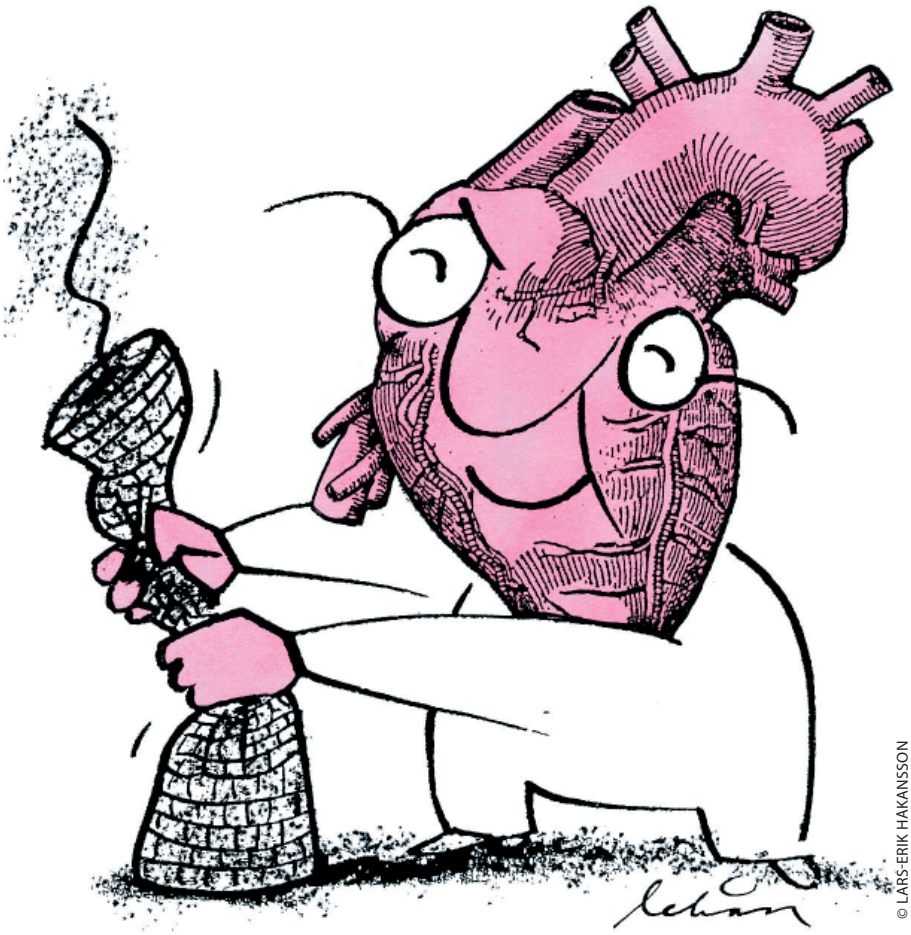
NO. 4, DECEMBER 2008

Acid News



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Climate policies improve health

Health savings of up to 25 billion euro could be achieved every year in the European Union if stronger climate policies were implemented, says a new study.

The health benefits would come from additional cuts in air pollutant emissions brought about if the European Union increased its 2020 target for greenhouse gas emission cuts from 20 to 30 per cent.

Raising the target to 30 per cent is in line with International Panel on Climate Change (IPCC) conclusions that developed countries need to reduce their greenhouse gas emissions by 25–40 per cent by 2020 in order to keep global temperatures from increasing more than two degrees.

Cutting greenhouse gas emissions would mean reducing the use of fossil fuels, which in turn would result in lower levels of health-damaging air pollutants, such as sulphur dioxide, nitrogen oxides and fine particles. The outcome will be savings from better health valued at be-

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A newsletter on air pollution and climate change

Acid News

A newsletter from the Air Pollution & Climate Secretariat, the primary aim of which is to provide information on air pollution and its effects on health and the environment.

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

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

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The Air Pollution and Climate Secretariat

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

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

In furtherance of these aims, the Secretariat:

- Keeps up observation of political trends and scientific developments.
- Acts as an information centre, primarily for European environmentalist organizations, but also for the media, authorities, and researchers.
- Produces information material.
- Supports environmentalist bodies in other countries in their work towards common ends.
- Participates in the lobbying and campaigning activities of European environmentalist organizations concerning European policy relating to air quality and climate change, as well as in meetings of the Convention on Long-range Transboundary Air Pollution and the UN Framework Convention on Climate Change.

Editorial

AirClim

Co-benefits from co-control

Cutting emissions of the main greenhouse gas (GHG) carbon dioxide by reducing the use of fossil fuels has many other beneficial impacts, including reducing emissions of a number of air pollutants such as sulphur dioxide, nitrogen oxides, fine particulate matter and mercury.

As a result of this simultaneous reduction of air pollutants, the net societal costs for carbon dioxide (CO_2) mitigation are significantly smaller than anticipated, partly due to cost-savings on air pollution control, and partly as a result of reduced air pollution damage.

Some of these co-benefits can be estimated by so-called integrated assessment modelling. For example, the International Institute for Applied Systems Analysis (IIASA) has estimated that implementing a CO_2 reduction in the EU of 20 per cent by 2020 (from 1990) could reduce annual air pollution control costs in the target year by about 20 billion euro, as compared to a business-as-usual scenario resulting in an increase in CO_2 emissions by three per cent.

The EU's climate and energy package presented in January aims to reduce GHG emissions by 20 per cent by 2020, of which CO_2 emissions would make up about 11 per cent. This would bring air quality related co-benefits to health valued at up to 52 billion euro per year in 2020.

A recent study by a coalition of environment and health organizations (see front page story) shows that raising the target to a 30-per-cent GHG cut, would increase the total health benefits by nearly 50 per cent, to 76 billion euro.

On top of the benefits for health, climate measures that reduce the use of fossil fuels will also bring other environmental benefits, including less ecosystem damage due to acidification, eutrophication and ground-level ozone.

A variety of measures could bring about simultaneous reductions of CO_2 and air pollutants, including energy efficiency and conservation, structural change (e.g. fuel switching from coal to renewables), and behavioural change (e.g. reducing car usage through a shift in the mode of transport).

Setting stricter air pollution emission standards for existing large combustion plants, or introducing air pollutant emission charges, will most likely speed up the phasing out of the oldest, most inefficient and most polluting plants, thus also reducing emissions of carbon dioxide.

If these interactions and co-benefits were to be fully taken into account by decision-makers, they would help motivate a significantly higher level of ambition for carbon dioxide reductions, as well as a higher share of domestic (e.g. within EU) carbon dioxide reductions.

Moreover, some "traditional" air pollutants also act as greenhouse gases. This is the case with ground-level ozone and black carbon aerosols, for example. Methane is a precursor of ozone formation as well as a greenhouse gas. Nitrogen oxides and non-methane volatile organic compounds are other important ozone precursors.

Consequently, action to decrease emissions of black carbon and ozone precursors will reduce global warming and at the same time improve air quality. As these substances are fairly short-lived, such emission cuts will produce relatively rapid climate benefits.

Christer Ågren

Climate policies ...

Continued from front page

tween 6.5 and 25 billion euro per year in 2020.

The estimates are based on economic evaluations of loss of life and health, working days lost and hospital costs. In terms of health improvements, the study estimates that the additional co-benefits in the year 2020 of better air quality due to achieving a 30-per-cent cut in greenhouse gas emissions would include:

- 105,000 reduction in life years lost
- 5,300 fewer cases of chronic bronchitis
- 2,800 less hospital admissions
- Many million fewer days of restricted activity due to respiratory symptoms

These health savings are over and above the benefits of the European Union's existing scenario of a 20-per-cent target. The report shows that raising the target to 30 per cent would increase the total health benefits by nearly 50 per cent, from 51 to 76 billion euro.

