

Acid News

Agreement by IMO to cut ship air pollution

Strict new limits for reducing sulphur emissions from ships were finally agreed in April – but action to cut NO_x emissions remains insufficient.

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High costs linked to pollution from ships

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Transport is undermining climate efforts

“The transport sector has had a free ride for far too long, and big improvements are now required in the sector if the EU is to meet its climate targets,” writes the EEA in a recent assessment.

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Nitrogen a major driver of biodiversity loss

New research predicts substantial effects also from low, chronic levels of nitrogen deposition.

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Link between ozone and premature death

Short-term exposure to current levels of ozone in many areas is likely to contribute to premature deaths, says a new US National Research Council report.

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Tangible climate effects already apparent

To avoid unwanted effects, the level of CO₂ in the atmosphere must be reduced to no more than 350 ppm, according to Jim Hansen.

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LARGE COMBUSTION PLANTS

Beneficial to cut pollution

The use of up-to-date emission control techniques in European power plants would drastically reduce emissions of sulphur dioxide (SO₂) and nitrogen oxides (NO_x) and deliver very significant health benefits across Europe, according to a new study.¹

Application of advanced emission control technologies to the 100 most polluting plants in the EU27 could reduce annual emissions of SO₂ and NO_x by approximately 3.4 and 1.1 million tonnes respectively (as compared to 2004 levels of emissions). This would

cut total EU27 emissions of SO₂ by approximately 40 per cent and emissions of NO_x by 10 per cent.

When comparing the calculated annual costs of achieving these emission reductions with the estimated health benefits, it was found that the latter are at least three times higher. Such cuts in SO₂ and NO_x emissions would in addition bring many other benefits that have not been quantified in monetary terms, including less damage to ecosystems and biodi-

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Acid News

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

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

In order to fulfill the purpose of AcidNews, 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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Published by The Swedish Society for Nature Conservation.

Language consultant: Malcolm Berry, Seven G Translations, UK.

Printed by Trio Tryck AB, Örebro, Sweden.
ISSN 0281-5087.

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, Nature and Youth Sweden, 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.

Editorial

Many people deserve praise for their contribution to the efforts that in early April culminated in IMO finally reaching agreement to tackle sulphur emissions from international shipping.

It is naturally both risky and difficult to highlight just a few when so many people have contributed, but I'll take that risk. Special thanks go to:

▶ Bryan Wood-Thomas, who chaired the negotiations of the air pollution working group, for having succeeded in the task of putting together an ambitious compromise solution that was adopted unanimously by all the countries present.

▶ The independent tanker owners' association, Intertanko, for its courage in proposing at an early stage of the negotiations a global transition to low-sulphur (max. 0.5 per cent) distillate fuel – a proposal which when presented in autumn 2006 was challenging, to say the least, but for which Intertanko put forward a well-reasoned and convincing argument.

▶ Sweden – and in particular Stefan Lemieszewski at the Swedish Maritime Administration – for bringing the issue of air pollution from international shipping on to the agenda back in the 1980s and then doggedly pursuing the issue, and for setting an example through the long-term national use of economic incentives.

▶ The United States for proposing at an early stage a maximum sulphur content of 0.1 per cent in coastal areas, which in the final agreement was made the limit that will apply in the Emission Control Areas.

▶ Germany, Finland and Norway, for the compromise solution they set out in the run-up to the negotiations in April, which then paved the way for the final agreement.

▶ The European Commission, for its work in preparing studies of the costs and environmental benefits of various

emission control measures for shipping.

Even though the Swedish NGO Secretariat on Acid Rain is part of the coalition of environmental organizations that has tenaciously applied pressure and lobbied against shipping emissions for many years, I would like to add that this work has also been of great importance. For example, the reports on the health effects of shipping emissions that were commissioned by the environmental organizations helped greatly in bringing the issue on to the political agenda.

The deal on sulphur is good, but it still has to be confirmed by another IMO meeting in October.

More importantly, the measures agreed so far in IMO for reducing NO_x emissions are totally inadequate – they are not likely to result in any real reductions in total ship emissions even within the next 15–20 years. Every effort must therefore be made to markedly strengthen the weak NO_x emission standards, both for existing and new ships.

In addition, the EU and its member states should expand the Emission Control Areas (ECAs) to include all European sea areas. Currently only the Baltic Sea and the North Sea have ECA status.

To ensure an organized gradual phase-in of low-sulphur fuel, and to speed up the introduction of cleaner fuels and ships, IMO regulations need to be complemented by economic instruments, such as emission charges.

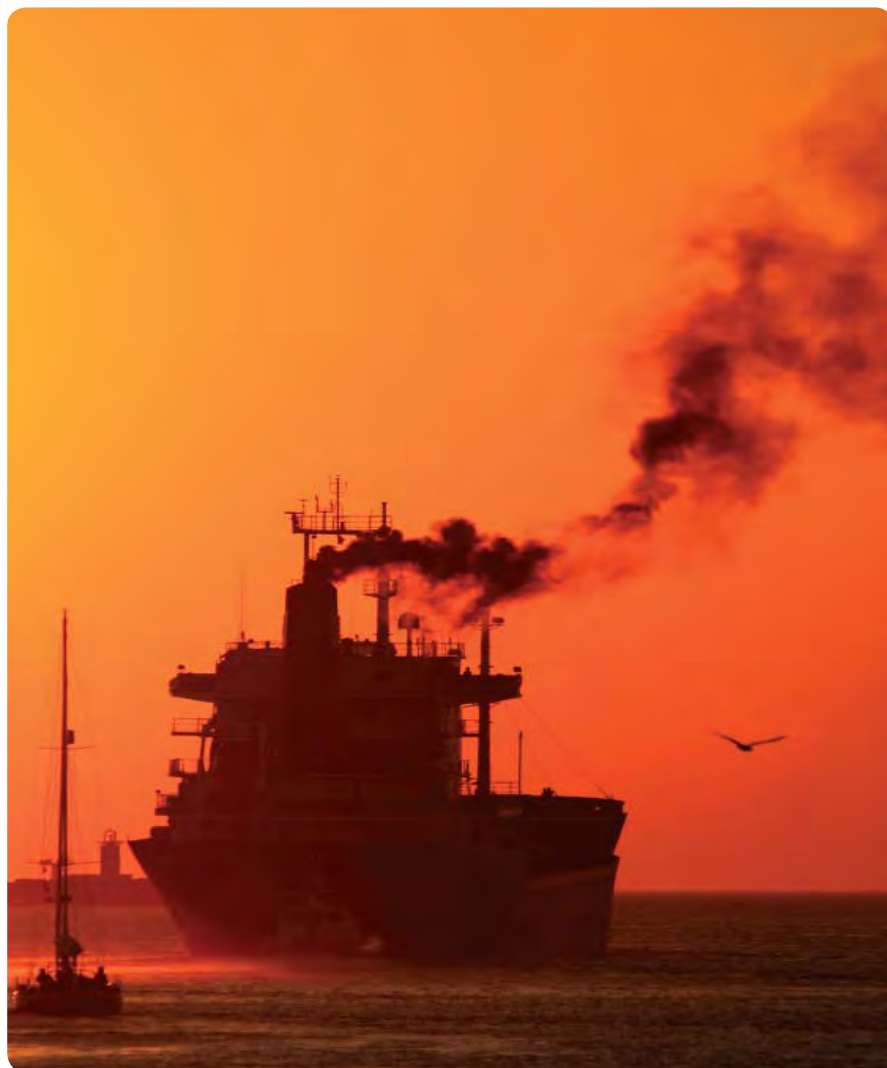
These should be set so as to make it financially worthwhile – at least for ships that regularly frequent the area – to use cleaner fuels or to invest in techniques needed to ensure a distinct reduction in emissions.

Christer Ågren

Praise where it is due

Agreement by IMO to curb shipping emissions

After many years of talks, strict new limits for reducing sulphur emissions from ships were finally agreed in April – but action to cut emissions of nitrogen oxides remains insufficient.



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The sulphur content of all marine fuels will be capped at 0.5 per cent worldwide from 2020, the International Maritime Organisation's (IMO) Marine Environment Protection Committee (MEPC) agreed at a meeting in London in early April. The deal is much more stringent than expected.

Bryan Wood-Thomas, who chaired the MEPC working group on air pollution, stressed that the agreement was unanimous and contained no insertions

or parentheses, a sign of the broad consensus behind the text.

Environmental groups welcomed the agreement. "This is a real ocean-sized change for the IMO," said Eelco Leemans of the North Sea Foundation. "After a decade and a half of discussion and pressure from environmentalists around the world, the IMO has recognised the need for clean shipping fuels."

Outlining the ramifications for indus-

try, Simon Bennett, secretary at the International Chamber of Shipping, said to Reuters that "All of this is going to be extremely expensive and cost the shipping industry billions of dollars; the cost of bunker fuels is going to increase quite dramatically". While welcoming the overall initiative on pollutants, Bennett said fuels currently represent 50 per cent of operating costs for container ships, for example, which carry manufactured goods.

Today, the maximum permissible sulphur content of marine fuels is 4.5 per cent, and the global average has been estimated by the IMO to be between 2.5 and 3 per cent. The new agreement means that the maximum limit will fall in stages to 3.5 per cent in 2012 and finally to 0.5 per cent in 2020.

Low-sulphur fuels are currently not widely available and the IMO agreement calls for a 2018 review to check their availability; depending on its findings, the 2020 target could be postponed to 2025. Moreover, if a ship can demonstrate that compliant fuel is not available to it, it may be granted an exemption from the new limits.

The provisions relating to fuel availability resulted at least partly from statements from the International Petroleum Industry Environmental Conservation Association (IPIECA) cautioning that the oil industry did not expect there would be sufficient availability of shipping fuel at 0.1 and 0.5 per cent sulphur in all regions by the desired dates.

The deal included an agreement that exhaust gas cleaning systems, such as scrubbers, and other alternative technologies or fuels to achieve the relevant emission reductions, would be allowed

in Annex VI. For this purpose an IMO working group has produced draft revised guidelines for exhaust gas cleaning systems and interim washwater criteria for such systems – standards that are necessary to allow the use of scrubbers as an alternative to low-sulphur fuels.

Special low-sulphur zones, called Emission Control Areas (ECAs), where the sulphur limit is now 1.5 per cent, will face a stricter limit of 1.0 per cent in 2010 and 0.1 per cent in 2015. Currently the only Emission Control Areas are the Baltic Sea and the North Sea.

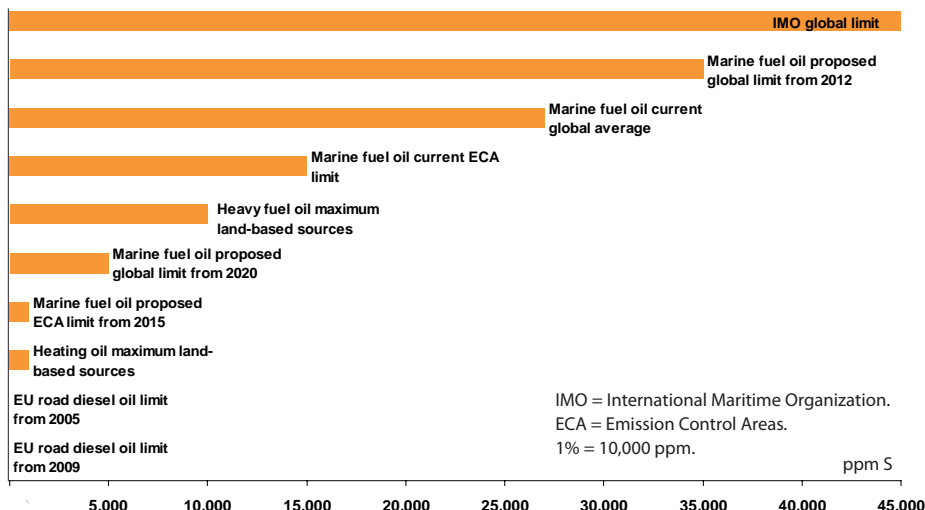
David Marshall of the US-based organization Clean Air Task Force observed, “Meaningful global sulphur reductions are a long way off and countries that value the health of their citizens will need to adopt protective ECAs as soon as possible. In particular, North America, Europe and other areas with high shipping traffic and population should expedite ECA adoption efforts.”

