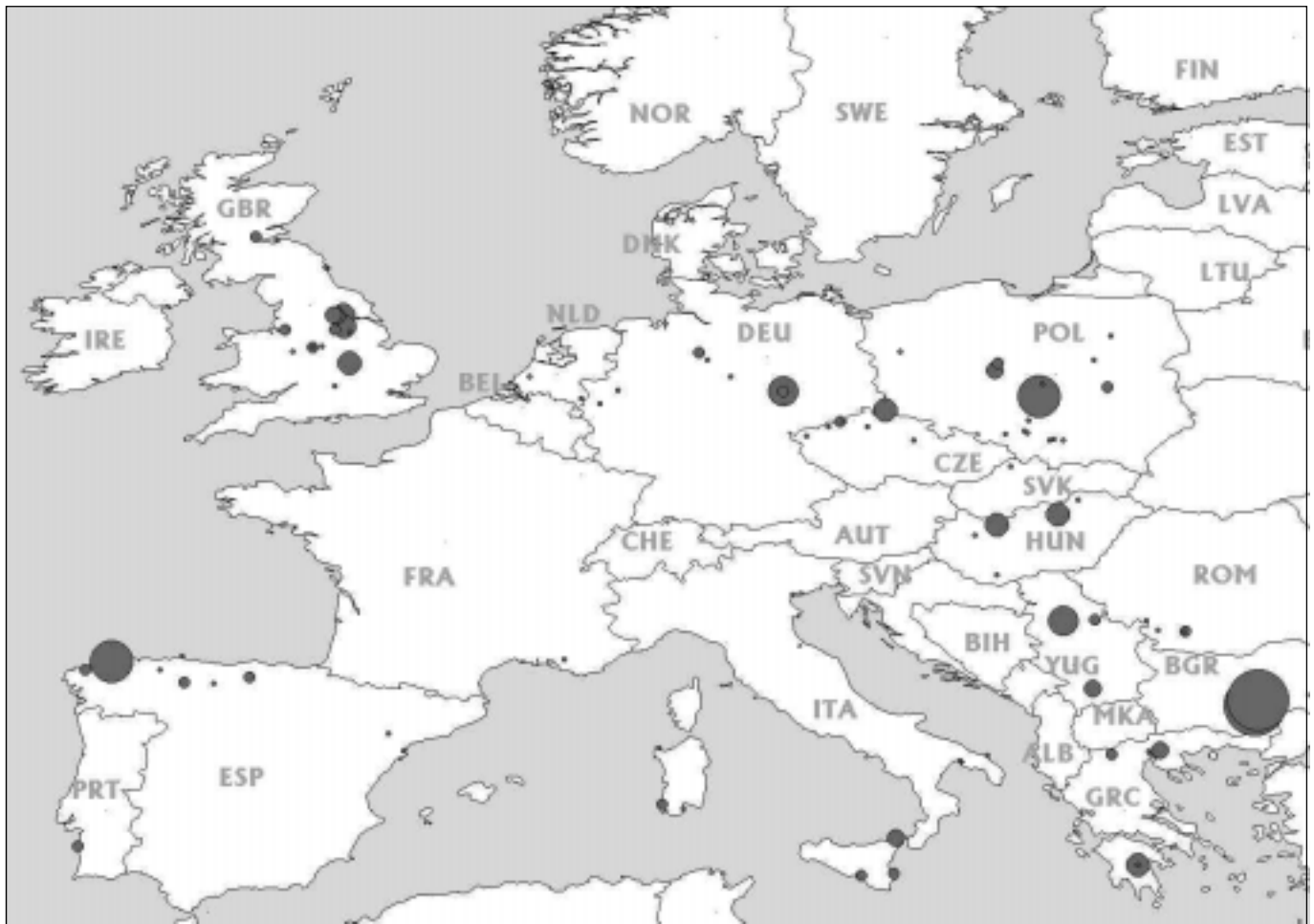
It can hardly be a matter of surprise that shipping should have emerged as such a prominent source of air pollution. For one thing calculations have scaled up the volume of its emissions in the Mediterranean (AN 1/00, p.24), and for another, emissions from sources on land, especially of sulphur, have markedly declined in the last twenty years. No country's emissions of acidifying air pollutants can even approach all that from ships plying in European waters.

PER ELVINGSON

¹ **Effects of international shipping on European pollution levels.** By J.E. Jonson, L. Tarrasón and J. Bartnicki. EMEP/MSC-W Note 5/00. Available from Meteorological Synthesizing Centre – West, Norwegian Meteorological Institute, P.O. Box 43-Blindern, 0313 Oslo, Norway. Also in pdf format at www.emep.int.

Countries where the proportion of acid fallout coming from ships is most marked.

Sulphur		NOx- nitrogen	
Malta	16%	Malta	38%
Denmark	15%	Cyprus	24%
Netherlands	13%	Denmark	20%
Sweden	13%	Estonia	17%
Cyprus	10%	Sweden	16%
Norway	9%	Greece	15%
Belgium	9%	Portugal	14%
Estonia	9%	Netherlands	13%
Portugal	9%	Finland	13%
France	8%	Ireland	12%



This is where the 100 largest emitters of sulphur dioxide are found in Europe. The size of the rings indicates relative output. Map: Mark Barrett.

> Continued from front page
 1997. As for other than coal-fired plants, Barrett's information was older, probably over-estimating the emissions.

Barrett points 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. Some of the Spanish ones have for example, by using imported coal instead of the local high-sulphur lignite, been able to cut down their emissions of sulphur by a factor of six.

Another source of error is the extent to which equipment for flue-gas desulphurization has been used. Because its FGD equipment was not always in operation in 1997, the Drax coal-fired power station in England landed ninth on the list. If it had been kept going throughout the year, the emissions would have been no more than a fifth of the recorded figure.

An aspect that is of direct political importance is the age of the plants.

Around 90 per cent of the emissions of sulphur from the largest coal-fired plants comes from those that were commissioned before 1987. This is now relevant in view of the likely adoption of an EU directive for LCPs, large combustion plants (see p.8). The question is whether the directive is to apply only to new plants, not yet built, or to existing ones as well.

In his report Barrett discusses briefly what it would cost to install equipment for flue-gas desulphurization – noting that it has halved in the last 5-10 years. The cost for eliminating one kilogram of sulphur is now US\$3-6. Equipping the hundred plants on the list for FGD would result in sulphur emissions being cut back by 4.7 million tons, at a cost of

somewhat more than US\$2 billion a year. But as Barrett points out, FGD "is not generally the best emission-control option for the first tranche of emission reduction." He suggests that switching fuel and using energy more effectively would be a better alternative.

PER ELVINGSON
 CHRISTER ÅGREN

¹The worst and the best. Atmospheric emissions from large point sources in Europe. By Mark Barrett, SENCO, UK. Published by the Swedish NGO Secretariat on Acid Rain. Obtainable free of charge from the publisher. Also available in pdf format at www.acidrain.org/publications.

The previous survey, entitled **Sulphur emissions from large point sources in Europe** (2nd edition, 1995) is also obtainable from the secretariat, as well as from the website.

About the table

The list include, besides the chief emitters of sulphur dioxide in western Europe, also those in ten countries of central and eastern Europe that are either accepted candidates for admission to the EU or are now applying. The

port also gives figures for emissions of NO_x and CO₂, and includes a list showing emissions from plants in Turkey, Ukraine, and Belarus, as well as in Russia and Georgia west of the 45th longitude.