Génon Jensen, Executive Director of Health and Environment Alliance (HEAL) says: "Data clearly show that action to control global warming by reducing carbon dioxide and other greenhouse gas emissions brings major benefits to health. This potential alone makes a case for immediately moving the EU target to at least 30-per-cent domestic cuts in greenhouse gases by 2020."

The European Commission's impact assessment of the "Climate and energy package" from 31 January 2008 estimated that currently 369,000 people die prematurely every year due to air pollution, and that premature deaths, health care and medication associated with air pollution amount to 3–9 per cent of EU Gross Domestic Product.

"Until now the discussion on climate change has been all about costs to industry and the economy, while costs of pollution to society have largely been neglected", adds Delia Villagrasa, Senior Advisor to WWF. "It is essential to see that measures to promote cleaner sources of energy and reduce fossil fuel consumption will not only contribute to control climate change but will also cut air pollution and improve quality of life for the citizens."

Moreover, there are other significant benefits of reduced emissions of sulphur dioxide, nitrogen oxides and fine particles. In Europe, a great deal of concern has been expressed about the effects of air pollution on forests as well as other terrestrial and freshwater ecosystems (including biodiversity) and historical buildings. These co-benefits are not quantified in the report and would therefore add to the health benefits described.

In moving away from the most polluting fuels, action on climate change also brings benefits to industry in terms of a reduction in the costs to companies of meeting air pollution control regulations. Though not quantified here, the Commission's impact assessment highlights that these savings can be of a similar magnitude to the health benefits that have been quantified.

With the current debate on the "Climate and energy package", the European Union has the opportunity to lead the way in keeping global warming below two degrees Celsius compared to pre-industrial levels. The NGOs behind the report call on the European Parliament to be ambitious and lift the bar for a 30-per-cent cut in greenhouse gases by 2020.

"The report clearly demonstrates what scientists, economists, academics and NGOs have said before: action on climate change produces win-win-win scenarios. Tougher targets mean a win for the planet, a win for European citizens' health and a win for industry in reducing air pollution control costs," stated Tomas Wyns, ETS policy officer at Climate Action Network Europe.

Christer Ågren

The report, **The co-benefits to health of a strong EU climate change policy**, was authored by Dr Mike Holland and commissioned by the Health and Environment Alliance (HEAL), Climate Action Network Europe (CAN-E) and WWF. It is available at www.env-health.org

Nine member states request derogation

Nine EU countries have used the facility provided in the new air quality directive to request more time to meet binding standards (see AN 3/08, p.10).

The nine countries that have requested time extensions are the Netherlands, Denmark, Spain, Belgium, France, Greece, Hungary, Poland and Slovakia.

In a letter sent out in late spring, the Commission stated that notifications must be submitted by 31 October. In the letter they warned that "failure either to achieve compliance with the standard or to submit notifications by that date will lead to legal action against the member state concerned."

Despite this, representatives of the Commission expect "several" more submissions to arrive after the deadline.

According to the Commission, time extensions will only be granted for zones that satisfy the conditions laid down in the directive, which relate to external factors over which the member states have no direct control, such as transboundary contributions and adverse climatic conditions.

The Commission estimates that on average 40 per cent of air quality zones in the EU currently do not comply with the PM_{10} standard.

Source: **ENDS Europe Daily**, 18 November 2008. Information on the directive and each country's submissions can be found at http://ec.europa.eu/environment/air/quality/legislation/time_extensions.htm

Climate policy plan improves air quality

Many climate policy measures will also reduce emissions of air pollution, but some could actually increase emissions of some air pollutants.

The Dutch climate policy plan announced last year is also likely to benefit the country's air quality, according to a study[1] by the Netherlands environmental assessment agency (PBL).

Many climate policy measures, such as energy savings and increased wind power production, will also reduce emissions of air pollution, thus improving air quality, the agency says. It is estimated that climate measures in the Netherlands could cut additional costs of meeting the indicated national emissions ceilings for air pollutants in 2020 by up to 50 per cent, or 150 million euro.

But the effect of certain other measures on air quality remains uncertain. Increased use of biofuels and the application of large-scale carbon capture and storage could actually increase emissions of some air pollutants.

Moreover, if Dutch climate targets were met by the purchasing of carbon credits from abroad, co-benefits – in the form of lower emissions of sulphur and nitrogen oxides – would also occur abroad.

As regards biofuels, the agency claims that instead of converting biomass into biofuels, it could be used more efficiently for the production of hydrogen or electricity, and that the air quality benefits could be larger if hydrogen and electricity generation were allowed to contribute to the EU's renewable energy target for road transport.

Co-firing of biomass in large coal-fired power plants is said to have a positive effect on air pollution, while a growing number of small and medium-sized biomass, biofuel, and biogas installations may result in increased air pollution, especially as long as emission limits for these smaller plants remain less stringent than those for larger ones.

Currently available post-combustion techniques for carbon capture and storage (CCS) can decrease sulphur emissions, but could result in increasing emissions of ammonia and nitrogen oxides (NO_x), if no additional measures are taken. One important reason for the increase in NO_x emissions is the fact that CCS requires an extra fuel input of about 30 per cent.

In conclusion the study confirms that the Dutch climate programme, together with the measures proposed in the EU climate and energy package, will reduce emissions of greenhouse gases as well emissions of most of the priority air pollutants in the Netherlands.

Christer Ågren

[1] **Effects of Climate Policies on Air Pollutants in the Netherlands** (October 2008). 74 pp. Published by Netherlands Environmental Assessment Agency (PBL). Available at www.pbl.nl/en

Ministers urge Dimas to act on NEC proposal

In October the Czech and Swedish environment ministers sent a joint letter to EU environment commissioner Stavros Dimas, urging him to publish the proposal for a revised national emissions ceilings (NEC) directive "as soon as possible".

The Czech Republic is due to take over the EU presidency from France as from 1 January, and will in turn hand it over to Sweden by 1 July 2009. In their letter Czech environment minister Martin Bursik and his Swedish colleague Andreas Carlgren conclude that "new stricter ceilings leading to additional emission abatement measures are urgently required".

If the presentation of the proposal is further postponed, they claim that adoption is likely to be postponed for at least 16 months, since much legislative work in the European Parliament will in practise be "on hold" due to the election of a new parliament in June 2009.

In their view this is a very unfortunate situation, since the proposal for a revised NEC directive has taken several years and enormous efforts – both by the Commission services and the member states – to prepare.

The longer the postponement, the greater the need for updating of crucial input data. At some stage in time, in order to maintain credibility of the underpinning analysis, the whole computer modelling analysis will have to be repeated, which would lead to additional costs, as well as additional delays.

This letter by the two ministers follows similar letters sent to the Commission a few months ago by environmental organizations (see AN 3/08), and by the Dutch environment minister Jacqueline Cramer.

According to Jacqueline Cramer, the proposal to revise the NEC directive is an essential piece of legislation that "should be published as soon as possible, as we urgently need to improve public health and prevent the environment from pollution."

Christer Ågren

Biogas-fuelled bus in Stockholm – for cleaner air and reduced climate impact. Photo: Scania.

Integrated approach means more value for money

To develop co-benefit strategies, enhanced collaboration between key climate change and air pollution stakeholders is essential at the international, national and local level.