Marshall also noted that the current IMO rules impose unnecessary and expensive barriers to the adoption of ECAs, and urged IMO to eliminate these barriers at its October meeting.

Emissions of sulphur dioxide, a major air pollutant and an important precursor to health-damaging fine particles (PM_{2.5}), are directly proportional to the sulphur content of fuel. A study presented to the IMO by the environmental NGOs showed that under a ‘no action’ scenario, sulphur in marine fuels will be responsible for more than 80,000 premature deaths per year in 2012 (see AN 1/08, p.3).

Dragomira Raeva, Air Policy Officer of the European Environmental Bureau, commented, “Let’s take the opportunity created by these new standards and make sure there is no back-peddaling before October. Now is the time for EU decision-makers to designate the Northeast Atlantic, the Mediterranean, and the Black Sea as Emission Control Areas, consistent with the Baltic and North Seas, so that all of Europe’s seas will be covered by the stricter emission standards.”

The MEPC also reached preliminary agreement on emission standards for



In the EU, the maximum allowed sulphur content in light fuel oil is 0.1 per cent, and in heavy fuel oil it is 1 per cent. Any new large combustion plants (i.e. with a thermal capacity of more than 50 megawatts) built after 2003 must keep their SO₂ emissions below levels equivalent to maximum sulphur contents in fuel oil of between 0.1 and 0.5 per cent. The bigger the plant, the stricter the emission limit value.

nitrogen oxides (NO_x) from new ship engines in two steps. In the first step, emissions would be cut by between 16 and 22 per cent by 2011 relative to 2000, and in the second step by 80 per cent by 2016. The longer-term limit would only apply in specially designated areas, however.

As regards existing ship engines, no significant reductions are expected. It was only agreed that some of the largest existing engines from the period 1990–1999 should be – subject to availability and costs – fitted with an emission-reducing “kit” that is expected to be able to reduce NO_x emissions from those engines by 10–20 per cent.

While applauding the progress on sulphur emissions, environmental groups criticized the failure to agree on any meaningful reduction of NO_x emissions from the existing global fleet of over 90,000 ships.

As a consequence of this lack of action by the IMO, the total amount of NO_x emissions from shipping is expected to continue to increase for many years, perhaps decades, ahead. A way to hinder this would be for coastal states to take action on their own to reduce this type of shipping pollution on a national and regional basis.

The MEPC also agreed not to pursue an IMO fuel quality standard, but instead forward a list of quality parameters to

the International Standards Organization (ISO) with a view to revising the ISO 8217 fuel standard addressing air quality, ship safety, engine performance, and crew health.

The April agreement on the revision of MARPOL Annex VI is scheduled for final approval by the MEPC plenary in October 2008 and is likely to enter into force in March 2010.

Christer Ågren

MARPOL Annex VI

Annex VI “Regulations for the prevention of air pollution from ships” under the IMO’s MARPOL Convention was adopted in 1997 and entered into force in 2005. It has so far been ratified by 49 countries representing about 75 per cent of the gross tonnage of the world’s merchant shipping fleet.

Annex VI sets a global cap of 4.5 per cent on the sulphur content of fuel oil, and contains provisions allowing for special “SO_x Emission Control Areas” (ECAs) to be established with more stringent control on sulphur emissions. In these areas, the sulphur content of fuel used onboard ships must not exceed 1.5 per cent. Alternatively, ships must fit an exhaust gas cleaning system or use other methods to limit SO₂ emissions.

The Baltic Sea was the first ECA to come into effect in May 2006, followed by the North Sea in November 2007.

Annex VI also sets limits on the emissions of NO_x from new ship engines, but these standards are so weak that in practice they do not have any appreciable effect.

High costs linked to pollution from ships

There are remarkable differences in external costs for the various ship categories, ranging from 0.3 to 3.2 eurocent/tonne-kilometre. And the cost for passenger transport is really high.

The annual costs of sea traffic's contribution to air pollution, climate change and marine pollution are estimated to amount to 260 billion euro for the world fleet and 57 billion euro for the EU fleet.

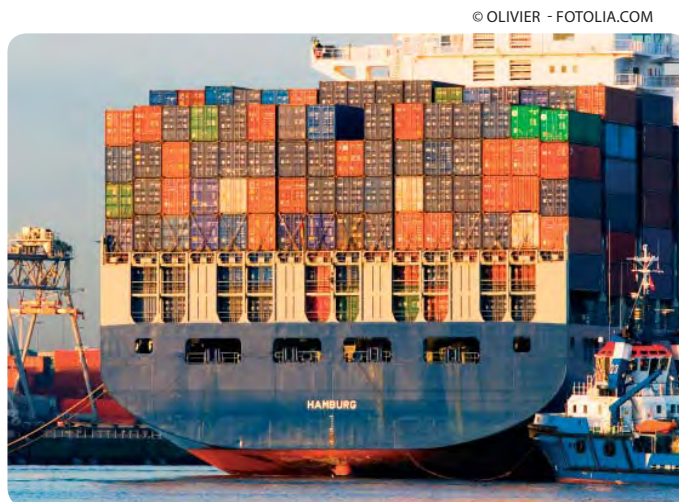
The figures come from a report prepared for the European Parliament's Committee on Transport and Tourism by the Italian consultancy TRT Trasporti e Territorio Srl.

It was estimated that 70 per cent of the costs are due to air pollutants, 30 per cent to greenhouse gases, and less than one per cent to pollution of the marine environment (see Table below).

If the costs of illegal oil spills worldwide are also included – estimated at some 39 billion euro – the overall external cost for the world fleet would increase to nearly 300 billion euro per year. However, this figure still does not include the external costs of consuming resources, and for solid (garbage) and liquid (sludge) waste, for which monetary valuations are not available.

Total and specific external costs for the EU shipping fleet (ships >100 gross tonnage).

	External cost categories			Total external costs million euro	Specific external costs
	Marine pollution million euro	Air pollution million euro	Climate change million euro		
Cargo and cargo/pax ships	124	38,452	16,173	54,750	0.43 eurocent/tkm
Cruise and passenger ships	2	1,378	915	2,296	24.13 eurocent/pkm
Sum	127	39,830	17,089	57,045	



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When they examine the specific external costs, excluding illegal activities, for the various ship categories considered, the authors note remarkable differences between bulk transport (about 0.3 eurocent/tonne-kilometre), container transport (0.5 eurocent/tkm) and truck and trailer Ro-Ro transport (3.2 eurocent/tkm).

Regarding greenhouse gases, using data on energy consumption and emission factors resulted in world shipping emissions in 2006 of more than one billion tonnes of carbon dioxide (CO₂), of

which 225 million tonnes from the EU fleet. Consequently, world shipping would account for nearly four per cent of global CO₂ emissions from fuel combustion. Around 178 million tonnes of CO₂ were released from ships in the five European sea areas in 2006.

Global emissions of sulphur dioxide (SO₂) from international shipping were estimated at 16.5 million tonnes, 21 per cent (3.5 million tonnes) of which is attributable to the EU fleet. The total amount of SO₂ released in European seas in 2006 was approximately 2.9 million tonnes.

Total ship emissions of nitrogen oxides (NO_x) were 24.3 million tonnes, 22 per cent of which is generated by the EU fleet. In the European sea areas the estimated emissions were 4.1 million tonnes. Global emissions of fine particles (PM) were 1.9 million tonnes, of which 324,000 tonnes in European sea areas.

For CO₂ an average damage value of 75 euro/tonne was used, and for the traditional air pollutants, the same marginal damage values per tonne of pollutant were used as in the EU's Clean Air For Europe (CAFE) programme.

Christer Ågren

Source: External Costs of Maritime Transport. Report prepared by TRT Trasporti e Territorio Srl for the European Parliament's Committee on Transport and Tourism. Available at www.europarl.europa.eu/activities/committees/studies.do?language=EN

Beneficial to cut ...

Continued from front page

versity through acidification, eutrophication and ground level ozone, and reduced rates of corrosion and weathering of buildings, materials and cultural monuments.

Emissions from large industrial point sources are currently regulated by the EU directives on Integrated Pollution Prevention and Control (IPPC) and Large Combustion Plants (LCP).

In December 2007 the European Commission presented draft legislation to revise these directives, and discussions on this are due in the European Parliament's environment committee after the summer.

"The findings of this study are important for debates in the European Parliament and the Council on regulating industrial emissions," says Dragomira Raeva, Air Pollution Officer at the European Environmental Bureau. "We think these are solid reasons to strengthen emission limits for large combustion plants."

Emission data shows that a relatively small number of plants emit a large fraction of total pollution. The 100 biggest plants provide 40 per cent of the generating capacity and are responsible for approximately half of the SO₂ and NO_x emissions from all the power plants. Similarly, the 500 biggest plants provide 85 per cent of the capacity, and around 90 per cent of the emissions. See Table 1.

Previous studies of the environmental performance of large combustion plants have also shown that by far the greatest share of emissions comes from old plants. To achieve the emission reductions that are needed over the next five to ten years in order to meet EU aims for air quality and acidification, action will need to be taken on the emissions from these plants.

In this study, the scope for further emission reductions was assessed by theoretically applying the best available emission control techniques to all the power stations. Based on information that includ-

ed an extensive literature review, it was estimated that applying such techniques would result in removal efficiencies for SO₂ of 98 per cent, and for NO_x of 90-94

per cent, at each power station.

It is clear that many of the "worst" SO₂ and NO_x emitters are also signifi-

Table 1. EU27 power stations: summary of emissions and costs.

First 50 power stations		SO ₂	NO _x	SO ₂ +NO _x	CO ₂ (Mt)	
% of total emissions	Base	36%	8%	19%	9%	
	Reduction	33%	7%	18%	-0.2%	
% of all power station emissions		61%	37%	53%	25%	
Emission	Baseline	kt	2901	858	3759	342
	BATECT ¹	kt	173	73	245	336
	Reduction	kt	2729	785	3514	-6
	Reduction	%	94%	92%	93%	-1.7%
Cost	Total	MEuro/a	2530	1809	4339	
	Total	Euro/t	927	2303	1235	

First 100 power stations		SO ₂	NO _x	SO ₂ +NO _x	CO ₂ (Mt)	
% of total emissions	Base	44%	11%	25%	16%	
	Reduction	41%	10%	23%	-0.2%	
% of all power station emissions		76%	53%	68%	44%	
Emission	Baseline	kt	3597	1240	4837	602
	BATECT ¹	kt	227	121	347	593
	Reduction	kt	3370	1119	4489	-9
	Reduction	%	94%	90%	93%	-1.5%
Cost	Total	MEuro/a	3988	2902	6890	
	Total	Euro/t	1184	2592	1535	

First 200 power stations		SO ₂	NO _x	SO ₂ +NO _x	CO ₂ (Mt)	
% of total emissions	Base	50%	14%	29%	21%	
	Reduction	47%	12%	27%	-0.3%	
% of all power station emissions		86%	67%	80%	58%	
Emission	Baseline	kt	4098	1567	5664	787
	BATECT ¹	kt	275	166	441	776
	Reduction	kt	3822	1401	5223	-11
	Reduction	%	93%	89%	92%	-1.4%
Cost	Total	MEuro/a	5899	4139	10038	
	Total	Euro/t	1543	2955	1922	

¹ BATECT = Best Available Techniques (BAT) in the form of Emission Control Technologies (ECT).