Europe's 100 largest SO₂ emitters

Note. This table is slightly revised compared to that in the printed version

Name	Country	Type	SO ₂ kt	Name	Country	Type	SO ₂ kt
1. Maritsa II	Bulgaria	PS	291	51. Opatovice	Czech Republic	PS	39
2. Maritsa III	Bulgaria	PS	220	52. Craiova	Romania	PS	38
3. Puentes As Pontes	Spain	PS	216	53. Blyth	United Kingdom	PS	38
4. Belchatow	Poland	PS	212	54. Brindisi	Italy	PS	38
5. Nikola	Yugoslavia	PS	156	55. Tisova	Czech Republic	PS	38
6. Thierbach	Germany	PS	141	56. Abono	Spain	PS	36
7. Irini	Greece	PS	126	57. Escatron	Spain	PS	36
8. Matra	Hungary	PS	123	58. Eesti	Estonia	PS	36
9. Drax	United Kingdom	PS	122	59. Borsod	Hungary	PS	33
10. West Burton	United Kingdom	PS	113	60. Drobeta-Turnu	Romania	PS	32
11. Turow	Poland	PS	111	61. Ostroleka	Poland	PS	32
12. Cottam	United Kingdom	PS	110	62. Balti	Estonia	PS	32
13. Oroszlany	Hungary	PS	110	63. Siersza	Poland	PS	31
14. Maritsa I	Bulgaria	PS	96	64. Antwerp	Belgium	Ref	30
15. Adamow	Poland	PS	96	65. Kardia	Greece	PS	30
16. St Demetrious	Greece	PS	88	66. Pecs	Hungary	PS	30
17. Eggborough	United Kingdom	PS	88	67. Anllares	Spain	PS	30
18. Messina	Italy	Ref	85	68. Rotterdam	Netherlands	Ref	29
19. Ferrybridge	United Kingdom	PS	83	69. Alcan	United Kingdom	PS	29
20. Kosovo	Yugoslavia	PS	81	70. Ironbridge	United Kingdom	PS	29
21. Kostolac	Yugoslavia	PS	74	71. Rugeley	United Kingdom	PS	29
22. Patnow	Poland	PS	71	72. Novaky	Slovakia	PS	28
23. Moneypoint	Ireland	PS	65	73. Taranto steel	Italy	Iron	28
24. Kozienice	Poland	PS	63	74. Narcea	Spain	PS	27
25. Priolo/Syracusa	Italy	Ref	62	75. Tilbury	United Kingdom	PS	26
26. Compostilla	Spain	PS	60	76. Maascentrale	Netherlands	PS	25
27. Meirama	Spain	PS	59	77. Ledvice	Czech Republic	PS	25
28. Robla	Spain	PS	58	78. Krakow	Poland	Iron	24
29. Fiddler's Ferry	United Kingdom	PS	58	79. Ribera	Spain	PS	24
30. Cagliari Non Ferrou	Italy	Ind	57	80. Megalopolis	Greece	PS	24
31. Sines	Portugal	PS	56	81. Lodz	Poland	PS	24
32. Amynteon-Filotas	Greece	PS	56	82. Krakow	Poland	PS	23
33. Chemopetrol(Litvinov)	Czech Republic	Ref	55	83. Mehrum	Germany	PS	23
34. Turceni	Romania	PS	54	84. Escucha	Spain	PS	23
35. Lippendorf	Germany	PS	54	85. Frimmersdorf	Germany	PS	22
36. Longannet	United Kingdom	PS	51	86. Cagliari	Italy	Ref	22
37. Caltanissetta	Italy	Ind	51	87. Guardo	Spain	PS	22
38. Brindisi	Italy	Ind	47	88. Zeran	Poland	PS	21
39. Bobovdol	Bulgaria	PS	47	89. Huta Katowice DG	Poland	Ind	21
40. Didcot	United Kingdom	PS	47	90. Ptolemais	Greece	PS	21
41. Prunerov	Czech Republic	PS	46	91. Melnik	Czech Republic	PS	21
42. Nordenham	Germany	Smelter	45	92. Gelsenkirchen	Germany	Ref	20
43. High Marnham	United Kingdom	PS	45	93. Novo Polotsk	Belarus	Ref	20
44. Venezia Chem	Italy	Ind	44	94. Goslar	Germany	Smelter	19
45. Ajka	Hungary	PS	43	95. Elektrownia	Poland	PS	19
46. Pomorzany	Poland	PS	43	96. Skawina	Poland	PS	19
47. Rybnik	Poland	PS	41	97. Kokkola	Finland	Smelter	19
48. Sassari Chem	Italy	Ind	40	98. Drakelow	United Kingdom	PS	19
49. Varna	Bulgaria	PS	40	99. Cockenzie	United Kingdom	PS	19
50. Kingsnorth	United Kingdom	PS	39	100. November 7th (Inota)	Hungary	Ind	18

PS = Power Station. Ref = Refinery. Ind = Industry. SO₂ kt = sulphur dioxide, kilo ton.

Clashing over ceilings

While Parliament wanted to improve on the Commission's proposals for national ceilings, the Council of Ministers voted to soften them, thus endangering essential environmental aims.



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ON JUNE 22 the environmental ministers of the EU countries agreed in principle on the common position they were to take in regard to the Commission's proposed directive for national ceilings on the emissions of four air pollutants: sulphur dioxide, nitrogen oxides, volatile organic compounds, and ammonia.

Although this was hardly unexpected, it would make the directive distinctly weaker (see table). On the other hand several countries have said themselves willing to accept tougher ceilings than they had agreed to when signing the Gothenburg protocol to the Convention Long-Range Transboundary Air Pollution only half a year ago (reported in AN 1/00, pp. 8-10).

The aim of this new directive is to provide better safeguards for people's health and the environment through a successive reduction of the pollutants in question. In its strategies for combating acidification and ground-level ozone the Commission has proposed interim targets for 2010 as a first step towards realization of the long-term aims, which are to ensure

no exceeding of the critical loads and a proper protection for health. The setting of national ceilings may well be pivotal for the attainment of environmental aims in the EU.

After having presented its strategy for dealing with acidification in 1997, the Commission started to make a careful analysis of ways of arriving at the most cost-effective means, for the EU as a whole, of at-

*Ceilings may be pivotal
for the attainment
of environmental aims*

taining the interim targets. Here use was made, for instance, of the RAINS computer model, which has long served for the work on transboundary air pollution. Contact was also maintained continuously with experts from all the member countries as well as other so-called stakeholders (industry and environmentalist bodies).

The outcome was the proposal for national ceilings that was put forward in June last year, which would reduce emissions of sulphur dioxide in the EU totally by 78 per cent between 1990 and 2010, those of nitrogen oxides by 55 per cent, and of volatile organic compounds and ammonia by 60 and 21 per cent respectively.

This directive would oblige each member country to have drawn up a program for progressive reduction of its emissions of the four pollutants and report it to the Commission at the latest by October 2002, stating also what measures it had actually taken to contain emissions. Every year, too, members should report on their current emission levels, and give forecasts for 2010. All this information should moreover be made public.

Having received all this, the Commission is to report to European Parliament and the Council of Ministers in 2004 and 2008 on the progress made towards the achievement of national ceilings, and on the extent to which the interim objec-

tives were likely to be met by 2010. The Commission can also propose any adjustments to the national ceilings that may seem necessary.

As can be seen from the table, too, the member countries were quite unprepared to accept the Commission's proposals. The Council thought that between 1990 and 2010 the overall emissions of sulphur dioxide should be reduced by 77 instead of 78 per cent, those of nitrogen oxides by 51 per cent, of VOCs by 54 and ammonia by 14 per cent (instead of 55, 60, and 21 per cent). But according to the Commission, that would mean failure to reach the interim objectives for the containment of acid depositions and ozone. The Council's attitude might also mean that the Commission's proposed air-quality standards for ozone, included in a new daughter directive, would be at risk.

As can also be seen from the table, the ceilings that the member countries consider possible do not differ appreciably from those in the Gothenburg protocol.

Why, then, all this trouble? The main reason is of course that EU

laws "weigh" much more than international agreements. With ceilings prescribed in an EU directive, their implementation can be much better observed.

Another reason is that the Commission is responsible for seeing that EU environmental aims are really met, which assumes legislation at the EU level. Moreover the EU as a possible coming signatory to the

*Member countries were
unprepared to accept
Commission's proposals*

Gothenburg protocol will be obliged as far as possible to ensure that its terms are fulfilled, and that can best be done with the backing of EU legislation.

At its June meeting the Council reached a "unanimous political agreement in view of a common position." The common position will now be formally adopted without further debate, at a forthcoming Council

session, before being again sent on the European Parliament for a second reading in accordance with what is known as the co-decision procedure.

As reported in Acid News 2/00 (p.10), the Parliament had already given full support to the Commission's proposals, both for emission ceilings and for air-quality standards for ozone. It was in fact inclined to a further tightening up of both directives.

Just when the second reading will take place is uncertain, although it will in all likelihood not be before late autumn. With an overwhelming majority favouring the tougher line, it is unlikely that the Parliament will change its mind – thus coming onto collision course with the Council. But that is something that will have to be dealt with by conciliation talks between Council and Parliament.

CHRISTER ÅGREN

Note. A press release from EEB (European Environmental Bureau) and various environmentalist organizations, giving their views on the Council's attitude, can be seen on the Secretariat's website, www/acidrain/org/policy.

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Emissions from each country in 1990 together with three scenarios for 2010. PRO is what each country has committed itself to by signing the Gotenburg Protocol. MIN is what would result from the common position reached by the Council of Ministers in June. COM shows figures resulting from the Commission's proposal for ceilings on emissions. 1000 tons.