There is an urgent need to address air pollution and climate change in an integrated way and there are large benefits in considering control options together, as such approaches would mostly lead to increased health and/or climate benefits and decreased costs.

This was one of the main conclusions when leading scientists and policy makers met at the conference "Air pollution and climate change: Developing a framework for integrating co-benefits strategies", in Stockholm 17–19 September 2008.

It was widely agreed that greenhouse gas (GHG) mitigation net costs are lower due to cost savings in air pollution control, and the benefits of GHG mitigation are greater due to reduced air pollution impacts. For example, recent computer modelling assessments for Europe and parts of Asia found that a 20-per-cent decrease in emissions of carbon dioxide (CO_2) could lead to about a 15-per-cent fall in air pollution-induced deaths, with considerable associated cost savings.

Ground-level ozone and black carbon aerosols are both air pollutants and act as warming agents. Methane is a precursor of ozone formation and a GHG. It was concluded that urgent action to decrease concentrations of ozone and black carbon in the atmosphere could provide opportunities, not only for significant air pollution benefits (e.g. health and crop yield benefits) but also for rapid climate benefits by helping to slow global warming and avoid crossing critical temperature and environmental thresholds.

It was recommended that decreasing concentrations of methane, ground-level ozone and black carbon should occur alongside CO_2 emission cuts and the required climate change adaptation measures. Ozone reductions are best achieved by cutting emissions of all precursors, which include nitrogen oxides and volatile organic compounds as well as methane.

Participants emphasized that to develop co-benefit strategies, enhanced collaboration and communication between key climate change and air pollution stakeholders is essential at the international, national and local level.

The international conference was part of a programme undertaken by the Global Atmospheric Pollution Forum (GAP) to examine the potential linkages and synergies between policies at various levels to jointly address air pollution and climate change.

Christer Ågren

Conference conclusions, programme and presentations are available at www.sei.se/gapforum/conf/

Global ship emission standards adopted

New global limits on emissions of sulphur and nitrogen oxides from international shipping have been adopted by the International Maritime Organization.

The need for measures to reduce air pollutant emissions from international shipping has been on the agenda since the late 1980s. After years of negotiation, a first agreement – the Annex VI[1] to the IMO's MARPOL Convention – was adopted in 1997. But even at the time of adoption it was widely recognized as being insufficient.

Today, the maximum permissible sulphur content of marine fuels is 4.5 per cent, and the global average has been estimated to be between 2.5 and 3 per cent. The revised Annex VI adopted on 9 October by the IMO's Marine Environment Protection Committee (MEPC) meeting in London, 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.[2]

Marine fuels with a sulphur content of 0.5 per cent or lower are currently not widely available and the 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.

According to the agreement, exhaust gas cleaning systems, such as scrubbers and other alternative technologies or fuels may also be used to achieve the relevant emission reductions. 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.

The new regulations will allow ECAs to be designated for sulphur and particulate matter, or nitrogen oxides (NO_x), or all three types of emissions, subject to a proposal from an IMO member country. The proposal would be considered for adoption by the IMO if supported by a demonstrated need to prevent, reduce and control one or all three of those emissions from ships.

A joint submission from France and Germany sought to relax the procedural requirements for ECA applications, and to remove the current 12-month delay between official ECA designation and the emission limits coming into force. But as there was no majority support for such changes, the criteria remain unchanged.

Bill Hemmings from Transport & Environment (T&E) said, "Despite the welcome global cap of 0.5 per cent sulphur, global shipping fuels will still be 500 times more polluting than road fuels. That's not good enough for Europe, with its bad air quality and dense population. We expect Europe to make the best use of the new ECA provisions, and apply the strictest fuel limits in all its sea areas."

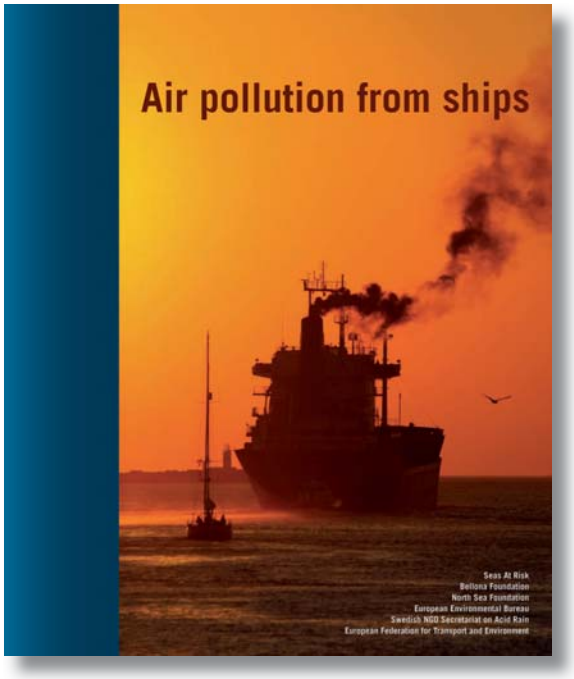
The revised Annex VI also sets new emission standards for nitrogen oxides (NO_x) from new ship engines in two steps. In the first step, emissions would be cut by between 16 and 22 per cent by 2011 relative to 2000, and in the second step by 80 per cent by 2016. The longer-term limit would only apply 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 environmental organizations welcomed the new sulphur standards, they concluded that IMO yet again failed to agree on any meaningful NO_x reductions from the existing global fleet of over 90,000 ships. As a consequence, total NO_x emissions from shipping are expected to continue rising for at least the next several decades. In a joint press statement, environmentalists urged coastal states to take action on their own to reduce this type of shipping pollution on a national and regional basis.

On the other hand, the World Shipping Council, representing over 90 per cent of the global shipping capacity, expressed its full support for the issuance, ratification and implementation of the IMO's new international ship air emissions standards.

In the United States, the Environmental Protection Agency will submit an application to the IMO to designate US coastal areas as sulphur Emission Control Areas, according to a statement by the agency. The EPA says more than 40 of the ports are in metropolitan areas that do not meet federal air quality standards.



The EU must act!

Reaching agreement within IMO is not enough – there are good grounds for EU countries to go further. The pamphlet *Air Pollution from Ships* provides background facts and a series of recommendations, including the introduction of market-based instruments to speed up the adoption of low-sulphur fuels and reduce emissions of nitrogen oxides and particles.

The pamphlet was produced in collaboration between the Secretariat and five other organizations and is available at www.airclim.org/publications

"Massive reductions in air pollution from these large ships will help 87 million Americans living in areas around ports that don't meet air quality standards breathe cleaner air," said Margo Oge, director of the EPA Office of Transportation and Air Quality.

On 9 October the United States of America became the 53rd state to ratify Annex VI of the MARPOL Convention.

In sharp contrast to the progress on sulphur, the IMO stalled on efforts to control greenhouse gas emissions (GHG) from ships. The session had been expected to build on work at a meeting last June in Oslo convened especially to address the issue (see AN 3/08, pp. 19–20). But the discussions in London quickly became bogged down in political questions with developing countries in particular saying they will not accept any action by IMO on climate change that does not respect the principle of "common but differentiated responsibilities". IMO activities are built around the principle of equal treatment for all ships.

As it became evident that the GHG debate would not be able to move forward, it was agreed that another so-called intersessional meeting will be held on 9–13 March 2009. The aim is still to adopt a binding instrument regarding GHG emissions from ships during session 59 of the MEPC, to be held in July 2009.