Table 2. Summary results for the 50, 100 and 200 power stations emitting the most NO_x+SO₂ combined in the EU27.

	50 highest emitters	100 highest emitters	200 highest emitters
SO ₂ abatement benefit (€M)	11,749	15,170	17,779
NO _x abatement benefit (€M)	2,660	4,387	5,777
CO ₂ penalty (€M)	-110	-171	-215
Total benefit (€M)	14,299	19,387	23,341
Reduced mortality (as life years gained)	160,960	207,823	243,567
Reduced mortality (avoided premature deaths)	15,082	19,473	22,823
Total cost (€M)	4,339	6,890	10,038
Net benefit (€M)	9,960	12,497	13,303
Benefit:cost ratio	3.30	2.81	2.33

cant point sources for emissions of fine particulates and carbon dioxide. Consequently, there is great potential for multiple benefits of 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. Implementing such stricter emission standards would in itself improve the relative economics of energy efficiency and renewables, thus improving their competitiveness.

“Setting strict mandatory emission limit values for existing large combustion plants would help ensure that the oldest, least efficient, and dirtiest coal-fired plants would be shut down – a win-win solution that will cut emissions of both traditional air pollutants and greenhouse gases,” says Dragomira Raeva.

Cutting emissions of SO₂ and NO_x from the 100 most polluting plants in the EU27 by more than 90 per cent is estimated to cost about 6.9 billion euro per year, cor-

responding to an average cost of 1,500 euro per tonne of pollutant reduced.

The health benefits of such emission reductions include avoiding nearly 20,000 premature deaths (or, expressed differently, the gain of more than 200,000 life years) every year. Using the lower valuation of life years lost from the Clean Air For Europe Programme (CAFE) these health benefits are valued at nearly 20 billion euro per year. If the higher CAFE mortality valuation of the value of a statistical life is used instead, the resulting estimated benefits would be about four times higher. See Table 2.

The study shows that the costs of applying efficient up-to-date emission control techniques to a large fraction of the fossil fuel-fired large combustion plants in Europe are significantly less than the economic benefits of improved health – even though the latter include health benefits solely related to secondary particles (from SO₂ and NO_x emissions), and the estimated benefits are based on the lower mortality valuation. These benefits would be further extend-

ed if other pollutants, such as mercury, were controlled with integrated flue gas treatment technologies.

The study also shows that there is significant variation in the application of emission control technologies between different plants and different countries. Improved application of best available techniques for reducing air pollutant emissions from large industrial point sources could contribute significantly to better air quality in Europe.

Since the retrofitting of abatement techniques, such as selective catalytic reduction (SCR) for reducing nitrogen oxides, can be done relatively quickly, early action to apply this would help some countries avoid breaching their national emissions ceilings for NO_x.

Christer Ågren

¹ **The Costs and Health Benefits of Reducing Emissions from Power Stations in Europe.** By Mark Barrett (University College London) and Mike Holland (EMRC). Published by the Swedish NGO Secretariat on Acid Rain and the European Environmental Bureau. Available from www.acidrain.org/pages/publications/reports.asp

Table 3. Costs and benefits of applying best available emission control techniques at the 20 plants in the EU26 with the largest combined SO₂ and NO_x baseline emission.

Rank	Country	Plant	Electrical capacity, MW	Heat capacity, MW	SO ₂ emissions, kilotonnes/yr	NO _x emissions, kilotonnes/yr	SO ₂ benefit, €/M/year	NO _x benefit, €/M/year	CO ₂ disbenefit, €/M/year	Total benefit, €/M/year	Total cost €/M/year	Benefit: cost ratio
1	Bulgaria	Maritsa II	1450	0	332	39	885	103	3	985	101	9.79
2	Spain	Puentes	1400	0	312	19	1315	47	4	1357	122	11.11
3	Greece	Megalopolis A	1400	0	209	4	284	3	1	285	70	4.08
4	Spain	Teruel	1050	0	163	31	421	77	1	497	65	7.62
5	Poland	Belchatow	4340	376	140	40	745	147	7	885	290	3.05
6	Bulgaria	Maritsa I	200	0	96	10	256	26	1	282	26	11.03
7	Poland	Patnow	1200	0	88	11	485	39	3	521	100	5.22
8	Spain	Compostilla	1312	0	62	35	258	85	3	340	107	3.19
9	United Kingdom	Cottam	2008	0	67	22	435	74	4	505	137	3.69
10	United Kingdom	Drax	3960	0	27	58	142	198	2	338	191	1.77
11	Portugal	Sines	1256	0	57	23	196	27	4	219	102	2.14
12	Spain	La Robla	620	0	57	23	241	55	2	294	54	5.43
13	Poland	Kozienice	2600	266	57	19	280	71	1	349	125	2.78
14	Spain	Meirama	550	0	63	11	267	26	2	291	38	7.65
15	Romania	Turceni	2310	0	52	20	188	70	2	256	131	1.96
16	Romania	Craiova	240	330	56	11	201	37	1	238	26	9.15
17	Poland	Rybnik	1720	59	48	19	257	65	3	319	101	3.16
18	United Kingdom	Eggborough	2065	0	44	19	283	65	4	344	132	2.61
19	United Kingdom	Ferrybridge	1470	0	41	20	266	68	4	331	106	3.11
20	United Kingdom	Longannet	2400	0	41	19	265	67	4	327	163	2.01

High potential to reduce air pollution

EU emissions of sulphur and nitrogen oxides could be significantly reduced if the emission levels associated with the best available techniques were to be achieved.

Emissions of sulphur dioxide from large combustion plants (LCP) could have been up to 97 per cent lower in 2004, and those of nitrogen oxides up to 87 per cent lower, if the best available emission abatement techniques had been applied to all plants, according to a recent report by the European Environment Agency.

Interestingly, the report also estimates that emissions of sulphur dioxide and nitrogen oxides could have been 61 and 20 per cent lower respectively, if the facilities had met the emission limits set in the 2001 LCP directive.

The EEA study was initiated in the context of the review of the Integrated Pollution Prevention and Control (IPPC) directive, and it quantifies the effects that reductions in emissions of two important air pollutants – sulphur dioxide (SO₂) and nitrogen oxides (NO_x) – would have had across the EU in 2004, had the best available techniques (BATs) been applied.

BATs were defined in this case as the techniques and associated emission levels as described in the LCP best available techniques reference document (BREF). The authors say that the study may be viewed as a “what-if” study that aims to quantify the potential emission reductions that are achievable by implementing the techniques presently identified in the LCP BREF as best available techniques in the sector as it operated in 2004.

The study is based on data from 450 electricity-generating LCPs across the EU25 in 2004.

In that year, these 450 plants accounted for more than 70 per cent of the emissions of SO₂ and NO_x from this sector. According to the most recent emissions reports, LCPs are responsible for about 54 and 18 per cent respectively, of total SO₂ and NO_x emissions from land-based sources in EU25 states.

The emissions reported in European Pollutant Emission Register (EPER) for 2004 for the 450 selected plants were compared to calculated emissions derived from the estimated fuel used and:

- ▶ emission factors based on the lower end of the BAT-associated emission levels from the large combustion plants BREF: “lower end of BATs” (most stringent);
- ▶ emission factors based on the upper end of the BAT-associated emission levels from the large combustion plants BREF: “upper end of BATs” (least stringent);
- ▶ emission factors derived from the emission limit values contained within the LCP Directive.

The results of the study clearly indicate that EU25 emissions of SO₂ and NO_x

from LCPs included in the scope of the study could be significantly reduced if the emission levels associated with the best available techniques described in the large combustion plants BREF were to be achieved (see Table).

On 21 December 2007, the European Commission proposed draft legislation to further reduce emissions from thousands of industrial installations regulated under the EU’s IPPC directive and six related laws (see AN 1/08, p. 11).

The proposal includes a merger of the IPPC and the LCP directives, as well as five other laws, into a single new industrial emissions directive, and its aims include increasing the level of environmental protection, simplifying existing legislation, increasing the use of BAT, and cutting the administrative burden on industry.

According to the Commission, the existing emission limit values for LCPs are not in line with BAT, and this sector must make additional cuts if the EU is to achieve objectives in the CAFE thematic strategy on air pollution. Another key proposal is to give BAT levels a more binding character than currently, which would leave less flexibility for member states to set permit conditions outside the BAT ranges.

Christer Ågren

Estimated emission reductions potential in 2004 from the selected 450 large combustion plants in EU25 under three various assumptions (tonnes).

	Sulphur dioxide	Nitrogen oxides
2004 EPER emissions	2,583,000	1,506,000
LCP ELVs	1,743,000 (-61%)	308,000 (-20%)
“Upper end of BAT”	2,287,000 (-80%)	884,000 (-59%)
“Lower end of BAT”	2,754,000 (-97%)	1,308,000 (-87%)

EPER = European Pollutant Emission Register. LCP = Large Combustion Plants (bigger than 50 MW thermal input capacity). ELV = Emission Limit Value. BAT = Best Available Techniques. BREF = BAT reference documents.

Source: Air pollution from electricity-generating large combustion plants. EEA Technical report No 4/2008. Available from www.eea.europa.eu/highlights/high-potential-to-cut-air-pollution-from-europes-power-plants



DECARBONIZATION OF FUELS

Ten-per-cent target could be met without biofuels

Friends of the Earth shows in a new report,¹ based on the oil industry's own information, that the "decarbonization" target proposed in revisions to the EU fuel quality directive can be achieved entirely without the use of biofuels.

In a number of statements made in spring, the oil industry trade organization, Europia, said that the only way to achieve a 10-per-cent reduction in emissions of CO₂ from fuels over the period 2010–2020 was with the aid of biofuels and/or emissions trading.

Until now, much of the discussion about the directive has revolved around claims that the use of biofuels will have to increase in order to achieve the target, but the report suggests this could be a distraction. It says fuel producers could reduce emissions by "at least 10 per cent".

The greatest effect is obtained by reducing gas flaring and venting. Other measures include improving energy efficiency, and using alternative fuels at refineries.

The report is highly critical of oil companies' efforts to undermine the directive proposal, partly by fierce lobbying behind closed doors against reduction targets for greenhouse gases and against sustainability criteria for biofuels. At the same time they are spending millions of euro on marketing the industry as environmentally friendly and climate change conscious. According to the report, this is "a public relations exercise and an example of hypocritical double talk contradicted by the industry's actual activity and even its own data."

It is also reported that in reality the emissions of most of the oil companies continue to rise, with heavy investment in dirty tar sand oil, whilst their commitments to renewable energy products remain negligible, and in some cases decrease.

¹ **Extracting the Truth: Oil industry efforts to undermine the Fuel Quality Directive.** Available in PDF format at www.foeeurope.org

Reducing emissions of VOCs during refuelling

In a consultation exercise in spring the EU Commission called for comments on a proposal for "Stage 2 Petrol Vapour Control", which is intended to reduce VOC emissions associated with the refuelling of petrol cars at service stations.