Country	Sulphur dioxide				Nitrogen oxides				Volatile organic compounds				Ammonia			
	1990	PRO 2010	MIN 2010	COM 2010	1990	PRO 2010	MIN 2010	COM 2010	1990	PRO 2010	MIN 2010	COM 2010	1990	PRO 2010	MIN 2010	COM 2010
Austria	93	39	39	40	192	107	103	91	352	159	159	129	77	66	66	67
Belgium	336	106	99	76	351	181	176	127	374	144	139	102	97	74	74	57
Denmark	182	55	55	77	274	127	127	127	182	85	85	85	77	69	69	71
Finland	226	116	110	116	276	170	170	152	213	130	130	110	40	31	31	31
France	1250	400	375	218	1867	860	810	679	2382	1100	1050	932	807	780	780	718
Germany	5280	550	520	463	2662	1081	1051	1051	3122	995	995	924	757	550	550	413
Greece	504	546	523	546	345	344	344	264	336	261	261	173	80	73	73	74
Ireland	178	42	42	28	113	65	65	59	110	55	55	55	127	116	116	123
Italy	1679	500	475	566	2037	1000	990	869	2055	1159	1159	962	462	419	419	430
Luxemb.	14	4	4	3	22	11	11	8	19	9	9	6	7	7	7	7
Netherl.	201	50	50	50	542	266	260	238	490	191	185	156	233	128	128	104
Portugal	284	170	160	141	208	260	250	144	212	202	180	102	71	108	90	67
Spain	2189	774	746	746	1162	847	847	781	1008	669	662	662	352	353	353	353
Sweden	119	67	67	67	338	148	148	152	511	241	241	219	61	57	57	48
UK	3805	625	585	497	2839	1181	1167	1181	2667	1200	1200	964	329	297	297	264
EU15	16339	4044	3850	3634	13226	6648	6519	5923	14031	6600	6510	5581	3578	3128	3110	2827

Sources:

1990 och **PRO2010**: Amann, M. et.al (1999) "Integrated Assessment Modelling for the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone in Europe." **COM2010**: European Commission COM(99)125 final "Proposal for a directive of the European Parliament and of the Council on national emission ceilings for certain atmospheric pollutants." **MIN2010**: Press release from the Environment Council, June 22, 2000.

Limits also for existing plants

Despite compromise reached in the Council, environmentalists remain critical

A COMPROMISE reached in the Council in June will mean that it is highly probable that the EU will be requiring emission reductions for existing large combustion plants – thus settling a matter that has been the main bone of contention ever since the Commission put forward its proposal for a revision of the 1988 directive¹ two years ago.

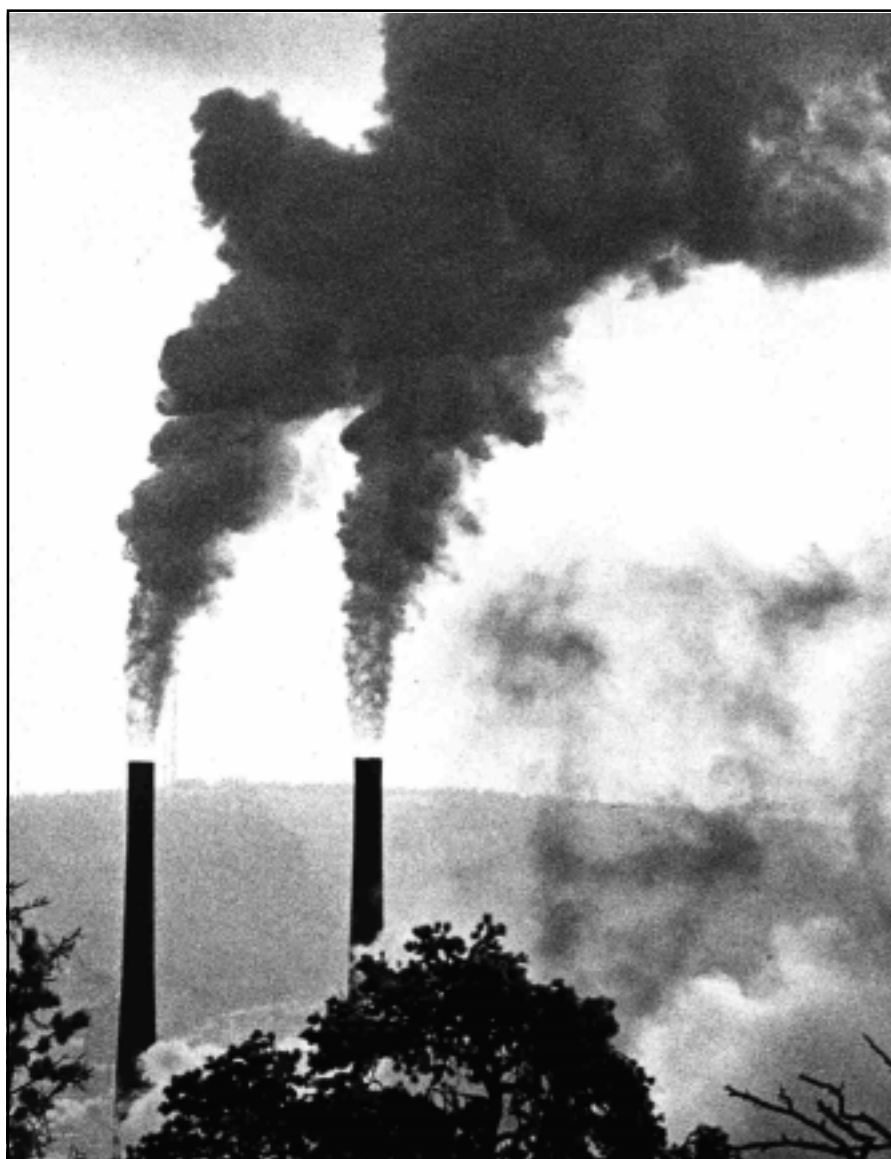
That proposal contained no requirements for existing plants. It aimed mainly at setting stricter limits for the emissions of sulphur dioxide, nitrogen oxides, and dust from future plants, yet to be built. Seeing that the present requirements for such plants are extremely modest – reflecting the technical situation of the early 1980s – such a proposal could hardly be earth shaking.

It nevertheless met with distinct irritation from certain industrial groups and some of the member countries. But even more member countries, as well as the European Parliament and environmentalist organizations, thought the proposal did not go far enough, and are therefore striving for stricter requirements (see for instance AN 4/98, pp. 9-10).

The Council compromise did not however alter the emission limits proposed by the Commission for new plants. This means that if the directive is adopted unchanged, those requirements will become binding from the date at which the directive comes into force, probably in 2003.

Those interests that were pushing for stricter requirements for new plants were also able to ensure that rules would be set for existing plants. Under the compromise agreement the member countries will now have to take steps to reduce emissions from plants built before 1987. The requirements will be about the same as those that have so far been applicable for plants built after that date, and will have to be carried out at the latest by January 1, 2008.

The member countries will be permitted to meet these requirements either by setting limit values for in-



In the EU much of the acidifying air pollution comes from existing large combustion plants. The European Parliament may now insist that the requirements for emissions from such plants be tightened up.

dividual plants, or using a national “bubble” ensuring the same emission total that would have resulted if limits had set for each plant separately. This latter alternative will mean that countries will be able to allow some “dirtier” plants to exceed the limits, provided the emissions from other plants are kept low enough.

The compromise will also mean that some very old plants – in any case scheduled for closing down in the near future – can be exempted alto-

gether. Provided member countries report such plants to the commission before 2004, they will be permitted to run them for a maximum of 20,000 operating hours after January 2008. A power plant kept going at base load throughout the year will run up about 7000-8000 operating hours. Thus the compromise will, at worst, make it possible to go on operating plants that are only used for 25-40 per cent of the time (which is becoming ever more usual, for instance in the case of

coal-fired power plants in Britain) for almost twenty years more.

The Council's attitude was strongly criticized by environmentalist organizations such as the European Environmental Bureau, which said in a press release: "The development towards a liberalized electricity market makes it even more important to establish minimum environmental requirements for existing power plants in order to avoid environmental dumping. Failure to set limits for existing plants will miss the opportunity to internalize some of the external costs to the environment and human health. This goes against the 'polluter pays' principle of the EC Treaty and fails to provide conditions for a 'level playing field', as required by the Single Market. Coupled with fossil fuel subsidies, this is why renewable energies cannot compete with conventional fossil fuels."

The common position pronounced on June 22 will be formally adopted, without further debate, by the Council at a forthcoming session. It will then be sent for a second reading in the European Parliament. Just when that reading will take place is uncertain, but it will probably be in November or December. It is likely that the LCP directive will be debated at the same time as that on national ceilings for emissions (see preceding article in this issue).

At its first reading of the LCP directive, the last Parliament was in favour of tightening up the requirements for existing as well as later plants (see AN 2/99, pp. 6-7). If the new parliament should maintain the same attitude as the last one, it will come into conflict with the Council. The composition of the Parliament was considerably changed by last summer's election. Any differences that may arise will have to be settled through conciliation talks with the Council in the spring of 2001.

CHRISTER ÅGREN

Note. A press release from the European Environmental Bureau and various environmentalist organisations, commenting on the Council's conclusions, can be found at the secretariat's home page www.acidrain.org/policy.htm#eu.

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

CLEAN AIR FOR EUROPE

Call for integration of all EU information

BETTER COORDINATION of the strategies and measures for dealing with air pollution is needed in the European Union. Originally aired in a discussion paper from the Commission's environment directorate in the autumn of 1998 (see AN 1/99, p.6), the idea was to improve coordination through the setting up of a Clean Air for Europe program, CAFE.