Christer Ågren

[1] Annex VI "Regulations for the prevention of air pollution from ships" of the IMO's MARPOL Convention was adopted in 1997 and entered into force in 2005. It has so far been ratified by 53 countries representing about 82 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 "SOx Emission Control Areas" (SECAs) 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 SECA to come into effect in May 2006, followed by the North Sea in November 2007. Annex VI also sets limits on the emissions of NOx from new ship engines as from 1 January 2000, but these standards are so weak that in practice they do not have any appreciable effect.

[2] The revised Annex VI, as adopted on 9 October 2008, will enter into force on 1 July 2010 under the tacit acceptance amendment procedure. This means that the amendments enter into force six months after the deemed acceptance date, 1 January 2010, unless within the acceptance period an objection is communicated to the IMO by not less than one third of the Parties or by Parties whose combined merchant fleets constitute no less than 50 per cent of the gross tonnage of the world's merchant fleet.

Sea-Cargo orders ferries powered by LNG

Sea-Cargo AS in Norway has placed an order for two multi-purpose ro-ro ferries powered by liquefied natural gas (LNG) rather than bunker fuel. Designed in close cooperation between Sea-Cargo, Seatrans and Rolls-Royce, they will be built in India and are believed to be the first of their kind.

In a statement the Bergen-based firm explained: "With focus on reducing exhaust emissions from short sea and coastal vessels, we identified LNG as the future fuel of choice." The vessels are due for delivery in 2009 and 2010 and will operate on a weekly service between the west coast of Norway, UK and mainland Europe.

The ships are 133 metres long and have a deadweight tonnage (dwt), a measure of the weight of cargo a ship can safely carry, of around 5,600 tonnes. Compared to a similar ship using liquid fuel, CO_2 emissions will be reduced by about 20 per cent, NOx by about 90 per cent, particulates will be negligible and sulphur dioxide emissions will be zero.

Source: www.sea-cargo.no/news09_08.asp

New dual-fuel engine

Finnish engine maker Wärtsilä says its new 50DF dual-fuel engine can run on either liquefied natural gas (LNG), marine diesel oil (MDO) or on heavy fuel oil (HFO), and that the engine can smoothly switch between fuels while running and is designed to give the same output regardless of the fuel used.

A joint venture between Wärtsilä and Hyundai Heavy Industries in South Korea has received an order from Flex LNG for four ships that will be equipped with dual fuel engines. The order calls for a total of 16 Wärtsilä 50DF engines to be installed on four Floating Production Storage Offloading (FPSO) vessels to be built by Samsung Heavy Industries. The first engine for the FPSO order will be delivered in February 2010.

Source: www.wartsila.com

New publication: Shipping impacts on climate: A source with solutions (2008)
Ships emit more carbon dioxide worldwide than most individual countries. Yet these ship emissions are entirely unregulated. Among the recommended short-term solutions in this report are speed reductions and a switch to cleaner fuels. Published by Oceana, USA. Available at www.oceana.org/fileadmin/oceana/uploads/Climate_Change/Oceana_Shipping_Report.pdf

UK commitment to cut emissions by 80 per cent

A new bill will make the UK the first country to legislate on a highly ambitious climate target.

Ed Miliband, the British government's new Secretary of State for Energy and Climate Change, did not mince words at his first appearance since being appointed to the new Department of Energy and Climate Change: The existing target to reduce greenhouse gas emissions by 60 per cent by 2050 is inadequate, he said. The new target is minus 80 per cent!

In both cases the base year for calculations is 1990. According to Miliband, new research has shown that a stiffer target is needed if the country is to play its role in an international agreement. The new target will also become legally binding shortly, since the Climate Bill was approved by parliament on 28 October.

Miliband acknowledged during his speech that it is easy to set targets that are to be met in the distant future, but he also pointed to the need for immediate measures. Few were actually mentioned, but he said that he plans to bring an amendment to the Energy Bill, also currently before the House, to introduce a "feed-in tariff" to support small scale renewables, and to make a further announcement soon on encouraging renewable heating.

In more general terms he said that "we need a market that secures future supply, including investment in nuclear power and carbon capture and storage; more to incentivize cuts in carbon emissions; and more to help homes and businesses."

At the time of Miliband's speech, on 16 October, there was no plan to include international aviation and shipping in this target, since it is difficult to allocate emissions fairly.

This point received widespread criticism, with one commentator likening it to "telling everyone you're going on a calorie-controlled diet but not counting cream cakes." Aviation and shipping are now included in the target.

Friends of the Earth UK report on their website that the legislation is the first of its kind in the world and represents "a huge step in the fight against climate change."

The law not only sets a target but also requires regular monitoring. The emissions will be measured in five-year budget periods, which will place a limit on the amount of greenhouse gases the UK can release into the atmosphere during each period. Annual target ranges will also be set as a way of ensuring the UK stays on track to meet its five year budget.

"This means all governments will be accountable for their record on cutting emissions. It also means the UK will gradually cut its emissions over time rather than waiting until the last minute to act," commented Friends of the Earth.

Further information: UK Department of Energy and Climate Change, www.decc.gov.uk. Friends of the Earth, www.foe.co.uk.

How much do environmental problems cost?

Based on a literature review in selected areas of environmental policy, a new OECD report[1] suggests that the economic costs of failing to introduce environmental policies that are "sufficiently ambitious", could be considerable.

One example is that the costs of not introducing the European Commission's "Thematic Strategy on Air Pollution" have been estimated to represent about 0.35 to 1.0 per cent of GDP in the EU25 in 2020.

Estimates of the economic costs of climate change vary widely, with recent assessments generating figures as high as 14.4 per cent in terms of per capita "consumption equivalents", when both market and non-market impacts are included.

[1] **Cost of Inaction on Key Environmental Challenges**. Available at www.oecd.org/env/costofinaction/publication.

Climate action despite credit crunch

Barack Obama, US president elect, has promised strong commitment to climate negotiations and, despite the credit crunch, to carry through plans to bring emissions back to 1990 levels by 2020 and to reduce them by a further 80 per cent by 2050.

Source: **Planet Ark** (Reuters) 19 November 2008.

Sustainable jobs

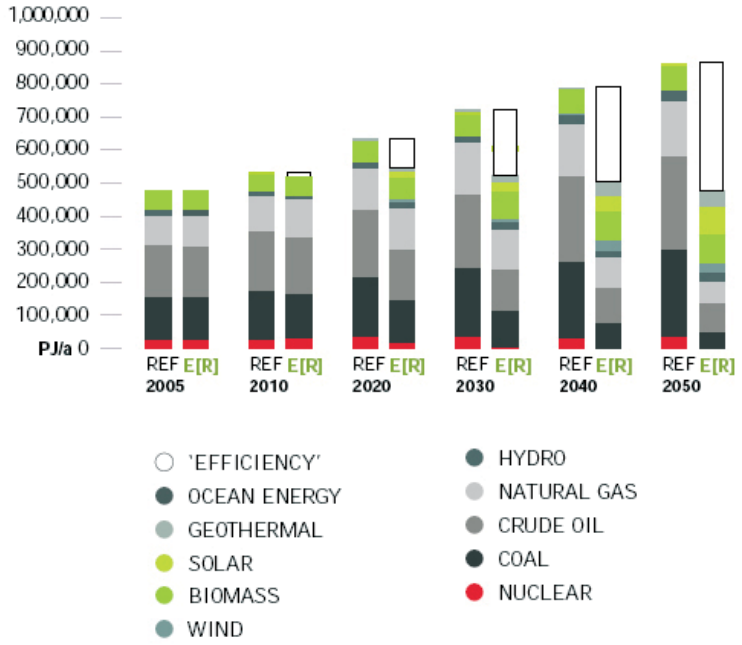
Tackling climate change could potentially generate millions of new employment opportunities, according to a new UN-backed study – the first of its kind on the emergence of a "green economy" and its impact on labour.