The Commission proposes a mandatory requirement for all filling stations to be fitted with petrol vapour recovery equipment. Such a requirement already exists in many EU countries, but not all. A 1994 directive limits VOC emissions from petrol storage and distribution operations but there are currently no EU restrictions for filling stations.

According to Entec, the consultant enlisted by the Commission, VOC emissions in the EU could be further reduced by around 50,000 tonnes per year for the period 2010–2020, at a cost of 1–3 euro per kg, if Stage 2 control is introduced in all member states.

The consultation period ended on 25 April and it should be possible to draw up a directive towards the ends of 2008.

Further information: DG Environment, <http://ec.europa.eu/environment/air/pollutants/stationary/petrol.htm>

German speed limit

Germany's city-state of Bremen announced last month that its 60 kilometres of motorway will have a blanket speed limit of 120 kph. Bremen's traffic and environment senator Reinhard Loske said the limit is to improve safety and to send out a signal about the need to tackle noise, environmental pollution and climate change. Loske is keen for the limit to be adopted nationwide (Germany has no general motorway speed limit), but there is little sign of enthusiasm from other German states.

Source: T&E Bulletin No. 168, May 2008.

MEPs want sector targets for transport

The European Parliament has called for the transport sector to meet the EU goal of reducing greenhouse gas emissions by 20 per cent by 2020 relative to 1990 levels in a non-legislative resolution. The necessary cuts should be achieved through a combination of technological improvements and the use of market-based instruments. As a first step MEPs called on EU governments to adopt a stalled proposal on linking passenger car taxes to CO₂ emissions.

Source: Car Lines 2008–2, April 2008.



Transport is undermining EU climate efforts

The transport sector has had a free ride for far too long, and big improvements are now required in the sector if the EU is to meet its climate targets,” writes the EEA in a recent assessment.

With passenger volumes steadily increasing and freight transport growing at a faster pace than the economy, the movement of goods is becoming less efficient, in spite of technological progress, states the European Environment Agency (EEA) in a study.¹

The EEA reports that previous and current EU policies have mainly focused on improving vehicle technology and fuel quality to reduce environmental impact from the transport sector. Trends and projections clearly show that these policies have not been enough, as transport volumes continue to grow.

The report highlights a number of indicators that the EEA monitors regularly.

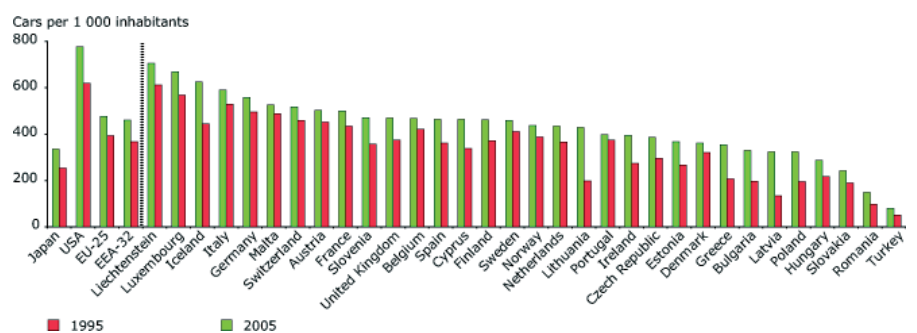
Rising greenhouse gas emissions

Despite more efficient vehicles and the introduction of renewable fuels, emis-

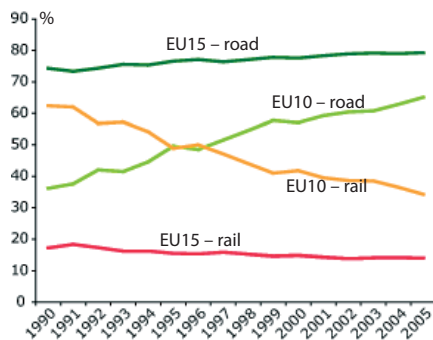
sions of greenhouse gases rose by 26 per cent in the period 1990–2005. Had transport sector emissions followed the same reduction trend as in society as a whole, total EU27 greenhouse gas

emissions during the period 1990–2005 would have fallen by 14 instead of 7.9 per cent.

Much more effective measures are required if the EU is to meet its unilateral



Car ownership increases. In 2005, the average car ownership level in the 32 EEA member countries reached 460 cars per 1 000 inhabitants, compared with 335 in Japan and 777 in the USA. Turkey has the lowest ownership rate (80 per 1 000 inhabitants), Liechtenstein the highest (705 per 1 000 inhabitants). The largest growth was observed in the new Member States and Turkey, with Lithuania topping the growth charts, up from 198 cars per 1 000 inhabitants in 1995 to 428 in 2005 (an increase of 116 per cent). © EEA, Copenhagen, 2008.



More road freight. Road transport's share increases – especially in the new member states. Road freight transport is assigned to the country of origin of the transport vehicle, not to where the vehicles actually drive. The trend is nevertheless expected to be correct. © EEA, Copenhagen, 2008.

climate target to reduce emissions by 20 per cent by 2020. In order to meet the more ambitious targets set out in the “Bali roadmap” (a reduction of 25–40 per cent) steps must be taken to reduce transport demand, in addition to using more efficient vehicles and renewable fuels. Transport volume growth would have to be limited to between +4 and -2 per cent over the period 2010–2020, compared to growth of 15 per cent under the business-as-usual scenario.

If we carry on doing business as usual, emissions from the transport sector alone – in particular from roads, aviation and shipping – could produce more emissions in 2050 than the total allowance for Europe from all sources. Setting a target for the entire transport sector would encourage policy-makers to take tougher action, says the EEA.

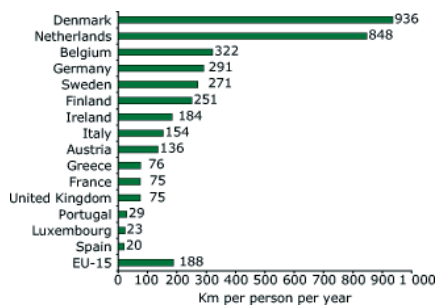
Freight transport growth

Freight transport is growing faster than the economy. A consequence is that emissions of CO₂ from freight transport are growing quickly. Better internalisation of external costs can help reduce market distortions and emission growth.

Passenger transport increasing

Passenger transport continues to grow, particularly aviation and car use. Passenger car use grew by 18 per cent between 1995 and 2004 and was responsible for 74 per cent of all passenger transport in 2004 (EU25).

Increased car usage and a reduced number of passengers per car negate the



Cycling rates in 2000. The differences in cycling are vast: levels in Denmark and the Netherlands are 946 km and 838 km per person per year respectively, whereas people in countries such as Luxembourg and Spain cycle just 23 km and 20 km per year respectively. © EEA, Copenhagen, 2008.

improvements gained from improvements in vehicle efficiency. Technology can deliver some of the greenhouse gas emission reductions needed, but not all. Behavioural changes are also needed to deliver net reductions.

Because transport volumes grow much faster than energy efficiency improves, the total aviation emissions of greenhouse gases tend to grow rapidly.

Harmful pollutants and air quality

Transport, in particular road transport, is generally becoming less polluting due to increasingly strict emission standards. Nevertheless, people in European cities continue to be exposed to significant health threats due to air pollution.

Biofuels in transport

Overall, EU member states are far from meeting the current biofuels targets. The EEA also reports that there are growing doubts about the real ability of first generation biofuels – agrofuels – to reduce overall greenhouse gas emissions, as well as growing awareness of negative impacts. It also considers that using available biomass to replace coal in electricity and heat production gives greater reductions in emissions of greenhouse gases at lower cost.

Focus on rail transport

Rail transport emits on average less greenhouse gas per transport unit than road transport. Passenger kilometre and tonne-kilometre figures for rail increased in absolute terms. However, rail transport's share of both passenger and

freight traffic decreased to 5.8 and 10 per cent respectively (see chart).

Action required

Because new technology is not sufficient to achieve targets, the EEA believes that measures and policy instruments must also address demand for transport in a serious way. There is a need for incentives that influence households, industry and services, within which the demand for transport actually originates.

Actions recommended include curbing road transport demand, a shift away from road use towards greener options such as sea, rail and inland waterways. Experience has shown that pricing incentives are the most effective at reducing emissions. A comparison over the period 1980–2007 shows that the average real price for fuel (including taxes) is at the same level today as in 1980, with a period of lower prices in between.

“Transport has been a free-rider for too long when it comes to the fight against global warming and carbon emissions. Governments and citizens need to rethink radically their approach to transport policy – if nothing else, out of self-concern in protecting their health. We cannot continue to give privileges to less efficient transport modes,” comments Professor Jacqueline McGlade, Executive Director of the EEA.

Per Elvingson

¹ **Climate for a transport change.** EEA report 1/2008. Can be downloaded from EEA at http://reports.eea.europa.eu/eea_report_2008_1/en.

Road freight through heavy vehicle fees

Since 2001, Switzerland has levied a distance-related heavy vehicle fee with the key aims of restricting the increase in heavy freight traffic on the roads, promoting the transfer of goods traffic to rail and relieving the strain on the environment. The size of the fee is based on tonne-kilometres travelled on Swiss territory.

Monitoring during the first five years of operation has shown that the upward trend prior to implementation has been reversed. By the end of 2005, the total number of kilometres travelled was 6.5 per cent lower than in 2000.

Source: EEA Report 1/2008.

Euro VI emission rules for lorry engines

Matthias Groote, a German socialist and rapporteur to the EU Parliament, wants to see stricter emission standards for heavy vehicles (Euro VI) than the Commission proposed in December last year (AN 1/08, p.15).

Groote presented his draft amendments to Parliament's environment committee on 27 May. He wants to bring forward the introduction of the new requirements by one year (2013 instead of 2014) and to tighten limits on particle emissions from 10 to 5 mg/kWh – which would force all manufacturers to use closed particle filters.

Source: ENDS Europe Daily, 27 May 2008.

MEPs split over deadline for car CO₂ curbs

The EU Commission's proposed directive to limit CO₂ emissions from new cars (AN 1/08, p.9) was debated by Parliament's environment committee on 28 May.

The Parliament's rapporteur, Guido Sacconi, backed the 2012 deadline proposed by the Commission for carmakers to cut average emissions to 130 g/km. But shadow rapporteurs for the other main political groups wanted to see a later introduction or phasing in over several years. Parliament's first reading will be in autumn. In a pre-legislative resolution last year there were calls for a target of 125g/km by 2015.

Several member countries are reported to want a slower timetable than the Commission has proposed, as well as a different burden allocation between carmakers. The matter was discussed at the Council meeting on 5 June, but no formal decision was taken.

Source: ENDS Europe Daily, 22 and 28 May, 6 June 2008.

Disproportionate influence for lobbyists

Lobbyists and representatives from industry have a disproportionate influence in the "expert groups" that advise the Commission on drawing up EU legislation. That is the conclusion of a report by Alter-EU, a coalition of NGOs campaigning for greater transparency in EU affairs.

Alter-EU recommends the expert groups should be dissolved and other consultation methods found. It also criticizes the Commission for not publishing the names of experts on advisory groups.

Further information: www.alter-eu.org

Road charging plans due in July

Reports of the draft Commission proposals on smart road charging, which are expected to be published in early July, say legislation will allow for pollution and congestion costs to be internalized, but this will not be obligatory for member states.

The battle to charge road users the full costs of road transport has been going on for nearly two decades, and next month's proposals – a revision of the Eurovignette directive – are likely to mark the biggest single step towards internalizing the external costs of road transport.