Last July the consultants that had been employed by the Commission to propose a form for the program submitted a preliminary report, in which they said "Ideally CAFE would integrate information relating to all air quality developments in the EU." Seeing however that it would be

practically impossible to do all that, they proposed various restrictions and organizational solutions.

Commenting on the report, the European Environmental Bureau, an umbrella organization for Europe's environmentalist groups, emphasized the need for adequate funding of the program, in order to ensure its capacity and authority to intervene if other parts of the Commission than the environment directorate should want to act in a way that would be inconsistent with the CAFE strategy for clean air.

The consultants final report to the Commission is expected towards the end of the year.



Cleaner bikes

The EU Commission has put forward a proposal for directive for new emission standards for motorcycles. The same both for two-stroke and four-stroke engines, they are intended to take effect in 2004, and would mean much lower emissions for all the regulated substances (carbon monoxide, hydrocarbons, and nitrogen oxides). A new test cycle would be introduced in a subsequent stage, together with still lower emission limits in 2006.

Car Lines, July 2000.

All clear

Now that the proposed directive for air-quality standards for benzene and carbon monoxide¹ has gone through a second reading in the EU Parliament, it can be assumed that the limit value for benzene will definitely be 10 µg/m³.

While expressing disappointment at some aspects of the directive, the European Environmental Bureau nevertheless declared the outcome to be "good news for citizens' health and the environment." The EEB found it especially praiseworthy that the Parliament had conducted this second reading in such a way as to avoid the possibility of a

lengthy conciliation process with the Council and so enable the directive to become law sooner than might otherwise have been the case.

¹ COM(1998)591. See also AN 1/99, p.7.

Transition costs overestimated

The Commission is currently carrying on negotiations with the first six accession countries as to the length of the period to be allowed for transition to EU environmental standards. Last year these countries had formally asked for periods of up to fourteen years in which to implement various directives.

The Centre for European Policy Studies questions however in a report made last June the need for derogations and long transition periods. It considers the cost of compliance to have been much overestimated, since by the time of accession existing capital stock will have been largely replaced "in the interests of modern standards for quality, productivity, and energy efficiency."

The Centre says that the big investments that will have to be made by energy, water, and waste utilities "are wrongly assumed to be largely a burden on public capital requirements," and that it is this misapprehension that is giving rise to the demand for long transition periods. It recommends cost-recovery pricing in these sectors as a means of raising revenues and reducing the scale of the necessary investments.

ENDS Daily, June 21 and 28, 2000.



Cyber voices against climate change

An international web-based initiative has been launched to give citizens around the world a voice in demanding a halt to global warming. The aim is to get people to send 10 million messages to world political leaders calling on them to use the November climate summit at the Hague, Netherlands, to really reduce the pollution that is causing global warming.

www.climatevoice.org

Among the sponsors are Friends of the Earth, Greenpeace and World Wide Fund for Nature.

About the air: electronically

The Encyclopedia of the Atmospheric Environment is the title of a highly informative electronic reference work created by the Atmospheric Research and Information Centre at Manchester Metropolitan University. It is available free of charge at

www.doc.mmu.ac.uk/aric/ea/

Among the matters associated with the atmosphere on which the Encyclopedia gives information are acid rain, air quality, climate change, and ozone depletion. The material is arranged in varying degrees of technicality, and is in general easy to read. Also provides links to other web sites.

Change or pay

Here are two internet data bases giving examples of the use of financial and fiscal instruments for the protection of the environment in various countries:

- That of the EU Commission's environment directorate: europa.eu.int/comm/environment/enveco/database.htm
- OECD: www.oecd.org/env/policies/taxes/index.htm

Environmental taxes

THE USE OF environmental taxes is increasing in the EU, albeit slowly. In 1997 they accounted for 6.71 per cent of the total tax intake, up slightly from 1990, when it was 6.17 per cent. In 1980 it had been 5.84 per cent.

It has been shown in several studies that environmental taxes do have an effect. Outstanding examples are the taxes on water pollution that have been applied in France, Germany, and the Netherlands, and also the Swedish charge on emissions of nitrogen oxides, and the differentiated taxes in several countries on leaded and unleaded petrol. More recent evaluations have shown the good effect of taxes on carbon dioxide in Denmark and Finland as well as in Sweden, and of the fuel-duty "escalator" in Britain and the Danish tax on sulphur in fuel.

The attraction of environmental

taxes has lately increased among the larger member countries of the EU – Germany and Italy having introduced one on emissions of carbon dioxide as part of an ecotax reform. France and Britain will be following suit next year.

Almost all the member countries have raised their taxes on energy, or are about to do so. The aim in many cases is to constrain emissions of carbon dioxide. The Commission's proposal for raising the minimum rate for the taxation of energy in all member countries has however got stuck in the Council, where it is being blocked by Spain (Council decisions on common taxes have to be unanimous).

Source: **Recent developments in the use of environmental taxes in the European Union.** European Environment Agency, July 2000. Available on www.eea.eu.int.



Jobs, emissions connected

There is now a study showing that application of the harmonized energy tax proposed by the Commission in 1997 would bring 120,000 new jobs to the EU by 2010, if the proceeds were used to lower labour costs. It would also cause emissions of carbon dioxide to decline by 2 per cent. The study was made by the English consultants AEA Technology Environment in collaboration with the University of Bath.

Most of the new employment would be in engineering firms supplying emission-reducing technologies. All the members of the EU would in line to benefit. Spain for instance – the country that is now blocking the Commission's proposal – would gain 10,000 new jobs.

ENDS Daily, August 14, 2000. Also on <http://europa.eu.int/comm/environment/enveco/studies2.htm#16>.

More countries signing up

A few more countries have now signed the Gothenburg Protocol, adding their names to the list given in AN 1/00, p.8. These new countries are Belgium, Greece, Poland, and Moldova. Among those that have still failed to sign are Belarus, Lithuania, the Russian Federation, Ukraine, and the European Union. LRTAP Secretariat. Status June 3, 2000.

Less sulphur in British oil

The EU directive restricting the sulphur content of oil became law in Great Britain last June. According to the UK environment ministry this will lessen English and Welsh emissions of sulphur dioxide by about 60,000 tons a year from 2003. In 1997 the burning of heavy fuel oil and gas oil accounted for 20 per cent of all UK emissions of SO₂. Implementing the directive would, also according to the ministry, cost between £67 and £176 million (euro 106-279m), with most of the extra expenditure falling on the oil refineries. Heavy fuel oil is used in a few UK power stations and in industrial boilers and furnaces. Gas oil is used for heating, in small industrial boilers, and as fuel on the railways and in some ships.

ENDS Daily, June 28, 2000.

Someone must make a move

Reluctance elsewhere means the EU must now act, say two German political scientists

SINCE IT IS CLEAR that international climate policy lacks both momentum and leadership, it is now essential that a strong player should step in to remedy the situation – and at the moment that can only be the EU.

Several countries that are willing to act have been waiting for the United States to join them in fulfilling the commitments made at Kyoto. But the USA, as well as some other countries, has an interest in delaying the process. The more time elapses before anything is done, the easier it will be for them to claim that their undertakings are either no longer realistic or impossible of fulfillment.

In order to get the international process of negotiation moving, the EU should assemble those countries that are committed to a strong policy for climate protection, thereby creating the atmosphere needed for bringing new life into the process.

A top priority to this end should be prompt ratification of the Kyoto Protocol, to ensure its coming into force as soon as possible. It is absolutely essential, in view of the Senate-driven resistance of the US to ratifying, that the EU, Japan, and Russia should do so. Their combined ratification is required in order to meet the minimum threshold of 55 per cent of the total CO₂ emissions of Annex 1 Parties (at 1990 levels).

The EU will therefore have to take steps to persuade its members to agree to its ratifying, without waiting for other countries to make a move, as well as starting to explore the possibility of getting Russia and Japan to ratify the protocol too. All of which will call for carefully designed diplomatic efforts, allowing for compromise on all sides.

As part of the bargaining process, the EU may have to show greater flexibility in regard to the Kyoto mechanisms. It should for instance be possible to agree to a charge on all transactions involving trading in emissions permits, as well as on strict procedures for monitoring, reporting, and verification of reductions. A comprehensive plan should enable the EU to prevent further di-



lution of the so-called sink categories under the protocol.

Then the EU should set targets for implementation of the Kyoto obligations within the Union, with possible wider coordination. The vast potential for low-cost and no-cost options for reducing the emissions of greenhouse gases in the EU and else-

*Could help minimize
concern about
economic competition*

where has been demonstrated in numerous studies.

A coordination of policies, especially with Japan, could help to minimize concern about economic competitiveness. The proposed coordination should not rely on common, binding measures, but should rest on a transparent and accountable process. To be successful the EU should concentrate on a limited number of measures upon which agreement would be most likely.

A leadership group of committed countries might then demonstrate that ecological protection and sustainable economic growth are not only compatible, but mutually reinforcing. Potential areas for fruitful coordination could include green taxation, a large-scale effort in R&D

for renewables and the efficient use of energy, the dismantling of climate-inimical subsidies, standards for energy efficiency, and climate-friendly public procurement.