Entitled "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World," the publication shows how efforts to address global warming and slash greenhouse gas emissions are leading to new "green" jobs in many sectors. This, in turn, has resulted in increased investment in renewable energy and energy efficiency.

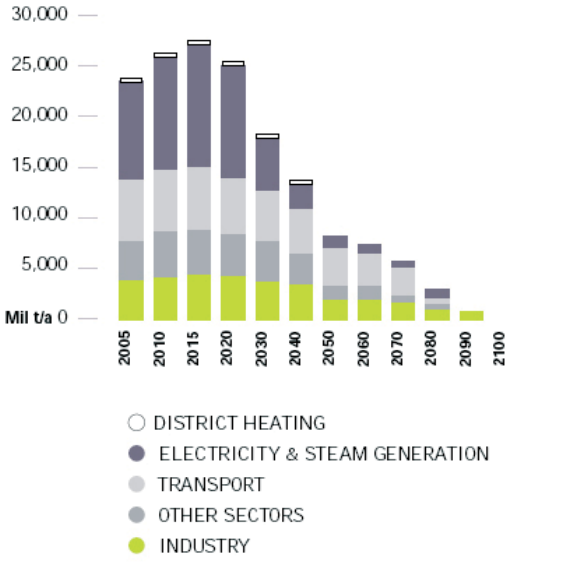
Source: **UN Press Centre**, 24 September 2008.

New global strategy saving US$ 18 trillion

Lower costs for buying energy, thanks to efficiency improvements and renewable sources, could largely finance the transition to a low-carbon economy.



Global primary energy consumption under the reference scenario (REF) and the Energy [R]evolution Scenario (E[R]), 2005–2050. 'Efficiency' is the reduction compared to the reference scenario.



Global emissions of carbon dioxide under the advanced energy [r]evolution scenario, 2005–2100. Both diagrams from the Energy [R]evolution report.

On 12 November the International Energy Agency presented its annual World Energy Outlook. As usual the IEA highlighted the growing global demand for energy and the difficulties and high costs of meeting climate targets.

But this is not the only view of the future, as demonstrated by a report prepared by the European Renewable Energy Council (EREC) and Greenpeace International, and published a few weeks earlier.

According to the latter report, aggressive investment in renewable power generation and energy efficiency could create an annual US$ 360 billion industry, providing half of the world's electricity, slashing over US$ 18 trillion in future fuel costs while protecting the climate.

"Unlike other energy scenarios that promote energy futures at the cost of the climate, our energy revolution scenario shows how to save money and maintain global economic development without fuelling catastrophic climate change. All we need to kick start this plan is bold energy policy from world leaders," said Sven Teske, Greenpeace International's Senior Energy Expert and co-author of the report.

In many cases the measures would be immediately profitable. The report estimates that the additional costs for coal fuel from now until the year 2030 could be as high as US$ 15.9 trillion, more than would be required to pay for the Energy [R]evolution. These renewable energy sources will produce electricity without any further fuel costs beyond 2030, creating an enormous number of jobs and helping lift the world out of recession.

"Especially in the context of today's economic instability, investing in renewable energy technologies is a 'win-win-win' scenario: a win for energy security, a win for the economy and a win for the climate," says the summary.

The report also highlights the short time window for making the key decisions in energy infrastructure. In order to achieve a greenhouse gas emission peak by 2015 and a fast reduction afterwards, governments, investment institutions and companies must act swiftly, and a strengthened UN climate deal must be agreed.

Further reading: **Energy [R]evolution: A sustainable World Energy Outlook**. Can be downloaded at www.erec.org. Regional reports available at www.energyblueprint.info

Business as usual not an option for energy

About 80 per cent of the greenhouse gas emissions in Europe still come from the energy sector, warns a report[1] from the European Environment Agency (EEA). Renewable sources only represented 8.6 per cent of the final energy use in Europe in 2005, some way short of the EU target to achieve 20 per cent by 2020.

The energy sector continues to have significant impacts on the environment, despite the fact that more efficient production of electricity and heat, together with an increased share of renewable energy sources and replacement of coal and oil with gas, are gradually contributing to cut emissions.

The report confirms that if Europeans simply stick to current policies and measures, energy use will continue to rise by up to 26 per cent by 2030, and fossil fuels will remain the main source of supply. "Business as usual is not an option for the energy sector," stated Jacqueline McGlade, EEA executive director at the launch of the report.

[1] **2008 Energy and environment report**. Available at http://reports.eea.europa.eu/eea_report_2008_6/en/

EU to ban incandescent light bulbs by 2010

EU energy ministers decided in October that sales of incandescent light bulbs for domestic use should be banned in Europe as of 2010. The move came a few days before the lifting of anti-dumping duties on energy-saving lamps imported from China, which took effect on 18 October.

The use of energy-saving light bulbs could cut carbon dioxide emissions by some 30 million tonnes each year. The decision is non-binding, however. The intention is to give political momentum to the implementation of EU laws on energy labelling and energy-using products (EuPs). A proposal is expected from the Commission in the next few months.

More efficient chargers

External power supplies, such as chargers for mobile phones and laptops, will have to use less energy under requirements drawn up by the EU ecodesign committee. It is estimated that the decision could save 9 TWh of electricity per year by 2020 within the EU. The proposal is currently being examined by Parliament. The requirement could come into force within a year of approval and would be progressively stiffened.

More biofuels – or less carbon?

Is it more important to increase the share of renewable energy or reduce the use of fossil fuels? Opinions differ.

At the start of the year the European Commission proposed as part of the climate package that the share of renewable fuels used by the transport sector should be increased to at least 10 per cent by 2020. At the same time consideration is being given to another Commission proposal to amend the fuel quality directive and make producers responsible for the "decarbonisation" of fuels.

The fuel quality directive

Late in November the Parliament and the Council reached a compromise over changes to this directive (see AN 1/08).

The provision that companies should aim for a 10-per-cent greenhouse gas reduction is still there, but it has been split into three different shares, with a legally binding reduction target of just six per cent by 2020. An additional four per cent should come from other measures.

The mandatory part of the target is technology neutral, which means less risk of carbon-intensive marginal fuels, such as tar sand and coal-to-liquid,on the EU market.

Sustainability criteria

Sustainability criteria will be part of both directives. One problem is the lack of a generally applicable method for assessing different fuels.

In October the Commission altered its assessment of how much certain biofuels save in terms of greenhouse gases, although this process has been criticized for a lack of transparency.

The alteration is significant, because the proposed biofuels legislation only allows fuels that save a minimum amount of greenhouse gases to be admitted as contributors to the EU's target. Under the new assessment, certain biofuels that would have fallen below the minimum level are now above it. Most notable among them is ethanol made from European-grown sugar beet.

See our website www.airclim.org for latest news.

Intense to the last

Negotiations continue in efforts to meet a tight EU decision-making timetable over climate issues.

The formula for EU climate policy that was agreed by government ministers in March 2007 was 20-20-20: a 20-per-cent cut in greenhouse gas emissions, a 20-per-cent increase in the share of renewable energy and a 20-per-cent improvement in energy efficiency; all by 2020. If other countries make the same undertaking the cut in emissions would rise to 30 per cent.