Reports from European news agencies say the legislation will give national road authorities a series of options and formulas for calculating the unpaid costs

of road transport. The legislation applies only to vehicles of 3.5 tonnes or more, although countries can introduce charging for cars if they want. All European roads would be covered under the new proposal, not just motorways as in the current legislation.

One report says toll prices on roads could be raised to include medical care for health problems relating to air and noise pollution, but not costs related to traffic accidents. Productivity losses due to road transport problems can also be charged for, as can costs caused by sleep disturbance, time lost in traffic jams, increased fuel consumption and road maintenance.

The draft text is expected to require member states to " earmark " revenue from such charges to finance " projects and measures aimed at reducing the external costs of transport, notably traffic management systems, measures to reduce pollution at source, and the development of alternative infrastructure."

Source: T&E Bulletin No. 168, May 2008.

Strict CO₂ target now for 2020

Getting agreement now on a strict emissions limit for carbon dioxide from new cars could be a key to the EU meeting its greenhouse gas reduction target of 20 per cent by 2020 without the need for massive fuel tax rises.

This is one of the conclusions to emerge from a new paper, *Tools for Cutting European Transport Emissions*, which was published in April by the Swedish transport economist Per Kågeson.

Kågeson set out to look at the various options for transport to play its part in EU efforts to meet the 2020 target, exploring the trade-off between fuel taxes and emissions trading.

Aware that politicians are reluctant to be associated with rising fuel taxes, he offers a scenario in which rises in fuel tax could be kept to just €0.09 per litre.

But for this to happen, ministers and MEPs would have to accept the Commission's proposal on how to split the burden between the emissions reductions expected from the ETS and those expected of member states, and the maximum possible use would have to be made of technical abatement measures.

This would mean an average CO₂ figure for new cars of 100g/km in 2020, and making use of 75 per cent of the CO₂ credits allowed from projects in developing countries.

Kågeson says the simplest way of meeting the 2020 target would involve a harmonized carbon tax on emissions from sectors not subject to emissions trading, but he recognizes this is unlikely to happen under current EU voting rules.

Source: T&E Bulletin No. 168, May 2008.



Nitrogen a major driver of biodiversity loss

That high levels of nitrogen deposition have the potential to change plant community composition and biodiversity has been well known for decades. However, new research also predicts substantial effects from the lower, chronic levels of deposition.

Bridget Emmett is head of the Centre for Ecology and Hydrology in Bangor, UK. Her research group has found evidence for substantial changes in the composition and the diversity of vegetation at nitrogen levels as low as five to 10 kilograms per hectare per year, a deposition rate that is common throughout large parts of the world.

“We have done several different types of studies, both nitrogen addition and nitrogen removal experiments, and studies along gradients with varying deposition,” says Bridget Emmett. “All of them point in the same direction. We start to

lose species at rates around five kilograms of nitrogen per hectare per year.”

Bridget Emmett’s group performed their studies in acid grasslands, shrublands and coastal oak forests. But other ecosystems show similar reactions. Anika Nordin, Associate Professor at the Plant Science Center at the Swedish University of Agricultural Sciences, added six kilograms of nitrogen per hectare per year to a boreal forest site in northern Sweden. After only four years of fertilization, an increase in the occurrence of grasses was measurable. The ambient deposition in this relatively remote area

amounts to only a couple of kilograms of nitrogen per hectare per year.

“**Low rates of nitrogen** deposition matter much more than everyone thought,” says David Tilman, Professor at the University of Minnesota, to Nature. For Bridget Emmett, the implications are clear. “Considering the current and historical deposition rates in Europe, I am convinced that we have missed the major shift with regard to species diversity in many parts of Europe,” she says.

She refers to an experiment that she recently finished, where nitrogen was

added to a grassland for twelve years. “I did not lose a single species,” she says. But when nitrogen was removed from turfs in the same grassland, species diversity increased.

Her interpretation, supported by several recent publications, is that species loss as a function of nitrogen load looks like a reverse exponential curve. Her grassland site, like many other sites in Europe, have most likely already reached the flat part of the curve, where species loss is no longer occurring at any considerable rate.

“That is why we do not see any substantial changes in vegetation composition as a consequence of nitrogen deposition any more,” says Annika Nordin. “The systems have already changed.”

There is always an exception to the rule, however. Nitrogen enrichment of an ecosystem does not always result in a decreased diversity. In some nutrient-poor ecosystems, the species pool is very small.

Adding nitrogen to such a system often has a negative impact on the characteristic species, but may in fact increase plant diversity. “But we are still changing the system, with all that this may bring,” says Annika Nordin.

So far, no one really knows what that may be. “We know very little about how the ecosystem web works,” says Bridget Emmett. Without proper knowledge about the functional redundancy of species, or about the relationship between levels of biodiversity and ecosystem function, it is difficult to estimate the costs of losing species.

“If we do not know what will happen when species disappear, losing them is

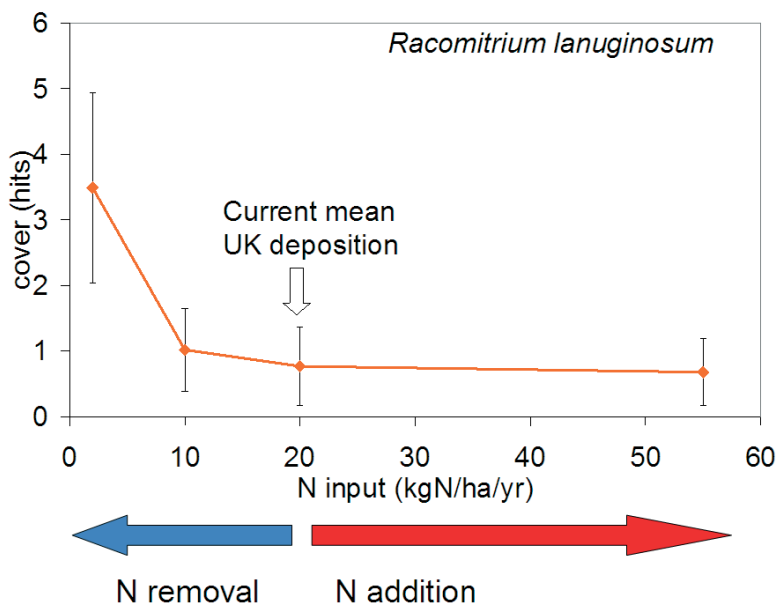


Figure 1. Several studies have found that species loss as a consequence of nitrogen deposition rate occurs at much lower levels than previously thought. This graph shows the cover of the moss *Racomitrium lanuginosum* at different levels of nitrogen addition in a grassland in the UK. The fastest decline in cover occurs at rates between five and 10 kilograms of nitrogen per hectare per year. Data and graph provided by Bridget Emmett, Centre for Ecology and Hydrology in Bangor, UK.

not very clever,” says Bridget Emmett.

The encouraging news is that some of the diversity can be recovered if nitrogen deposition is reduced. In a study by David Tilman and colleagues on a prairie site in Minnesota, plots that stopped receiving additional nitrogen slowly recovered and began to look much like the control plots, as seeds from previously lost species migrated back from other areas.

However, it could take much longer than the 13 years it took in this study, without such reservoirs of plant diversity nearby. The rate of nutrient cycling and immobilization within an ecosystem may also influence its recovery. Earlier fertilization experiments in the north of Sweden, for example, have revealed more subtle effects on species compo-

sition and diversity than in the study performed by David Tilman, but the effects seem to be much more difficult to reverse, and are sometimes chronic.

“It is important to realize that once a system is fertilized, it is fertilized,” says Annika Nordin. “Then you have changed the system because the nitrogen does not disappear. It will be retained within the system, unless removed by for example burning of the land.”

Until now, it has mainly been ecosystems in Europe and North America that have been affected by nitrogen deposition. However, the rapid industrialization of developing countries may have major consequences for the impact of nitrogen on world biodiversity. Global chemistry transport models show that in 2050, 17

Nitrogen deposition in the world

Human activities have led to major increases in global emissions of nitrogen into the atmosphere, with global emissions of fixed nitrogen now estimated to be nearly four times greater than before the agricultural and industrial revolutions.

Consequently, deposition of biologically available nitrogen in the terrestrial biosphere,

particularly in areas of Northern Europe and North America, has increased substantially and the rate is currently an order of magnitude greater than in pre-industrial times. Current deposition rates are estimated at seven kilograms over central and eastern USA, 17 kilograms over central Europe, and as much as 100 kilograms per hectare per year over parts of the Netherlands. This can be compared with pre-industrial levels of 1–3 kilograms per hectare per year.

At a global scale, emissions of anthropogenic

nitrogen continue to increase, and by 2050 total deposition of reactive nitrogen is estimated to reach almost twice the level in the early 1990s. In certain regions, emission rates are stabilizing, or even declining.

However, continued increases in human population growth and rapid industrialization mean developing countries are rapidly emerging as emitters of nitrogen, adding to the large amounts already emitted by developed countries.



Figure 2. Many mosses and lichens are sensitive to nitrogen deposition. Here, *Sphagnum capillifolium* that grows along an ammonia gradient at Whim Bog in south-east Scotland. The healthy tussock to the left has been exposed to an ambient gaseous ammonia concentration of $0.4 \mu\text{g NH}_3/\text{m}^3$, while the dead tussock to the right has been exposed to an annual average of $65 \mu\text{g NH}_3/\text{m}^3$. Photo: Ian Leith, Centre for Ecology and Hydrology in Edinburgh, UK.

out of 34 world biodiversity hotspots could have between 10 and 100 per cent of their area receiving greater than 15 kilos of nitrogen per hectare and year, a rate that is substantially higher than the five kilos found to cause vegetation changes in ecosystems in Europe.

The hotspots, mainly situated in tropical and subtropical moist broadleaf forests, contain as endemics some fifty per cent of the world's vascular plant species. According to Gareth Phoenix, research fellow at the University of Sheffield, and his colleagues, the sensitivity of these systems to nitrogen deposition remains largely unknown, but it seems likely that the mechanisms of nitrogen deposition impacts may act differently in the tropics than in European ecosystems, since plant growth is often considered not to be limited by nitrogen and soils are already highly acidic.

Despite the potentially huge impact that nitrogen deposition may have on world biodiversity, with some experts considering nitrogen deposition to be

the third greatest driver of biodiversity loss on the global scale (after land use and climate change), attempts to reduce nitrogen emissions have been relatively limited.

“To me this is one of the big ways that humans are changing the world, but it is not very well understood by policymakers,” says David Tilman to Nature.

For Annika Nordin it is more a matter of selective thinking. “Politicians choose not to see this problem right now. Instead, everything revolves around climate change, carbon and sources and sinks of this element,” she says.

She emphasizes the need to protect areas that do have a low deposition today. They may provide essential information for the future regarding mechanisms of nitrogen deposition impacts, including interactions between nitrogen and other environmental variables.

“But I do believe in using our forests and other productive land as efficiently as possible,” she adds. Bridget Emmett agrees. “Nitrogen is really a good thing,”

she says. “We have been able to feed people thanks to it. But let us keep it where it should be, in productive areas and added under controlled forms. Today, air pollution is basically uncontrolled and there is no planning at all regarding where the nitrogen finally ends up.”

Ulrika Jönsson-Belyazid

Further reading:

De Vries W et al. (2007). Developments in deriving critical limits and modelling critical loads of nitrogen for terrestrial ecosystems in Europe. Alterra rapport 1382, Cereales Publishers, Wageningen. Available in digital format at www.alterra.wur.nl

Emmett B (2007). Nitrogen saturation of terrestrial ecosystems: Some recent findings and their implications for our conceptual framework. *Water, Air and Soil Pollution Focus* 7: 99-109.