It will be of utmost importance for the protection of the climate, both in the medium and the long term, and for the future development of the international climate regime, to have the involvement of the developing countries. Their needs must be addressed first.

Immediate emphasis might focus on an adapting strategy to future climate changes. The resources needed for this could be obtained by setting up an adaptation fund financed by a transaction charge on all Kyoto mechanisms. Effort should be directed for instance toward elaboration of the Clean Development mechanism (CDM) under Article 12 of the protocol. That would ensure due recognition of the needs of the developing countries, but without compromising ecological effectiveness. Moreover the EU should, together with its allies outside the Union, start a dialogue with the developing countries in order to arrive at an equitable allocation of emissions rights.

If the EU were to take the lead as here proposed, the result could be a reinvigoration of the Kyoto Protocol and the creation of further incentives for governments to implement the policies and measures needed for mitigating climate change. It could also help to persuade people that economic wellbeing can be improved without having to burn increasing amounts of fossil fuels. By taking over the leadership in climate matters, the EU could ensure the progress needed to protect the Earth's climate.

The above is a digest of **Breaking the Impasse: Forging an EU Leadership Initiative on Climate Change**. By Hermann E. Ott and Sebastian Oberthür, 1999. Published by Heinrich-Böll-Stiftung, Hackesche Höfe, Rosenthaler Str. 40/41, D-10178 Berlin, Germany. E-mail: info@boell.de. Internet: www.boell.de.



TRANSPORT AND ENVIRONMENT

Disturbing trend revealed

Effects have become worse, and if nothing is done they will continue that way

MUCH OF THE GAIN to the environment from cleaner vehicles and fuels is being eroded by an increase in traffic volume and a larger proportion of heavier vehicles with more powerful engines.

Long suspected, this development has now been confirmed in the first of a series of reports on trends in transportation that are to come every year from the European Environment Agency. From this it appears that the effects of road traffic on the environment have become worse and if nothing is done to check it, the trend will continue at least until 2010.

The agency has set forth a great volume of data in support of its views.

The transportation sector as a whole is responsible for 26 per cent of the emissions of carbon dioxide in the EU, 85 per cent of which comes

lines have shrunk by 8 per cent. A good one per cent of the EU land area is now covered by roads, the proportion being highest in Belgium, where it is 4 per cent, and lowest in Sweden, about 0.5 per cent.

Notable among the few improvements is that lead has practically disappeared from petrol, and that vehicles are individually nine tenths less noisy than they were in 1970. The volume of traffic has however in the meantime doubled, so that 30 per cent of the population is now being disturbed by noise.

The EEA puts a great part of the blame for the bad aspect of these developments on the private car, already the chief and an ever growing form of travel. Not only is the total distance travelled increasing, but each vehicle is carrying fewer people. Most of the car trips are short, too, half of them being less than 6 km and 10 per cent less than one.

An attempt has been made to determine price trends for travel both in actual figures and as a comparison between modes. The EEA has found that whereas the cost of travel by car has fallen in many countries, it has become more expensive to use public transportation.

It is also noted that road traffic does not pay its external costs, arising from noise, exhaust emissions, congestion, and so forth. According to the agency, road traffic now pays no more than 30 per cent of these costs. Railways are somewhat better, with 39 per cent.

PER ELVINGSON

Are we moving in the right direction? Indicators on transport and environment integration in the EU. TERM 2000. Can be obtained from the national sales outlets for EU publications. Also available free of charge as pdf file on internet: www.eea.eu.int.

EEA

EEA, European Environment Agency, is an EU body for gathering, analysis, and spreading of information on the state of the environment in Europe. It was started 1993 as a result of a decision made in 1990 by the EC Council of Ministers. Its offices are in Copenhagen. Participants include Norway, Iceland, and Liechtenstein besides the 15 EU member countries, but any European country can join.

EEA REPORT

Link between growth and energy use still unbroken

THE European Environment Agency, an EU organ, now intends to issue annual reports on the state of the environment as a means of bringing pressure to bear on legislators and others who may be able to start moves for its improvement.

The first report¹ covers just about all the environmental issues that are of importance to the EU – describing in particular the success of efforts to inject the environmental aspect into key policy areas, as urged by the EU heads of government at their meeting in Cardiff, Wales, in 1998.

By setting forth trend indicators for each policy area, the report aims to give decision makers at all levels the possibility of judging whether developments are proceeding in the desired direction or call for further action.

It is noted that economic growth within the EU is continuing to require the use of ever more energy. In other words, the link between GDP growth and an increasing use of energy has still not been broken.

The EU countries' dependence on fossil fuels and nuclear power remains considerable. Barely 6 per cent of the energy used in the EU stems from renewables. Sweden is shown to be best in this respect, taking 27 per cent of its needs from such sources, closely followed by Austria,

23 per cent. The proportion is lowest in the UK, only 0.9 per cent. "The EU target of 12-per-cent use of renewable energy by 2010 will require significant additional initiatives," warns the EEA in its report.

Price developments between 1985 and 1996 have hardly contributed to a more efficient use of energy. Although the proportion of taxes in final prices has increased for practically all types of fuel, both oil and electricity have actually become cheaper. During the 90s the price of fuel for transportation did increase somewhat, but for all fuels the real price was lower in 1996 than it had been in 1985.

In 1997 the average gross consumption of energy per capita ashore in the EU was 3.8 tons in oil equivalent, although with marked variations from country to country. Leading the list here were Luxembourg and Finland, with 8.0 and 6.4 tons respectively. Lowest were Portugal and Greece, with a per capita consumption of 2.1 and 2.4 tons.

As regards greenhouse gases, emissions increased between 1990 and 1996 in all the EU countries but Germany, Britain, and Luxembourg. The greatest increase, 40 per cent, occurred in Denmark. The EEA fore-

Continued on next page >



Great efforts will be required in policy making if environmental goals are to be attained in several important fields – for example as regards renewable energy.

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casts a rise between 1990 and 2010 of 6 per cent in the EU as a whole, noting at the same time that great reductions will have to be made in very many of the member countries if the EU is to meet its commitments under the Kyoto protocol.

At least one favourable trend is reported in the matter of the climate: the emissions of methane dropped between 1990 and 1996, mainly as a result of reduced coal mining in Germany and the United Kingdom.

The trend has been much better for acidifying and ozone-forming substances. The emissions of sulphur dioxide went down by 60 per cent between 1980 and 1996 (by 40 per cent from 1990), meaning that the target for 2000 has already been attained. Since 1985 the area of ecosystem receiving depositions in excess of the critical load has shrunk by 40 per cent.

On the other hand a considerable proportion of the population is still being exposed to ozone in concentrations well above the guide values for the protection of health, and farm crops and forests are in many cases being subject to concentrations above the critical levels.

Although the emissions of ozone-forming substances – nitrogen oxides and volatile organic compounds – have undergone a distinct decline since 1980, the EEA insists that in order to achieve the targets for 2010, substantial further reductions will be needed.

While noting that the proportion of environmental taxes in the EU tax system has indeed increased, the EEA observes that it is still small, being no more than 5-10 per cent of the tax total (highest in Portugal, lowest in Austria).

A general conclusion of the report is that as regards the integrating of environmental concerns into key economic sectors, the indicators employed for energy and transportation show there to be a movement away from the targets, and that price incentives are running counter to them.

PER ELVINGSON

¹ **Environmental Signals 2000.** European Environment Agency. Can be obtained from the national sales outlets for EU publications. Also available free of charge as pdf file at www.eea.eu.int.



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NEW PROCESS

For cleaner diesel fuel

It seems there is a possibility of using microorganisms for desulphurizing diesel oil as an alternative to the current method. It is at any rate now being tried in a three-year research project financed by the US Department of Energy. The idea has come from Petro Star, a small refinery company in Alaska. The aim is to develop a way of producing diesel fuel that would be especially suitable for small refineries, to meet the requirements for a still lower sulphur content that will come into force in the United States in 2006 (AN 2/00, p.20).

Hydrodesulphurization is the current refinery method for removing sulphur from diesel fuel. But this process is not only costly. It also requires separate facilities to be constructed to generate the large amounts of hydrogen needed to convert sulphur impurities in diesel into hydrogen sulphide. And there is also the further expense for the facilities needed to convert the smelly, poisonous hydrogen sulphide gas into environmentally safe elemental sulphur.

The proposed biocatalytic process, using selected strains of microorgan-

isms to remove the sulphur in diesel, eliminates both the need for hydrogen production and the expense of operating the high-temperature, high-pressure hydrodesulphurization process. Nutrients for the biocatalyst can be obtained from the components of agricultural fertilizers. The nutrients that are not consumed by the biocatalyst can be removed from the process wastewater by conventional treatment techniques.

The major technical challenge is to develop a system in which the biological process proceeds rapidly enough to remove sulphur at commercially acceptable rates and in the presence of oil (which can inhibit the microbial action).