The UN climate summit, which takes place from 1 to 12 December in Poznan, will debate a number of issues in the run-up to the conference on a post-Kyoto protocol that will be held in Copenhagen in December 2009.

If the EU is to maintain its credibility in Poznan it is essential that the 27 EU governments agree between themselves how efforts should be divided. The Commission put forward its proposal back in January and negotiations are now entering their most critical phase.

Some countries, including Italy and several eastern European nations, have openly voiced their dissatisfaction. Poland claims that its entire energy supply network is being put at risk, since it is based on old coal-fired plants.

Germany also has difficulties, since its energy-intensive industry wants to avoid the expense of the proposed trade in emission rights, while the car industry is pressing to soften requirements on vehicle fuel consumption.

Environmental organizations in Europe stress the importance of automatically raising the EU commitment to minus 30 per cent if climate convention negotiations are successful. On the whole they are highly critical of proposals to use tax revenues to develop carbon capture and storage (CCS) – as this is seen as a further subsidy to the coal industry.

Other key issues concern the proportion of measures that should be taken within the EU and the proportion that should be bought in from outside, and how much support should be given to developing countries to mitigate and adapt to climate change.

It will be the task of France, which will chair the summit, to find compromises that can save both the timetable and the content of the climate policy. It is likely that the intense negotiations will continue right up until the last moment, which in this case will be the EU summit on 11–12 December.

The European Parliament has not yet completed its first reading of the Commission's proposal in plenum. According to the latest information this will take place in mid-December. There have been suggestions to set an earlier date in order to avoid Parliament being politically marginalised by the Council, but the hope is now that the parties will consent to a first reading agreement before the end of the year.

See our website www.airclim.org for latest news.

Correction: Carbon Capture and Storage

The article about carbon capture and storage (CCS) in our last issue said that CCS reduces plant efficiency by about 10 per cent.

This is not correct. Plant efficiency is reduced by about 10 percentage points (as stated in the report given in reference).

The difference in efficiency is therefore much greater: If a power station has an efficiency of 45 per cent and CCS reduces this by 10 percentage points it means that the plant efficiency is actually reduced by about a quarter.

Further reading: **Last Gasp of the Coal Industry.** Available at the Secretariat's website www.airclim.org/publications

Energy efficiency and security

The efficiency with which energy is used in the EU will only rise by 13 per cent by the year 2020, according to the Commission. However, the target of the climate package, on which a decision is to be taken shortly, is 20 per cent. The Commission has therefore drawn up an "Energy security and solidarity action plan", which is designed to achieve the 20-per-cent target while also safeguarding EU energy supplies in the future.

Among other areas, the Commission wants to stiffen the directive on energy efficiency for buildings. Until now this has only applied to buildings large than 1,000 square metres, but the intention is that it should be extended to include buildings of less 1,000 m^2. It is estimated that energy savings of 30 per cent could be made in buildings by 2020.

It is also hoped that energy labelling can be extended to more products. One example is new tyres, which have lower rolling resistance and can therefore cut fuel consumption by up to 10 per cent.

In addition to the achievement of climate targets, the Commission also highlights the benefits for energy security. Energy efficiency improvements help to reduce dependence on imported energy. At present, 54 per cent of energy is imported from countries outside the EU.

The environmental organisation WWF criticises the plan for major contradictions among suggested policies, a lack of ambition and a mixture of actions with little relevance for the environmental and economic objectives outlined in the proposals. Above all it criticises the absence of a mandatory energy saving target of 20 per cent by 2020 for the EU.

WWF is urging the Parliament and the Council of Ministers to strengthen the laws and come to an agreement before the EU elections in June 2009.

Further reading: European Commission, http://ec.europa.eu/energy/strategies/2008/2008_11_ser2_en.htm. WWF, www.panda.org.

Call for major boost in renewable energy use

At least 50 per cent of global electricity supplies will need to come from renewable energy sources by the middle of the century if mankind is to avert the most serious effects of climate change, according to a new report[1] by the International Energy Agency (IEA).

"Only a limited set of countries have implemented effective support policies for renewables and there is a large potential for improvement," IEA executive director Nobuo Tanaka said when presenting the report.

According to the study, the most effective renewable energy policies are to found in Germany, Spain, Denmark and Portugal for onshore wind power, and China for its development of solar heating at a competitive cost.

[1] **Deploying Renewables: Principles for Effective Policies**. Available from IEA online bookshop, www.iea.org.

Europe needs to intensify adaptation

Increasing temperatures, changing precipitation, rising sea level, more intense and frequent extreme weather events and melting glaciers are some of the challenges for Europe already triggered by global climate change, according to a report[1] by the European Environment Agency.

The report, based on 40 key indicators, stresses the consequences of both observed and projected changes, including an increased risk of floods and droughts, losses of biodiversity, threats to human health and damage to economic sectors such as energy, transport, forestry, agriculture, and tourism.

[1] **Impacts of Europe's changing climate – 2008 indicator-based assessment**. EEA Report 4/2008. Available at http://reports.eea.europa.eu/eea_report_2008_4/en/

Rising emissions from industrialized countries

Greenhouse gas emissions of 40 industrialized countries rose by 2.3 per cent between 2000 and 2006, although they are still about five per cent below the 1990 level, according to the United Nation's framework convention on climate change (UN FCCC).

The biggest recent increase in emissions of industrialized countries has come from economies in transition, which have seen a rise of 7.4 per cent in greenhouse gas emissions within the 2000 to 2006 time frame.

Source: UN FCCC press release, 17 November 2008.

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Climate change gathers pace faster than expected

Global warming is accelerating faster than experts had previously predicted, according to a new compendium.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) released their Fourth Assessment Report – a study of global warming that involved nearly 4,000 scientists from more than 150 countries.

However, the science of climate change has moved on in the year since this respected report was published. A new report[1] published by WWF amalgamates this new scientific data and reveals that global warming is accelerating beyond the IPCC's forecasts:

- The Arctic Ocean is losing sea ice up to 30 years ahead of IPCC predictions. It is now predicted that the summer sea ice could completely disappear between 2013 and 2040.
- The number and intensity of extreme cyclones over the British Isles and the North Sea are projected to increase, leading to increased wind speeds and storm-related losses over Western and Central Europe.
- The level of ozone, an air pollutant, is projected to be similar to that in the 2003 heat wave, with major increases over England, Belgium, Germany and France.
- Annual maximum rainfall is projected to increase in most parts of Europe. Over two million people in nine countries around the Upper Danube and Meuse catchments will be affected by floods and related economic damage, while the Mediterranean will suffer from prolonged droughts.
- At a global level, sea level rise is expected to reach more than double the IPCC's maximum estimate of 0.59 metres by the end of the century, putting vast coastal areas at risk. Rising temperatures have already led to a reduction in global yields of wheat, maize and barley.

WWF calls on the EU to adopt an emission reduction target of at least 30 per cent below 1990 levels by 2020, to be delivered within the boundaries of the EU rather than relying heavily on offsetting overseas. It also asks the EU to commit to providing substantial support and funding for developing countries, in order to help them tackle future climate change and adapt to those impacts that are already unavoidable.

[1] **Climate Change: faster, stronger, sooner**. Available for download at www.panda.org.

EU countries need help

Several EU member states will not be able to meet their commitments under the Kyoto protocol without buying emission rights from elsewhere.

The fifteen "old" EU countries (EU15), which collectively agreed to reduce greenhouse gas emissions by eight per cent between 1990 and 2010, only succeeded in reducing emissions by 2.7 per cent by 2006.