Phoenix GK et al. (2006). Atmospheric nitrogen deposition in world biodiversity hotspots: the need for a greater global perspective in assessing N deposition impacts. *Global Change Biology* 12: 470-476.

Nordin A et al. (2005). Nitrogen deposition and the biodiversity of boreal forests: implications for the nitrogen critical load. *Ambio* 34: 20-24.

Effects of nitrogen on vegetation

The vegetation changes found to occur at low doses of nitrogen are similar to those previously reported for higher nitrogen loads.

The losers in the various ecosystems tend to be ericaceous dwarf shrubs, tender herb-like species and mosses and lichens, while grasses and certain forbs characteristic of more nutri-

ent-rich sites increase. The increase in different grass species is often due to their higher capacity for nitrogen uptake and conversion into biomass. Thus, they expand more rapidly than for example dwarf shrubs that are often adapted to low nutrient supply and cannot respond rapidly to excess nutrients by greater biomass production.

However, the expansion of nitrogen-loving species at the expense of others may also be a consequence of direct toxicity of nitrogen,

changes in soil chemical variables resulting from nitrogen enrichment of the soil, or knock-on effects, increasing the susceptibility of characteristic species to frost and drought or attack by pests and pathogens.

Fertilization of bilberries with nitrogen, for example, renders leaves more susceptible to the pathogenic fungus *Valdensia heterodoxa*, resulting in premature leaf loss and thus increased light availability, favouring the establishment of light-demanding grasses.

Canada led G8 in GHG emissions growth

Canada's greenhouse gas emissions increased by 25 per cent from 1990 to 2005, the highest amount of any G8 nation, according to Statistics Canada. Energy use for transportation and oil and gas production in areas such as Alberta's oil sands were largely responsible for the rise.

Canada's former Liberal government signed the Kyoto Protocol that pledged to reduce emissions at least five per cent below 1990 levels by 2012, but the current Conservative government has said it cannot honour that agreement.

Source: Planet Ark (Reuters) 23 April 2008.

US requires trains and ships to cut pollution

The US Environmental Protection Agency has issued standards to significantly cut emissions from new diesel engines that will power trains and ships.

When fully implemented, the new standards will reduce soot by 90 per cent, or 27,000 tonnes, and cut nitrogen oxide emissions by 80 per cent, or nearly 800,000 tonnes. The cleaner engines would reduce pollutants linked to health problems, preventing 1,400 deaths and 120,000 lost workdays annually in 2030, the EPA said. The new standards will be phased in in 2014–2015.

Source: Car Lines 2008-2, April 2008. Further information: www.epa.gov/OMS/locomotv.htm

"CCS is unproven, risky and expensive"

Carbon capture and storage (CCS) aims to reduce the climate impact of burning fossil fuels by capturing carbon dioxide from power station smokestacks and disposing of it underground. Its future development has been widely promoted by the coal industry as a justification for the construction of new coal-fired power plants.

However, the technology is largely unproven and will not be ready in time to save the climate, according to a new report, "False Hope", published by Greenpeace.

"Policymakers should prioritize investments in sustainable energy solutions to stop the climate crisis and not succumb to pumping vast amounts of taxpayers money into the elusive promise of CCS," concludes Greenpeace.

Further information: www.greenpeace.org

Climate impact of agriculture can be reduced

Agriculture is one of the largest sources of greenhouse gas emissions. However, it is possible for the sector to change from being a key contributor to a carbon sink.

The total global contribution of agriculture to climate change, including fossil fuel use in farm operations, the production of agrochemicals and the conversion of land to agriculture, is estimated to be equivalent to between 8.5 and 16.5 billion tonnes of carbon dioxide or 17 to 32 per cent of all human-induced greenhouse gas emissions.

A Greenpeace report¹ describes how energy- and chemical-intensive farming has led to increased emissions of greenhouse gases, primarily as a result of the high use of fertilisers, land clearance, soil degradation, and intensive animal farming.

Agriculture directly contributes between 5.1 and 6.1 billion tonnes of CO₂-eq (10–12 per cent) to global greenhouse gas emissions. These emissions are mainly in the form of methane and nitrous oxide. This represents a significant difference from other sectors of society, where carbon dioxide from burning fossil fuels is the dominant element.

Fertiliser overuse is responsible for the highest single share of agriculture's direct greenhouse gas emissions, currently equal to some 2.1 billion tonnes of CO₂-eq annually. Excess fertiliser results in the emission of nitrous oxide, which is some 300 times more potent than carbon dioxide in changing the climate.

The second largest impact comes from livestock production. Cows and sheep produce large amounts of methane during digestion. Lamb and beef have the highest climate impact of all types of meat, with a global warming potential of 17 and 13 kg CO₂-eq per kilogram of meat respectively, while pork and poul-

try have less than half this impact.

Agriculture also has serious indirect effects on the climate. When forests and other vegetation disappear as a result of cultivation for agricultural use it releases trapped carbon. This is especially true when rainforest is felled to clear land for the production of soya and palm oil.

The report details a variety of practical solutions which can reduce climate change and are easy to implement, including reducing overuse of fertilisers, protecting the soil, improving rice production and cutting demand for meat, especially in developed countries.

When combined, these measures can greatly reduce the negative effects of agriculture on the climate, and even turn this sector into a carbon sink.

Per Elvingson

¹ Cool Farming: Climate impacts of agriculture and mitigation potential. Written for Greenpeace by Professor Pete Smith from University of Aberdeen. Available at www.greenpeace.org

Sources of direct and indirect agriculture greenhouse gases (average figures).

Sources of agriculture	Mill. tonnes CO ₂ -eq/yr
Nitrous oxide from soils	2128
Methane from cattle enteric fermentation	1792
Biomass burning	672
Rice production	616
Manure	413
Fertiliser production	410
Irrigation	369
Farm machinery (seeding, tilling, spraying, harvest)	158
Pesticide production	72
Land conversion to agriculture	5900

Source: Cool Farming / Greenpeace.



The plug-in hybrid Chevy Volt – to date just a concept car, but it will be on sale by 2010, according to GM.

Cars should plug-in to a new future

Dramatically increased use of plug-in electric and hybrid vehicles would be a way to a transport future that doesn't risk climate catastrophe. Such a move would also reduce the risk of conflict over less oil, which is increasingly concentrated in relatively unstable areas of the world, according to a report¹ published by the WWF.

It finds that vehicles running solely or partly on grid-connected electricity are more efficient and less greenhouse-gas intensive than all alternatives, even with most power now being generated using fossil fuels.

The report also finds that cleaner power generation and more use of renewable fuels in power generation will make it certain that the comparative efficiency and pollution advantages of plug-in transport will improve into the future,

while the future of liquid fuels is one of increasing resort to dirtier sources that will take more energy to turn into fuels.

In addition the report finds that plug-in electric vehicles can be three times more efficient than hydrogen-fuelled vehicles and that they can be widely introduced using existing technologies and distribution infrastructure.

To hasten the transition the report recommends dismantling market barriers to superior technologies and removing a host of hidden and overt subsidies to liquid fuel use. Vehicles should be subject to similar energy labelling and efficiency improvement requirements as other energy-consuming appliances.

¹ **Plugged In: The End of the Oil Age.** Available at www.panda.org

Improving energy performance of buildings

The European Commission is planning to propose legislative changes to the directive on energy performance of buildings later this year. A public consultation is open until 20 June.

The current directive requires governments to set national efficiency standards. The Commission has previously talked about binding requirements to drive improvements in the worst-performing member states, but in the consultation member states merely mentions establishing a "benchmarking system."

The current directive, which was agreed in 2002, has been implemented slowly and incompletely. The Commission has opened infringement proceedings against 17 member states for late or incomplete transposition.

The buildings sector is responsible for around 40 per cent of the EU's final energy use. According to Commission estimates this figure could be cut by 28 per cent by 2020 in a cost-effective way, which equates to an 11 per cent cut in the EU's total energy use.

Consultation and background document: http://ec.europa.eu/energy/demand/consultations/buildings_dir_en.htm

Gold Standard best for carbon offsets

The Gold Standard for carbon offsets has been singled out for praise in an independently commissioned report to rate voluntary carbon offset standards. Gold Standard is an independent, internationally recognized benchmark for carbon offset projects that was created by environmental and development NGOs. WWF, which commissioned the report, urges consumers and business leaders to use offsetting only as the final part of a three-pronged approach known as 'avoid, reduce, then offset'.

Further information: WWF UK, www.wwf.org.uk/news/n_0000004910.asp

Bicycles in the spotlight

The world produced an estimated 130 million bicycles in 2007 – more than twice the 52 million cars produced – according to a recent overview published by the Earth Policy Institute. Much of the recent growth has been driven by the rise in electric, or "e-bike" production, which has doubled since 2004 to 21 million units in 2007.

Further reading: Earth Policy Institute, www.earthpolicy.org/Indicators/Bike/ 2008.htm



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Link between ozone and premature death

Short-term exposure to current levels of ozone in many areas is likely to contribute to premature deaths, says a new US National Research Council report.

It has been known for some time that ozone can cause respiratory problems and other health effects. In addition, evidence of a relationship between exposures of less than 24 hours and mortality has been mounting, but interpretations of the evidence have differed.

Based on a review of recent research, the committee that wrote the report found that deaths related to ozone exposure are more likely among individuals with pre-existing diseases and other factors that could increase their susceptibility. However, premature deaths are not limited to people who are already within a few days of dying.

The committee also examined research to find out if there is a threshold – a concentration of ozone below which exposure poses no risk of death. It concluded that if a threshold exists, it is probably at a concentration below the current US public health standard.

The research on short-term exposure does not account for all ozone-related mortality, and the estimated risk of death may be greater than if based solely on these studies, the committee noted.

To better understand all the possible connections between ozone and mortality, future research should address whether exposure for more than 24

hours and long-term exposure – weeks to years – are associated with mortality, including how ozone exposure could impact life expectancy.

The evidence is strong enough that the US Environment Protection Agency (EPA) should include ozone-related mortality in health-benefit analyses related to future ozone standards, says the committee.

The EPA toughened standards for ozone pollution in March but outside experts complained its new requirements were more lax than the EPA's own scientists recommended. The new standards are 75 parts per billion ($150 \mu\text{g}/\text{m}^3$) over an eight-hour period. The previous standard, set in 1997, was 80 ppb.

The EPA's Clean Air Scientific Advisory Committee recommended, however, a standard of 60 to 70 ppb, with the lower level suggested for children who are more vulnerable to ozone pollution.

According to EPA, 85 US counties still have ozone levels higher than the old standard, and 345 counties would not meet the new standard. EPA estimates the new rules could cost some \$7.6 to \$8.5 billion. Health benefits could range between \$2 and \$19 billion, according to agency estimates.

Per Elvingson

Further reading: The report, "Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution," is available for free download from the National Academies Press at www.nap.edu

Ground-level ozone

Ozone is formed in the presence of sunlight by the reaction of nitrogen oxides and volatile organic compounds. These pollutants are released mainly by motor vehicles, power plants and other industrial facilities. Ozone has not only severe health effects, it also causes damage to crops and ecosystems even at low levels.

The US law requires EPA to review air quality standards for several pollutants, including ozone, every five years. EPA is bound by the statute to determine the standards based solely on the scientific knowledge of impacts on public health – it is not permitted to consider economic impacts.

To reduce adverse health effects, the World Health Organization (WHO) recommends an air quality guideline for ozone of $100 \mu\text{g}/\text{m}^3$ (50 ppm) as the eight-hour daily maximum value.