Petro Star believes the solutions lie primarily in genetically engineering microbes to boost the rate and activity of the biocatalysts and in designing specialized process equipment that will produce a cleaner diesel fuel as well as minimizing biocatalyst losses.

Source: US Department of Energy. August 16, 2000.

More stringent than directive's

Environmentalist organizations are urging adoption of the most advanced scenario.

FOUR DUTCH ministries have worked out options to enable the Netherlands to go beyond its international commitments to cut emissions of the air pollutants that are responsible for acidification, eutrophication, and the formation of ground-level ozone.

All three of the proposed scenarios will cost considerably more in implementation than current policies would. There have been two reasons for developing them. Firstly, to ensure fulfillment of international commitments, it will be necessary to set lower ceilings for the Netherlands, in case reduction should appear to be stalling. Secondly the ministries want to know how the Netherlands could meet a demand for even lower international ceilings.

Three options are put forward for cutting emissions of sulphur dioxide, nitrogen oxides, volatile organic compounds, and ammonia by 2010. Even the least far-reaching of these, dubbed Gothenburg, is considerably stricter than what the Netherlands committed itself to under last year's UN protocol of the same name, when the ceilings were: for SO₂ 50 kt, for NO_x 266 kt, for VOCs 191 kt, and for NH₃ 128 kilotons.

Compared with the country's current targets for emissions, all the options would cost significantly more. The extra cost of "Gothenburg" would be euro 199m (DF439m), that of the more stringent "National Plus" nearly euro 450m, and of the most ambitious "Advanced Plus" option some euro 680m.

Most of the ceilings proposed for the Netherlands are stricter not only than in the UN protocol, but also than those in last year's proposal by the European Commission for a directive on national emission ceilings (see table).

Oil refineries would have to deliver the biggest cuts for SO₂, essentially by changing over from firing with oil residue to using gas (after gasification of the oil residue).

As for NO_x, transportation and industry would have to

bear the main burden. For transportation a big extra cut could be made by inland shipping, while for industry a number of technologies are available, of which the most cost-efficient should be chosen and implemented by means of an a proposed new system for trading of NO_x reduction obligations.

Transportation and industry would also have to contribute most of the cuts in VOC emissions, partly because

Virtually all cuts in ammonia have to be made in farming

of the coming EU regulation of solvents and light motorcycles, although consumers would also be involved.

Virtually all the cuts in NH₃ emissions would have to be made in farming. Measures would include limiting the nitrogen in fodder, restricting stock keeping, lowering the emissions from stables, and injecting dung into the soil instead of spreading it on top.

The report in which all this has been set forth was compiled jointly by the ministries of agriculture, environment, transport and economic affairs. Stressing that the emissions of the four air pollutants remain too high, it estimates, on the basis of preliminary data, that strict national limits would do much to reduce NH₃ pollution in the Netherlands, but that cross-border transports would

limit their ability to reduce the effects of SO₂ and NO_x, and least of all to reduce the pollution from VOCs.

The Dutch research institute RIVM has calculated the effects of the depositions of acid and nitrogen on the soil in ten valuable nature reserves that are situated in areas with the lowest depositions (the coastal zone and the northern provinces). This includes part of the dunes, the Wadden Sea and its islands, and some areas of raised bog, heath, and fen.

Even there it appeared it would not be easy to reach a safe deposition level in 2010. It will be only possible when ceilings in conformity with the Commission's proposal have been adopted by the EU member states, and emissions of ammonia in the Netherlands have been brought down to the level of the "advanced" scenario and those in the regions of the ten nature reserves reduced still further.

The ministries suggest that the government should choose one of their proposed options for the country's new plan for the environment (NMP4), that is now being drafted. They note that going beyond international commitments could provide substantial benefits for the environment and public health, as well as strengthening the Dutch position in negotiations.

The Dutch environmentalist organizations, headed by the Netherlands Society for Nature and Environment, have requested the ministers to choose the advanced scenario for the Dutch acidification policy, and to add additional regional reductions in order to reach safe deposition levels in 2010 for the ten best-situated nature reserves.

JAN FRANSEN

Stichting Natuur en Milieu (The Netherlands Society for Nature and Environment).

Alternative emission ceilings for the Netherlands in 2010.

The scenario figures, which are preliminary, may change in the final RIVM calculations.

	Scenarios				
	PRO ¹	NEC ²	Gothenburg	National Plus	Advanced
SO ₂	50	50	46	42	32
NO _x	266	238	248	226	210
VOCs	191	156	178	164	146
NH ₃	128	104	108	99	84

¹ Commitments under the Gothenburg Protocol.

² Commission's proposal.

Air quality improved ... possibly

Technological efficiency, fuel conversion, and diminished industrial activity have brought down emissions of carbon dioxide at least to West German levels.

IN THE FORMER German Democratic Republic, grey pungent smoke belched from millions of chimneys. City buildings were shrouded in a veil of soot, the sombre monotony occasionally punctuated by decaying statuary. Chronic respiratory diseases and forest degradation were the grim parables of an archaic energy industry, incapable of reconciliation with human health or the environment.

Sulphurous lignite, or soft brown coal, was used to meet 70 per cent of primary energy needs. Hard-currency shortages prevented the implementation of efficient power plants for imported gas and oil. Lack of financing did on the other hand mercifully stall the planned construction of 10,000 MW of nuclear capacity from the Soviet Union at 1830 MW.

Dust precipitators were rarely employed in the lignite power stations of the GDR. Desulphurization never passed the experimental stage, and local air pollution was routinely countervailed by increasing the height of smokestacks.

There would have been no prospect of fulfilling the 30-per-cent requirement of the Helsinki Protocol for the reduction of sulphur transports, except by inflating the base-year data. A figure of 2.5 million tons for sulphur emissions, corresponding to 5 million tons of sulphur dioxide, was officially submitted to the ECE Secretariat for 1980,¹ but an analysis of the data for fuel consumption indicated only 3.9 million tons of SO₂ having actually been emitted.² By the end of the decade the annual production of lignite had risen from 253 to 320 million tons, boosting emissions of sulphur dioxide to 5.2 million tons, or one-third more than the level calculated for 1980.³

After national reunification, most of the municipal utilities in eastern Germany switched to natural gas or oil for heating services and cogeneration plants. Environmentally favourable district-heating systems continued to serve large cities, while



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As it was in the GDR. Since unification the emissions of air pollutants from road traffic have greatly increased, but dropped from electricity generation.

suburbs and smaller towns were for the most part connected to newly established gas networks. Lignite briquettes disappeared as the mainstay of space heating except in unrenovated housing.

Output in lignite mining has

*Air pollution reduced by
the widespread decline
of productive industry*

dropped to 65 million tons a year. About 50 million tons of crude lignite are burnt in base-load power stations, the remainder being employed in heating plants, industrial processes, and briquette manufacturing. The GDR's widely diversified but highly polluting lignite chemical combines have been replaced by modern petrochemical complexes.

Whereas 140,000 were once employed in the lignite industry and its subsidiary operations, less than 20,000 now remain. Part of the work-

force is engaged in the restoration of hydrological and ecological balances in the ill-reputed strip mining regions ("lunar landscapes") of Lusatia, near the Polish border, and in the chemical triangle of Bitterfeld/Halle/Leipzig.

One of the last German offenders on the list of 100 worst emitters of sulphur in Europe,⁴ the 30-year-old lignite power plant at Lippendorf (600 MW), was shut down at last March. Eastern Germany's largest power company, the Vereinigte Energiewerke AG (Veag), has installed desulphurization equipment at the 3000 MW lignite plant it inherited at Jänschwalde, which formerly emitted up to 400,000 tons of SO₂ annually.⁵

Highly advanced lignite power stations have been built at Lippendorf (1866 MW), Schwarze Pumpe (1600 MW), and Boxberg (907 MW), the last being flanked by 1000 MW of reconstructed GDR capacity. A new 900 MW lignite plant at Schkopau, south of Halle, is owned and operated by a German/Anglo-American consortium.

These state-of-the-art installations will have contributed significantly to the 93 per cent overall reduction of sulphur dioxide emissions projected by the government of Saxony for the year 2000 (from their 1990 level).⁶ Air pollution has already been reduced by the widespread decline of productive industry. Despite having nearly one-fifth of the population, eastern Germany presently accounts for only 3.5 per cent of national German exports. Household consumption of electricity is typically 2000 kWh/yr, about half the western German average. Since additional base-load generation is not required under these conditions, construction of a second 907 MW block planned for the Boxberg power station has been postponed indefinitely.

In combustion lignite emits more carbon dioxide than any other fossil fuel. Generating a billion kilowatt-hours (1 TWh) of electricity requires nearly a million tons of crude lignite, releasing about the same weight of carbon dioxide into the atmosphere. At a current combined output of 50 TWh/yr, the Veag and Schkopau plants are thus responsible for approximately 50 million tons of CO₂ annually.