A new report from the European Environment Agency (EEA) reveals that policies and measures in place as of today are expected to push down emissions to only 3.6 per cent below the base-year emissions by 2010. But if the additional measures planned by ten member states were fully implemented and on time, a further reduction of 3.3 per cent could be obtained, which would mean a total reduction of 6.9 per cent.

However it is not just measures taken at home that count towards the undertaking.

Most EU15 countries intend to use carbon sinks – such as planting forests that absorb carbon dioxide – to achieve their Kyoto target. The total amount of carbon dioxide that could be removed annually between 2008 and 2012 is however relatively small, 1.4 per cent compared to 1990, although it is somewhat higher than the projections made in 2007.

Further reductions can be achieved using the Kyoto protocol's flexible mechanisms. Under these mechanisms, member states can trade emissions between themselves or acquire credits from emission-cutting projects they finance abroad. The purpose is partly to promote the transfer of technology, and partly to allow reductions to be made where costs are lowest – at least in the initial phase of combating climate change.

The projected use of Kyoto mechanisms by ten of the EU15 countries will reduce emissions by 2010 by 3.0 per cent from base-year levels. The ten countries are Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. The combined effect for the EU15 would be a reduction of 11 per cent by 2010.

The overall EU15 Kyoto target of minus eight per cent corresponds to differentiated emission targets for each member state. In 2006, four countries – France, Greece, Sweden and the United Kingdom – had already reached a level below their Kyoto target. Another eight member states – Austria, Belgium, Finland, Germany, Ireland, Luxembourg, the Netherlands and Portugal – project that they will achieve their targets. But projections from three countries, Denmark, Italy and Spain, indicate that they will not meet their emission reduction goals.

Ten of the 12 member states that joined the EU in 2004 and 2007 have individual reduction targets of six or eight per cent. Only Cyprus and Malta do not have a target. In the EU12, all countries project that they will achieve their Kyoto targets despite projected increases in emissions between 2006 and 2010. Slovenia is the only one planning to use the Kyoto mechanisms to meet its target.

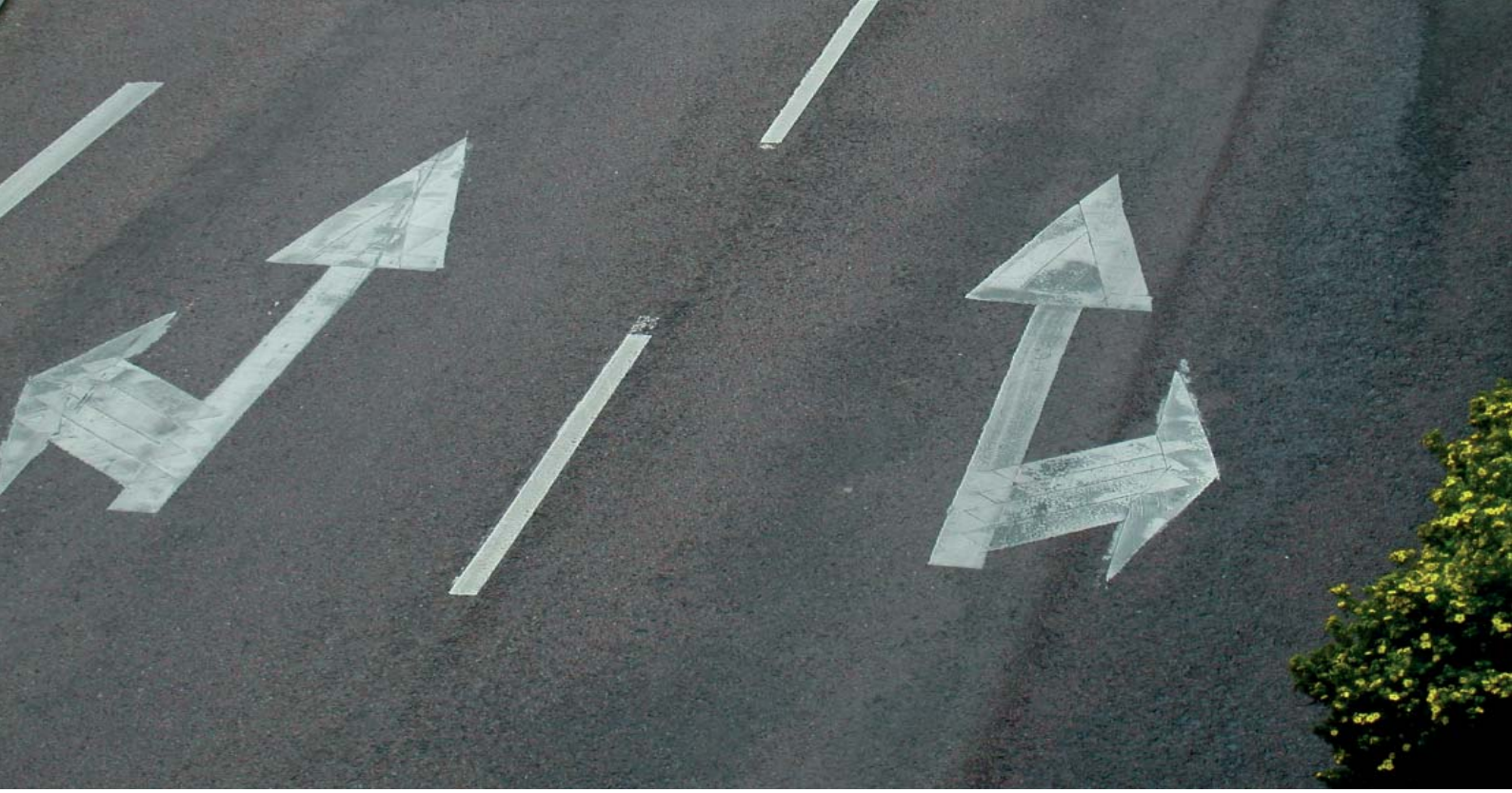
The report also gives a long-term estimate of the emissions situation in Europe. Although emissions are projected to continue decreasing until 2020 in the EU27, the 20-per-cent reduction target from the 1990 level, which was endorsed by European leaders in 2007, will remain out of reach without the implementation of additional measures, such as the EU energy and climate change package proposed by the European Commission in January 2008.

Further reading: **Greenhouse gas emission trends and projections in Europe 2008**. http://reports.eea.europa.eu/eea_report_2008_5/en

Overview of progress for EU Member States.

National projections for 2010	Planned measures by 2010	EU15 member states	EU12 member states
Countries meeting their Kyoto or burden sharing target	Existing domestic policies and measures	Germany [1] Greece [1] Sweden [1] United Kingdom [1]	Bulgaria Czech Republic [1] Estonia Hungary Latvia Lithuania Poland [1] Romania Slovakia
	Existing and planned domestic policies and measures	France [1]	
	Domestic policies and measures, use of Kyoto mechanisms	Austria [1] Belgium Finland [1] Ireland [1] Luxembourg Netherlands [1] Portugal [1]	Slovenia [1]
Countries not meeting their Kyoto or burden sharing target	Domestic policies and measures, use of Kyoto mechanisms	Denmark [1] Italy [1] Spain [1]	

[1] Projected net removal from carbon sink activities (land-use change and forestry).



Money talks

Economic incentives are – if used appropriately – among the most effective tools for reducing CO_2 emissions from road transport, according to a study conducted in the Nordic countries.