Levels of ozone in Europe still too high

The formation of ground-level ozone is promoted by sunshine. Due to cool weather the levels were exceptionally low in summer 2007.

Although ground-level ozone values across Europe in summer 2007 were the lowest for several years, the EU's long-term target for protecting human health (maximum ozone concentration of 120 µg/m³ over eight hours) was exceeded in every country, in almost every summer month and at most stations during the summer of 2007.

Approximately 83 per cent of all stations reported one or more exceedance. For those countries that reported exceedances, the number of exceedance days per country ranged from two (Bosnia-Herzegovina and Latvia) to 174 (Italy).

Ozone levels were the highest in July; the relatively low temperatures in June were associated with a much lower number of exceedances than in previous years.

The highest one-hour ozone concentration of 479 µg/m³ was observed in Sicily, Italy, followed by 363 µg/m³ in Romania.

France, Greece, Italy and Romania also reported high hourly ozone concentrations at least six times last summer.

Further reading: Air pollution by ozone across Europe during summer 2007. European Environment Agency technical report No. 5/2008. Free download: http://reports.eea.europa.eu/technical_report_2008_5/en.

See also www.eea.europa.eu/maps/ozone, which shows the situation for ground-level ozone across Europe based on near real-time data.

Diesel fumes are harmful for the brain

Knock-on effect on heart and lungs, since the brain also regulates blood pressure and respiration.

Further evidence has been found for the harmful effects of diesel exhaust fumes. For the first time, researchers in Sweden and the Netherlands have been able to show that exhaust particles can harm our brains even at moderate exposure levels.

US researchers have previously shown that exhaust particles can reach the brains of animals via the nose and olfactory nerve, but this is the first time it has been observed in humans.

“The most serious aspect is the effect on the brain itself, in the form of

reduced ability to concentrate and probable impairment of other functions. The brain also has a co-ordinating role; regulating blood pressure, cardiac rhythm and respiration. Any interference could have fatal consequences for susceptible individuals,” says Thomas Sandström, professor of clinical medicine at Umeå University, Sweden, where the study was conducted in partnership with Zuyd University in the Netherlands.

Further reading: Particle and Fibre Toxicology 2008, 5:4. 11 March 2008. Available at www.particleandfibretoxicology.com/content/5/1/4.

Improvements in US air quality have stalled

The American Lung Association (ALA) issued its annual report card on air pollution on 1 May, ranking US cities most affected by three types of pollution: short-term particle pollution, year-round particle pollution and ozone pollution. For the first time ever, a city outside California – Pittsburgh, Pennsylvania – tops one of the most polluted lists.

The ALA report and the EPA analyses confirm that air pollution levels in the US dropped in the early years of this

century, but have levelled off in the last three years, particularly when adjusted for weather.

“The air quality in several cities has improved, but in others, declines in pollution have stalled. The trends tell us loud and clear that we need to do more to protect Americans from breathing air that’s simply hazardous to their health,” said Bernadette Toomey, President at the American Lung Association.

Further information: www.lungusa.org.

Asia's emissions pollute North America

Satellite data from NASA shows that close to 15 per cent of the air pollution over the western United States and Canada originates in East Asia. It takes pollutants from forest fires, urban exhaust fumes and industrial production in East Asia less than a week to be transported to the American west coast.

Over the four-year period 2002-2005, NASA researchers calculate that almost 40 billion pounds of pollution aerosols were exported to the northwestern Pacific Ocean and nearly 10 billion pounds reached North America annually from East Asia.

The research team found that pollution movements fluctuate during the year, with the East Asian airstream carrying its largest load in spring and smallest in summer.

Source: Environment News Service, 17 March 2008.

Tangible climate effects already apparent

Current greenhouse gas levels in the atmosphere are already melting ice sheets and affecting ecosystems all over the world. The solution is to reduce the level of CO₂ in the atmosphere to no more than 350 ppm, according to Jim Hansen.

“If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimatic evidence and ongoing climate change suggest that CO₂ will need to be reduced from its current 385 ppm to at most 350 ppm.”

This is the message of an article¹ by Jim Hansen, director of NASA’s Goddard Institute for Space Studies, jointly written with eight other researchers.

The researchers started by looking at paleoclimatic data (the natural historical record that exists in ancient ice and seabed deposits), and at ongoing global changes, which indicate that ‘slow’ climate feedback processes that are not included in most climate models – such as ice sheet disintegration, vegetation migration, and release of greenhouse gases from soils, tundra or ocean sediments – may begin to come into play on time scales as short as centuries or less.

The Earth’s climate response has previously been assumed to lead to a temperature rise of three degrees Celsius for a doubling of the atmospheric concentration of greenhouse gases (increasing from the pre-industrial level of 275 ppm to 550 ppm). This figure is also included in the IPCC’s latest assessment. But according to Hansen and his colleagues, a more reasonable estimate is six degrees at equilibrium, as a result of the feedback mechanisms that the models were unable to take into account.

Hansen himself has previously recommended a target of 450 ppm, but has changed his view. He now believes that this level would have disastrous consequences in the long term, including a

sea rise of 75 metres, since practically all the ice sheets would melt.

The concentration of carbon dioxide in the atmosphere is currently about 385 parts per million and increasing by two parts per million each year. A series of examples in the article illustrate that even this level has tangible effects on ice sheets and ecosystems around the world.

The article explains that there are tipping points, but that because of inertia in the climate system, these may be temporarily exceeded without passing the point of no return – the point at which various feedback processes make the changes permanent and irreversible.

According to the calculations, the level of carbon dioxide in the atmosphere must be reduced to 350 ppm as soon as possible to avoid passing the point of no return. It is difficult to model the length of time over which the critical level can be exceeded, but according to the researchers it is a matter of decades, not centuries. It may be necessary to set the target level even lower than 350 ppm, depending on factors such as how the Earth’s ice caps respond to change. And a limit between 300 and 350 ppm is probably necessary for the survival of coral reefs.

The specified level of 350 ppm refers only to the concentration of carbon dioxide, but the effects of other greenhouse gases are also taken into account. Their effect is expected to remain relatively constant over time, however. If dedicated measures are taken to combat non-CO₂ gases the allowable level of CO₂

could be roughly 25 ppm higher. On the other hand, reduction of human-made aerosols, which have a net cooling effect, could force stricter requirements.

To bring the level of carbon dioxide down to 350 ppm, emissions must be lower than can be absorbed by the soil and sea, which – considering the long life of carbon dioxide in the atmosphere – means emissions close to zero. Coal combustion without carbon capture and storage would need to be phased out by 2030. Agricultural and forestry practices would be required to sequester carbon, say the researchers.

Economic incentives are required to bring about these changes: “A rising price on carbon emissions and payment for carbon sequestration is surely needed to make drawdown of airborne CO₂ a reality.”

Per Elvingson

¹Target atmospheric CO₂: Where should humanity aim? J. Hansen et al, 2008. Paper available free of charge at arXiv, an e-print service operated and funded by Cornell University, USA. Web address: <http://aps.arxiv.org/abs/0804.1126>.

Dr Jim Hansen

... is director of NASA’s Goddard Institute for Space Studies. He was one of the first to bring the climate issue to world attention in testimony to the US Congress in the 1980s. His relationship with the Bush Administration has been frosty. In 2005, he accused the White House and NASA administrators of trying to censor him. He is the recipient of the 2007 Award for Scientific Freedom and Responsibility given by the American Association for the Advancement of Science, AAAS.



Warming could hit tropical wildlife hardest

Despite the fact that climate changes are expected to be greatest closest to the poles, biodiversity could suffer the worst effects in tropical areas.

The biodiversity of the planet is concentrated in tropical climates, where there is a tremendous variety of species. This could be the main reason why more species are wiped out in the tropics when temperatures rise; a much smaller number of species live close to the poles. Another important factor is that many tropical species are adapted to uniform temperatures, and therefore find it more difficult to cope with change than species that live in habitats where the temperature varies more widely.

These are the conclusions of research that was published in the Proceedings of the National Academy of Sciences in May.¹

The scientists have measured in laboratories how sensitive different species are to changes in temperature. For insects, the data is comprehensive and includes

information on how temperature affects the population growth rate for species. This data was compared with predicted temperature change in various regions.

Also published in May was a detailed summary of the effects of climate change that can already be seen in ecosystems.²

In this study the researchers analyzed data from published papers on 829 physical systems and some 28,800 plant and animal systems, stretching back to 1970. They worked to rule out observed changes that could have been caused by other factors besides anthropogenic climate change.

The observed biological effects include earlier leafing of trees and plants over many regions; movements of species to higher latitudes and altitudes in the northern hemisphere; changes

in bird migrations in Europe, North America and Australia; and shifting of the oceans' plankton and fish from cold- to warm-adapted communities.

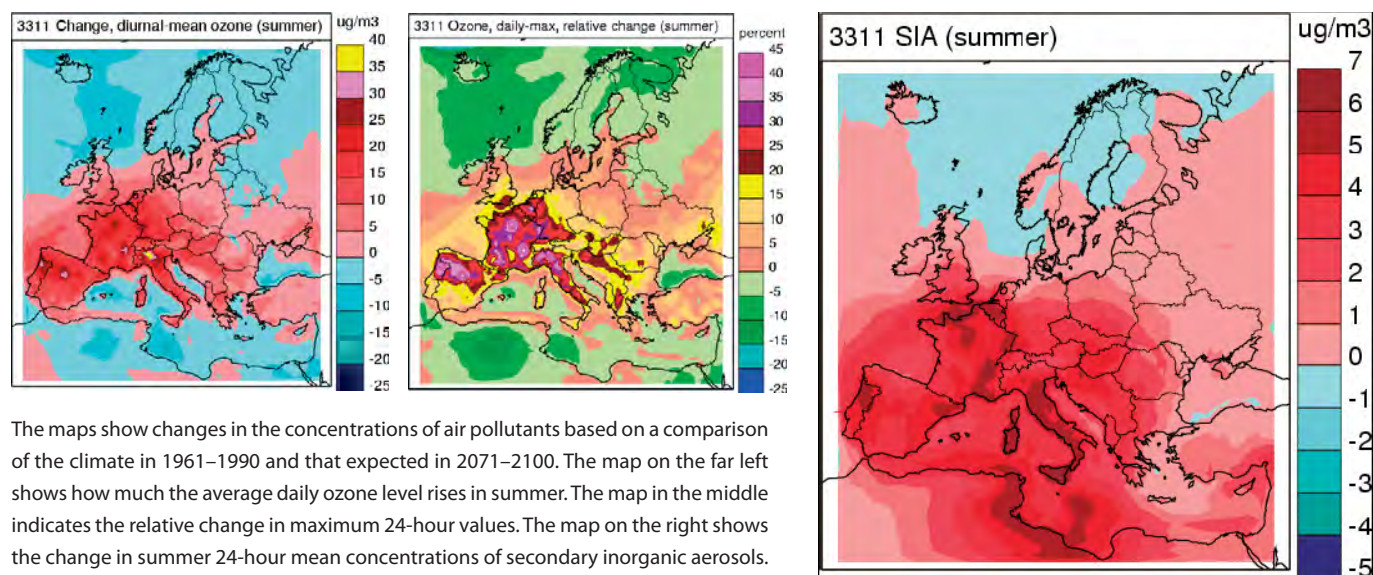
The data showing the patterns of change are strongest in North America, Asia and Europe – mainly because far more studies have been done there. On the other continents, including South America, Australia and Africa, documentation of changes in physical and biological systems is sparse, even though there is good evidence there of human-influenced warming itself.