Technological efficiency, fuel conversion, and diminished industrial activity have cut pro-capita emissions of carbon dioxide to 11 tons per year, which is half the former GDR figure and roughly the same as western German levels. However, an additional 100 million tons of annual emissions must be eliminated if Germany is to achieve its self-imposed reduction goal of 25 per cent for CO₂ by 2005. Realizing this objective would be equivalent to a twofold abandonment of lignite power production in the east. But in order to facilitate the phasing out of the country's 19 nuclear power stations, fossil-fuel plant operators are being tacitly encouraged by the federal government to maintain present capacities.

The consequent stabilization of lignite for electricity generation shifts the burden of CO₂ reduction to other sectors, where climate protection remains a tedious task. For instance, some 24 million German dwellings are currently in need of modernization, but barely two per cent are being fully renovated each year to meet applicable insulation standards. A recent estimate ascribes 95 per cent

of all heating energy consumption to older buildings. While the majority of homes and businesses in the east have been modernized with the assistance of post-reunification loan programs, significantly greater funding would be required to mount a comparable effort for the rest of Germany.

Because of stringent emission standards for furnaces, nitrogen oxides from traffic have superseded SO₂ as the chief airborne pollutant.

*All remaining lignite
plants will have ceased
operation by 2040*

With unemployment reaching 25 per cent in some parts of eastern Germany, workers shuttle by hundreds of thousands in cars and buses to jobs in the west. In the early 90's, long-distance truck transport outdistanced that on the railways, which had previously handled 70 per cent of all freight traffic (although a third consisted of lignite transports). Because of low population densities, smog alerts remain rare in the east. Persistent forest damage in mountainous regions is however indicative of excessive concentrations of nitrogen oxides and ozone, as well as of the cumulative effects of acid precipitation.

Other conflicts are the result of inflexible energy policies. The Sorbian (Lausatian) town of Horno is facing imminent destruction by lignite mining for the Jänschwalde power station, and the 700-year-old village of Heuersdorf near Leipzig is similarly threatened by mining for the Lippendorf plant. Yet recent court decisions have fallen in favour of these communities. The operating permit for a mine serving Jänschwalde was revoked in April 2000 because the planning authorities had failed to assess the effect on the environment. Three months later, Heuersdorf successfully contested a devastation law drawn up on the premise that a monopoly electricity market could be maintained indefinitely in eastern Germany.

The verdict refuting this assumption constituted an opportunity to realign energy strategies towards future trading in emission permits

for CO₂, which could make it lucrative for Veag to employ less lignite. The government of Saxony has nevertheless announced that amended legislation would be formulated for displacing the 225 inhabitants of Heuersdorf. The success of this renewed assault on communal sovereignty remains doubtful, however, since excess generating capacities throughout Europe have rendered the destruction of human settlements anachronistic.

Ideally, the lignite mining regions could become fields of reconciliation. In June this year, Europe's largest wind park was inaugurated at Klettwitz, on the site of a former strip mine west of Schwarze Pumpe. The 38 wind turbines exhibit above-average performance in the deforested landscape.

The state of Brandenburg already fulfills 4.6 per cent of its electricity requirements with wind power. Although that is too little to eliminate fossil fuels from the energy equation, it does stimulate speculation on the post-lignite era. Jänschwalde will in any case have been shut down by the end of the next decade, and all the remaining lignite plants will have ceased operation by 2040. To date, no one seems to know what will follow.

JEFFREY H. MICHEL

Jeffrey H. Michel is an American engineer who has been involved with the environment of central Europe since the 1980's. He serves as the community energy coordinator of Heuersdorf (www.heuersdorf.de).

Selected references:

1. Nature Demands Stricter Limits. Stichting Natuur en Milieu, 1989, p. 29.
2. Cord Schwartzau, "Die Entwicklung der Umwelt in der DDR. Neue Probleme durch Renaissance der Braunkohle." In: Umweltprobleme und Umweltbewußtsein in der DDR, Köln. 1985, p. 19.
3. Jeffrey H. Michel, "What it will cost." Acid News, October 1991, pp. 1, 12.
4. Sulphur emissions from large point sources in Europe (second edition). The Swedish NGO Secretariat on Acid Rain, 1995.
5. Bo Thunberg, "Air Pollution in the GDR." Acid Magazine, No. 8, September 1989, p. 19.
6. Kajo Schommer, "Brauchen die neuen Bundesländer eine neue Energiepolitik?" In: Ansichtssache Energie, PDS Fraktion im Sächsischen Landtag, p. 45.

Recent publications

Transportation on internet

The Car Lines newsletter, reporting regularly on transportation policy all around the world, is now available without charge on <http://walshcarlines.com>. There are also some background documents at the same address.

World Transport Policy & Practice, a quarterly journal edited by John Whitelegg, is also available, free of charge, at www.ecoplan.org/wtpp/general/

Cutting Your Car Use (2000)

By Anna Semlyen. Under the subhead "Save Money, Be Healthy, Be Green," this book aims at convincing people, through argument and practical advice, of the advantages of cutting down on the use of private cars.

160 pp. Pocket format. £4.95 plus £1 postage and packing. Published by Green Books of Foxhole, Dartington, Totnes, Devon TQ9 6EB, UK. Internet: www.greenbooks.co.uk.

Bringing the Eurovignette into the electronic age (2000)

A promising way of making road transportation pay for the damage it causes is to introduce a kilometre charge for heavy freight carriers. This T&E report examines ways of modifying existing European legislation so as to allow for fair and efficient pricing.

T&E Report 00/4. Printed copy available from European Federation for Transport and Environment (T&E), Boulevard de Waterloo 34, 1000 Brussels, Belgium. Can also be downloaded free of charge from the T&E website www.t-e.nu.

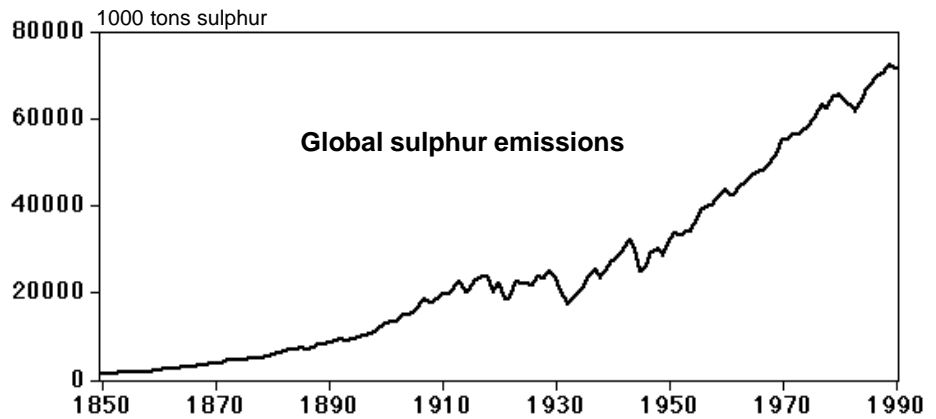
T&E conference on transport, enlargement and the environment (2000)

Proceedings from a conference in March this year on the environmental consequences of transportation in an enlarged Europe. T&E Report 00/3. Available from T&E, see above.

What is the Aarhus Convention?

A 12-page pamphlet describing this convention of 1998 establishing the right of citizens to have information concerning the environment and to participate in the decision making.

Available from Mara Silina, EEB, Boulevard de Waterloo 34, 1000 Brussels, Belgium. Tel. +32.2.289 13 05. E-mail: mara.silina@eeb.org. See also www.participate.org.



GLOBAL SO₂ EMISSIONS

Show a steady increase

SINCE 1850 the global emissions of sulphur resulting from human activities are estimated to have increased by a factor of sixty, and despite the extensive measures lately taken in Europe and North America they were still increasing in 1990 – mainly because of a rapid increase in the burning of coal in China.

To arrive at these estimates¹ a common methodology was applied for each country and year. The figures for emissions were based on the net production of fuel (production plus imports minus exports), the sulphur content, and information on sulphur retention. Emissions from ships were not included in the estimates – although such emissions have previously been estimated to account for about 5 per cent of all the sulphur coming from the combustion of fuel.

Whereas global sulphur emissions were estimated to have been 1.2 million tons 1850, by 1990 they had risen to 71.5 million tons. The slight decline that had started in 1913 continued through the first world war. There was a marked decrease during the great depression of 1930-32, followed by increases right through 1944, in part as a result of the effects of World War II. Except for a drop in 1981-1983, primarily due to a decline in the demand for oil during the global recession at that time, the postwar years have shown a continuous increase.

From a comparison of emissions from North America, Europe, and Asia it appears that whereas those from the two former have been lev-

elling off, rapid increases are taking place in Asia. The methods used for the estimates fail however to give a full picture of the great reductions achieved in Europe and North America since 1980. As explained by Janja Husar of the study group:

“Our methodology over the 150-year period is consistent and the trends are valid for long-term trends. As far as to be accurate for recent and short-term trends, 10 years, probably not. In the last 20 years many environmental controls have been introduced in various countries. Thus the estimates of sulphur content of consumed fuel might need adjustments as the current information on controls becomes available.”