¹ Impacts of climate warming on terrestrial ectotherms across latitude. Deutsch et al. PNAS, May 6, 2008, vol. 105, no. 18, 6668-6672. Free access article, www.pnas.org.

² Attributing physical and biological impacts to anthropogenic climate change. Rosenzweig et al. Nature 453, 353-357 (15 May 2008).

Climate change reduces European air quality

Changes in the European climate can cause significant increases in concentrations of several pollutants, including secondary inorganic particles and ground-level ozone.



The maps show changes in the concentrations of air pollutants based on a comparison of the climate in 1961–1990 and that expected in 2071–2100. The map on the far left shows how much the average daily ozone level rises in summer. The map in the middle indicates the relative change in maximum 24-hour values. The map on the right shows the change in summer 24-hour mean concentrations of secondary inorganic aerosols.

Expected changes in the chemical environment include altered transport pathways or deposition or conversion processes, caused, for instance, by changes in temperature or precipitation patterns. A change in climate may also directly or indirectly affect the emissions of natural and anthropogenic pollutants.

By keeping the chemical boundary conditions and surface emissions constant over three different 30-year periods (1961–1990, 2021–2050 and 2071–2100), a computer modelling study¹ has investigated the resulting change in atmospheric near-surface concentrations of a number of air pollutants.

It was shown that changes in the European climate can cause significant increases in concentrations of several pollutants, including ground-level ozone. Seasonal-mean ozone concentrations are expected to increase by up to 10 per cent in central and southern Europe by 2050, and about 30 per cent by 2100.

The increase is particularly pronounced in central and southern Europe (Spain, France, the Netherlands, Belgium, western Germany and Italy) during summer.

The increase in daily-maximum ozone concentration is even more noticeable, with significant areas experiencing increases of more than 40 per cent.

Concentrations of secondary inorganic particles (i.e. sulphate, nitrate and ammonia) are expected to increase dramatically in continental Europe. The largest increases – of 20 per cent by 2050 and 50 per cent by 2100 – will take place around the Mediterranean during summer.

This increase in the levels of secondary inorganic particles is linked to the large decrease in wet deposition of sulphur and nitrogen compounds, especially in areas around the Mediterranean, France, Belgium and the Netherlands. Here, atmospheric depositions of sulphur and nitrogen could be more than

halved by 2100, as compared to present conditions.

The Norwegian coast, on the other hand, is expected to receive more sulphur and nitrogen deposition due to an anticipated increase in precipitation.

The reason behind these significant changes in air pollutant concentrations and depositions in parts of Europe is a combination of higher temperatures, less cloudiness and more incoming solar radiation, factors that promote photochemical ozone formation and increase the biogenic emissions of isoprene, as well as decreased wet deposition by decreased precipitation.

Christer Ågren

¹ **Luftföroreningar i Europa under framtida klimat.** By M. Engardt and V. Foltescu, 2007. In Swedish, with summary in English, and about 500 small maps. SMHI Meteorologi Rapport Nr. 125. Published by Swedish Meteorological and Hydrological Institute. Download (pdf, 17 MB): www.smhi.se/content/1/c6/03/17/47/attachments/meteorologi_125.pdf

EU climate package – what’s happening?

Debate on the climate package has been dominated by the question of whether the requirement for biofuels makes sense or not.

The Commission presented its climate package in January (AN 1/08). The aim is to provide tools that make it possible to achieve the EU’s climate target to reduce greenhouse gas emissions by 20 per cent by 2020 compared to 1990 levels (or 30 per cent if a global and comprehensive post-2012 agreement can be reached).

Emissions trading (ETS)

Proposed directive: It is proposed that the present system is extended to include more greenhouse gases, and to involve all major industrial emitters. The emission allowances will be reduced year-on-year to allow for emissions covered by the system to be reduced by 21 per cent from 2005 levels in 2020. A growing share of emission rights will be auctioned instead of being allocated free of charge.

Positions: Several countries consider that more flexibility is required. Other subjects for discussion include auctioning, carbon leakage, what base year to use, and exemptions for small installations.

Effort sharing

Proposed directive: In sectors not covered by the ETS, the EU will reduce emissions to 10 per cent below 2005 levels by 2020. The Commission is proposing a specific target for each member state.

Positions: Most countries support the proposal to use 2005 as a base year, but some would prefer to count from 1990. The proposed effort sharing is not liked by everyone. Many countries want to be able to use flexible mechanisms more widely than the Commission proposes.

Renewable energy

Proposed directive: The Commission wants binding targets for all member states. A separate target exists for a 10-per-cent share of biofuels in overall EU transport

petrol and diesel use by 2020. This would be linked to sustainability criteria.

Positions: There is disagreement between countries on the ambition level, burden sharing and on the formulation of the system for renewable energy certificate trading. There is also disagreement on the need for a separate target for biofuels and the sustainability criteria that need to be drawn up in harmony with the fuel quality directive (see AN 1/08, p.10).

Parliament’s rapporteurs put forward their proposals at the end of May. Opinions among MEPs are divided on the issue of 10 per cent biofuels. Some want to scrap the requirement entirely, while others want the level to be lowered. The sustainability criteria are also important considerations. Voting will take place in plenum in September.

Carbon capture and storage (CCS)

Proposed directive: Twelve demonstration projects are to be built by 2012. Plants fitted with CCS would not need to buy carbon permits on the market.

Positions: Some member countries are doubtful, while others are enthusiastic. The latter group includes France, which will have chairmanship in the Council this autumn.

The rapporteur to Parliament’s environment committee wants power generators that equip their plants for CCS to receive “double credits” for a limited period under the EU emission trading scheme to encourage commercialization of the technology. He also wants all newly constructed power plants to be “CCS-ready” by 2015. The environment committee is due to vote in October.

Further reading: A longer version of this article, including links to relevant documents, can be found in the electronic version of Acid News, at www.acidrain.org

Recent publications

Protecting health in Europe from climate change

This publication from the WHO European Office intends to stimulate debate and support an active response by providing up-to-date information on the health effects of climate change, as well as practical guidance on specific actions that decision-makers at different levels in health and other sectors can take now.

51 pp. ISBN 978 92 890 7187 1. Available in PDF format at www.euro.who.int/Document/GCH/Protecting_health.pdf

Success stories within the road transport sector on reducing greenhouse gas emission and producing ancillary benefits

Traffic congestion, poor air quality, noise and greenhouse gas emissions are some of the challenges addressed by six initiatives identified by the European Environment Agency as “success stories” in this report.

The measures include replacing business travel with teleconferencing, limiting speed and promoting behavioural change with ‘eco-driving’, introducing congestion charges, and improving energy efficiency by means of freight consolidation centres.

EEA Technical report No. 2/2008. Available from EEA at http://reports.eea.europa.eu/technical_report_2008_2/en

Emissions Standards for 2008

The company Delphi has compiled two 2008 Worldwide Emissions Standards reference booklets: one for cars, vans and motorcycles, and another for heavy-duty and non-road vehicles. They describe both emissions standards and testing procedures. Electronic versions of both brochures can be downloaded from Delphi’s website and hard copies can be requested as well. See http://delphi.com/news/featureStories/fs_2008_03_17_001/

Driving Climate Change – How the Car Industry is attempting the thwart CO₂ emission legislation

This autumn the European Parliament and Council of Ministers are expected to cast their final votes on fuel efficiency standards for cars. In this critical review, Greenpeace writes: “The EU positions itself as a world leader on climate change, yet it has steadfastly failed to stand up to the car lobby. If the EU does not effectively legislate for greater fuel efficiency, it is in danger of failing to meet its own 2020 greenhouse gas emission reduction targets.”

Available in PDF format at www.greenpeace.org/international/press/reports/DrivingClimateChange

Recent publications from the Secretariat



The Costs and Health Benefits of Reducing Emissions from Power Stations in Europe

According to this study, application of advanced emission control technologies to the 100 most polluting plants in the EU27 would cut total EU27 emissions of SO₂ by approximately 40 per cent and emissions of NO_x by 10 per cent. The average benefit-to-cost ratio for measures at the 100 most polluting plants in Europe is 3.4, i.e. the estimated health benefits are 3.4 times bigger than the estimated emission control costs. By Mark Barrett, UCL, and Mike Holland, EMRC, April 2008.



Status and Impacts of the German Lignite Industry

This report includes a historical treatment of German lignite use and discusses many of the hidden costs involved: excessive greenhouse gas emissions, depletion of groundwater resources, and destruction of hundreds of villages. Special consideration is paid to eastern Germany, where lignite accounts for up to 85 per cent of electrical power consumption in some regions. By Jeffrey H. Michel, April 2005, *updated version March 2008*.



Sex, sulphur and a fishy business

A film with the sub-title "A kind of twisted documentary on acid rain in Scandinavia". Explains air pollution problems in an unconventional way. Produced for the Secretariat by Dockhouse Film & TV AB and shown on Swedish and Norwegian TV. The film won several international prizes and was distributed to environmental organizations all over Europe. 58 min. Available on DVD, single copies free of charge within Europe.

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. Reports 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

PRONET 2nd Workshop Transport. Stockholm, Sweden, 16-17 June. *Info:* www.proneteurope.eu

Future Challenges of Transport and Environment. Berlin, Germany, 24-25 June 2008. *Information:* Deutsche Umwelthilfe, e-mail: spannagel@duh.de.

World ports for a better climate. Rotterdam, the Netherlands, 9-11 July 2008. *Information:* www.wpcrotterdam.com

23rd European Photovoltaic Solar Energy Conference and Exhibition. Valencia, 1-5 September. *Information:* www.photovoltic-conference.com

CLRTAP Working Group on Strategies and Review. Geneva, Switzerland, 1-4 September 2008. *Information:* www.unece.org/env/lrtap

European Mobility Week 2008. 16-22 September. *Information:* www.mobilityweek-europe.org

Air pollution and climate change: Developing a framework for integrating co-benefits strategies. Stockholm, Sweden, 17-19 September 2008. *Information:* www.gapforum.org

Air Pollution 2008. Sixteenth International Conference on Modelling, Monitoring and Management of Air Pollution. Skiathos, Greece, 22-24 September, 2008. *Information:* www.wessex.ac.uk/conferences/2008/air08/

4th International Conference on Biomass for Energy. Kiev, Ukraine, 22-24 September 2008. *Information:* www.biomass.kiev.ua/conf2008

CLRTAP Working Group on Effects. Geneva, 24-26 September. *Information:* www.unece.org/env/lrtap

IMO Marine Environment Protection Committee. London 6-10 October. *Information:* www.imo.org

Energy Investments and Trade Opportunities. Athens, Greece, 8-9 October 2008. *Information:* www.kepa.uoa.gr/PROMITHEAS2_Conference.htm

How to fight air pollution and climate change effectively together in Europe? Strasbourg, 6-7 November. *Information:* EFCA, www.efca.net

2008 EU Presidency Renewable Energy Policy Forum. Paris, 17-22 November 2008. *Information:* EREC, www.erec.org.

UN Climate Change Conference. Poznań, Poland, 1-12 December. *Information:* www.unfccc.int

CLRTAP Executive Body for the Convention. Geneva, Switzerland, 15-19 December 2008. *Information:* www.unece.org/env/lrtap

EWEC 2009: European Wind Energy Conference & Exhibition. Marseille, France, 16-19 March 2009. *Information:* www.ewec2009.info

7th International Conference on Air Quality – Science and Application (Air Quality 2009). Istanbul, Turkey, 24-27 March 2009. *Information:* www.airqualityconference.org