The study shows coal to be the main source of anthropogenic emissions of sulphur – since 1970 the steady increase in the global total being almost entirely due to increased coal burning. In the regions where emissions has decreased it can be explained as a result of switching to fuels with a lower sulphur content. Only in a few countries, one of which is Germany, has flue-gas desulphurization produced any noticeable effect.

PER ELVINGSON

¹ Estimating Historical Anthropogenic Global Sulfur Emission Patterns for the Period 1850-1990. By Allen S. Lefohn, Janja D. Husar, and Rudolf B. Husar. In *Atmospheric Environment* 33 (1999) 3435-3444. The study can be read in toto on http://capita.wustl.edu/CAPITA/CapitaReports/GlobSEmissions/GlobS1850_1990.htm.

Recent publications from the Secretariat

The worst and the best



Large combustion plants are by far the greatest source of emissions of acidifying substances in Europe. Here are up-to-date lists a) of the largest single emitters of sulphur, and b) those power plants that are already doing better than is supposed to be attainable from the use of the “best available technique” proposed for EU legislation. See also article starting on page 1 of this issue.

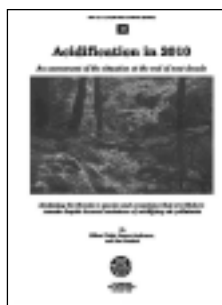
Atmospheric emissions from large point sources in Europe. By Mark Barrett. APC Series No. 15. 2000.

The outlook for 2010

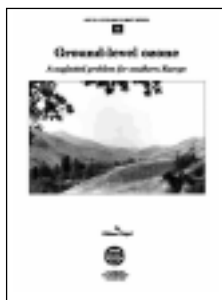
Even if all the planned measures aimed at cutting down the emissions of acidifying air pollutants during the next ten years should in fact be carried out, acidification is likely to remain a threat to many plant and animal species as well as whole ecosystems.

In this study the outlook has been examined in the light of various assumptions as to the possible trend of emissions. It appears from it that the problems of continued acidification may have been considerably underestimated.

Acidification 2010. By H. Pleijel, I. Andersson and G. Lövblad. APC Series No. 10. 1999.



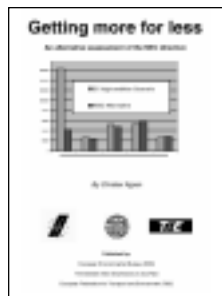
Ozone over southern Europe



This is the first overall survey to have been made of the problems associated with ground-level ozone in southern Europe, where concentrations are frequently exceeding levels that can be injurious both to health and vegetation.

Ground-level ozone. A problem largely ignored in southern Europe. By Håkan Pleijel. APC Series No. 12. 2000.

Need not cost so much



A detailed examination of the Commission's proposed directive for national ceilings on emissions of air pollutants shows that they could be reduced at a much lesser cost than has previously been assumed – provided the member countries really take their plans for dealing with the climate problem seriously.

Getting more for less. An alternative assessment of the NEC directive. By Christer Ågren. APC Series No. 13. 1999.

To reduce air pollution at sea

The decline of air pollution from land sources is bringing the matter of ships' emissions ever more to the fore. This study examines various ways of dealing with that problem, describing the available techniques as well as the possibilities of applying economic instruments to the same end.

Economic instruments for reducing emissions from sea transport. By Per Kågeson. APC Series No. 11. 1999.



Summarized



Emissions from ships could be reduced very cost-effectively compared with what would have to be done to achieve similar results ashore. The study advertised above is here summarized in an 8-page pamphlet in eleven languages: English, German, French, Flemish, Danish, Polish, Russian, Estonian, Lettish, Lithuanian, and Finnish.

How to order. Single copies of any of the above can be had from the Secretariat (free of charge within Europe). Please call for quotation if more copies are required. All these publications can be downloaded at no cost as pdf files on www.acidrain.org. Select “Publications”.

Sex, sulphur, and a fishy business

Could a film be of use to you as a means of driving home to people the problems of acidification in a rather unconventional manner? If so, “Sex, sulphur, and a fishy business” may be what you want. Sponsored by the secretariat among others, it has been produced by Dockhouse

Film & TV AB and shown on TV both in Norway and Sweden. A winner of several prizes at international film festivals.

Distributed as VHS video. 58 minutes. Single copies free of charge within Europe.





Italian cities

Traffic pollution in Italian cities is having very significant health effects, according to a study released in June. It estimates that vehicle emissions of fine particulates (PM₁₀) account for 4.7 per cent of all deaths of people aged over 30 and for nearly 29 per cent of acute respiratory disorders in children under 15.

If particulate levels were reduced to the EU limit of 40 micrograms per cubic metre 2,000 deaths would be prevented annually, the study says. Cutting PM₁₀ to 30 µg/m³ is estimated to avoid 3,500 deaths, and a limit of 20 µg/m³ 5,500 deaths. The study was carried out jointly by WHO and Italy's national environmental protection agency, ANPA.

ENDS Daily, June 22, 2000.

Greek deaths from air pollution

According to estimates made by Greenpeace Greece, air pollution is killing 1300 people a year in this country. The calculation was made partly from information in official reports, partly by use of World Health Organization methodology. Greenpeace wants a ban on diesel taxis, which it says are responsible for more than 20 per cent of the total vehicle mileage in Athens. It would also like to see investment in tramways and light rail, improved energy efficiency in buildings, and more generation of energy from renewables, and the planting of forests around urban areas.

ENDS Daily, July 7, 2000.

French air

Last June the French minister of environment, Dominique Voynet, put forward a number of proposals for the improvement of air quality.

The limit at which traffic shall be

restricted during pollution episodes should be lowered from 400 to 200 micrograms of NO₂ per cubic metre of air.

Public air-quality reporting should be improved.

Two new grants to be added to the existing program for the purchase of "clean" vehicles. Purchasers of LPG taxis will be able to claim 20,000 francs (3000 euros). Anyone buying an electric moped will be eligible for a grant of 2000 francs.

Speaking in July, Voynet attacked French cities for not doing enough to prevent increases in road traffic. A law passed in 1996 requires France's 65 cities with more than 100,000 residents to draw up urban transport plans, but only 10 of them had sent in their proposals by the June deadline. Voynet expressed concern in particular over a lack of measures to tackle the use of private car.

ENDS Daily, June 22 and July 3, 2000.



Energy Globe Award

O.Ö. Energiesparverband in Austria will be giving an international award for the best sustainable solutions in respect of energy efficiency and the generation of energy from renewable sources. Companies, public and private organizations and individuals from all over the world are invited to submit their projects before October 20.

Further information: O.Ö. Energiesparverband, Landstraße 45, A-4020 Linz, Austria. Tel. +43-732-6584-4382. Internet: www.esv.or.at/energyglobe/

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Coming events

2nd Euro Environment 2000 Conference on Industry and Environmental Performance. Aalborg, Denmark, October 18-20, 2000. *Information:* Else Herfort. Tel. +45-9935-5555. E-mail: euro@akkc.dk

Sustainable Building 2000. October 22-25, 2000, Maastricht, The Netherlands. *Information:* Organizing Committee SB2000, Novem, P.O. Box 17, 6130 AA Sittard, The Netherlands. E-mail: SB2000@novem.nl; Internet: www.novem.nl/sb2000.

XIV IUAPPA Clean Air Conference – Peru 2000. Miraflores, Peru, November 26-30, 2000. *Information:* SPAGAL, P.O. Box 14, 0246 Lima 14, Peru. E-mail: idefe@terra.com.pe.

COP 6 – Sixth Conference of the Parties to the UN Framework Convention on Climate Change. The Hague, Netherlands, November 13-24, 2000.

China International Environment and Renewable Energy Conference and Exhibition. Beijing, P. R. China. November 28-December 1, 2000. *Information:* Yong Zhang, tel. (+86) (10) 65157760. E-mail: cisc@midwest.com.cn.

Executive Body for the Convention on Long-Range Transboundary Air Pollution. Geneva, Switzerland, November 28-December 1, 2000.

Acid Rain 2000: 6th International Conference on Acidic Deposition. Tsukuba, Japan, December 10-16, 2000. *Inquiries:* Acid Rain 2000, c/o International Communication Specialists, Sabo Kaikan-bekkan, 2-7-4, Hirakawa-cho, Chiyodaku, Tokyo 102-8646, Japan. E-mail: acid2000@ics-inc.co.jp.

EU Environment Council. December 18-19, 2000.

Nitrogen. 2nd Conference. Potomac, Maryland, USA, October 14-18, 2001. *Information:* Rhonda Kranz, The Ecological Society of America, 1707 H Street, NW, Suite 400, Washington, DC 20006, USA. E-mail: nitrogen@esa.org. Internet: <http://esa.sdsc.edu/n2001>.

Second International Conference on Plants and Environmental Pollution. Lucknow, India, November 15-19, 2001. Organized by International Society of Environmental Botanists and National Botanical Research Institute in Lucknow. *Information:* K.J. Ahmad, e-mail: nbri@lw1.dot.net.in. Internet: www.icpep.org.