In a joint report[1] financed by The Nordic Council of Ministers, environmentalist organizations in the five Nordic countries have analyzed similarities and difference between each country's taxes and fees for owning and driving vehicles and their taxes and charges on fuel. The fee systems vary widely between the countries, and this is partly reflected in the number of cars.

Road vehicles are taxed for a variety of different reasons. One way of encouraging more fuel-efficient vehicles is to impose differentiated fees for car ownership. According to the report this has only a limited effect, however.

It is only in recent years that some of the countries – Norway, Denmark and Finland – have started to apply differentiated fees to car purchases. This appears to be a much more effective way of influencing the number and especially the type of cars that are sold. In order to have significant effect the degree of differentiation must be clearly felt by the consumer, however.

Experience shows that fees that are connected with an active process – i.e. buying a car or driving it – have a greater effect than fees that apply to owning a car. Fuel taxes, among other factors, have an influence on overall mileage, as well as the choice of car model to some degree.

The report puts forward some other interesting conclusions:

- Sweden, which does not impose any registration fee on cars, has more cars per capita than the others, although it is closely followed by Iceland.
- Sweden has the highest carbon dioxide emissions per new car. In Norway, Denmark and Finland, emissions from new cars have fallen progressively since differentiated registration fees were introduced.
- In contrast to the general view put forward in debate, there is no link between high registration fees and the average age of cars. Finland, which has the lowest registration fee, also has the oldest cars.
- Every country has a high proportion of company cars. In several cases these account for between 30 and 40 per cent of new car sales. In this case there is very little incentive to buy fuel-efficient vehicles. Company cars are sold on after a few years to private buyers. This means there is a lot to be gained by ensuring that incentives also influence buyers of company cars.

The report puts forward a series of recommendations for traffic taxation. They include support for introducing congestion charging in bigger cities and in time also nationwide mileage tax/road pricing. This could be an extra tax or be offset against motor tax, petrol tax and partly also registration taxes. There would be advantages in co-ordinating the introduction of many of these reforms in the Nordic countries.

Per Elvingson

[1] **Trafikafgifter og klimapåvirkning: Hvordan sænker vi bilernes CO_2-udledning?** TemaNord 2008:587, Nordic Council of Ministers, 2008. In Swedish, Norwegian and Danish, but with an English summary. Download: www.norden.org/pub/miljo/miljo/sk/TN2008587.pdf

Dutch lead opposition to French attempts

The battle over limiting emissions of carbon dioxide from new cars goes on, with the French presidency saying it is determined to conclude a deal by the end of this year.

France has offered what it calls "further concessions" to gain the support of sceptical countries, but these have only made the proposed legislation even less acceptable to some member countries as well as environmental groups.

With negotiations between members of the European Parliament and the presidency now beginning, France is still trying to push through a version of an agreement reached between the French and German leaders in June.

The centrepiece of this agreement was a "phased-in approach", which effectively means a postponement of three years to 2015.

But other countries – notably Denmark, the Netherlands and Sweden – are pushing for a much stricter deal. At a meeting of environment ministers in October, the Dutch said the Commission's original position of 130 grams per kilometre by 2012 should be supported if the EU was not to lose credibility regarding its climate change goals for 2020.

The Dutch statement to the meeting said:

"In June 2007, the Environment Council requested stringent measures aimed at the car industry: 120 g/km carbon dioxide in 2012 (130 g/km to be achieved by means of technical innovation and a further 10 g/km by means of additional measures), plus ambitious long-term goals for 2020. In this regard, it is alarming that the contribution made by passenger cars is at risk of being severely weakened, putting the climate change objective at stake."

The European news agency EurActiv said there was "wide-ranging support" for the Dutch stance among EU environment ministers, notably from Denmark, but also Belgium, Finland and other states.

The debate over carbon dioxide limits coincides with a request by European carmakers for a low-cost EU loan of 40 billion euro, which they say is necessary if they are to develop cleaner technologies. This has the support of the President Sarkozy, who said after an informal EU summit last month: "Can we ask the European car industry to produce clean cars – to change the whole industrial system in just a few months – without giving them a helping hand?"

Yet the latest presidency proposal, far from envisaging change in "just a few months", foresees carmakers having to ensure 60 per cent of their new cars meet the 130 g/km limit in 2012, 75 per cent in 2013, 85 per cent in 2014 and 100 per cent by 2015.

"It's almost as if France is pretending September's vote in the European Parliament supporting a 130 g/km limit by 2012 just didn't happen," said Jos Dings, director at T&E, the European Federation for Transport and Environment.

"We must hope that the members of the European Parliament stand up for the position they took in September, and are awake to the fact that the French compromise is not a compromise but a weakening."

With France keen to get agreement before its presidency ends, the Parliament's plenary discussion of this legislation on 3 December takes on added significance.

Source: **T&E Bulletin** (www.transportenvironment.org), November 2008.

Charging lorries for climate change

In July, the European Commission published proposals on updating road use charges for lorries (the so-called Eurovignette directive). The move was designed to allow for the charging of "externalities" such as air pollution, noise and congestion. But the proposal said the amount charged could not include a climate change element, and there should be a maximum amount that could be charged.

Now the rapporteur in the Parliament, Saïd Khadraoui, has drafted an amendment saying countries should be allowed to charge for climate emissions unless they are included in fuel duty. He has also recommended abandoning the maximum amount idea.

The debate in the Parliament could well become polarised, with the socialist, liberal and green groups supporting Khadraoui's approach, and the centre-right EPP supporting the Commission's line.

Meanwhile, Spain's transport minister is reported to have launched a "virulent attack" on the proposals. Spain says that, as a peripheral nation, it is unfairly penalised by legislation that raises road use charges.

Source: **T&E Bulletin**, November 2008.

Growing support

More than half of residents in the Finnish capital of Helsinki are in favour of congestion charging, according to a recent survey. At the start of 2007 only one-third expressed their support. Party affiliation plays a big part in the issue. Supporters of the conservative National Coalition party are most critical, while those that side with the Green League are most positive. Students give the strongest backing for congestion charging, while those in management positions oppose it most strongly.

Source: www.yle.fi, 11 October 2008.

Germany to increase motorway tolls

The German government and the 16 federal states have agreed to increase motorway tolls for lorries by a quarter from 2009. The measure is intended to encourage the use of vehicles with low carbon emissions, which pay lower charges. It is expected to save 300,000 tonnes of carbon dioxide emissions annually and generate 800 million euro in revenues. This is the second increase since the road charging system was introduced in 2005.

Source: **ENDS Europe Daily**, 10 October 2008.

A growing threat

Existing emission controls are failing to reduce ground-level ozone to a level that protects human health and the environment, and climate change will make the challenge harder, warns a major new report from the Royal Society.

Ground-level ozone is a global air pollution problem and an important greenhouse gas. In large areas of the industrialised and developing world, it remains one of the most pervasive of the global air pollutants, with impacts on human health, food production, and the environment. Despite the efforts of many countries to reduce the pollutants that lead to ozone formation, ozone concentrations have continued to increase in many parts of the world.

In parts of the Northern Hemisphere, background concentrations of ozone have grown by six per cent, or two parts per billion (ppb), per decade since the 1980s. Levels of the pollutant have doubled since the mid-nineteenth century.

Ozone is a powerful oxidant that irritates the lungs and causes more people to die from respiratory complaints. Children, the elderly and asthmatics are particularly vulnerable. In 2000 an estimated 21,400 premature deaths in the EU were attributed to ozone. Assuming full implementation of current EU legislation, this figure is projected to decline slightly to 20,800 in 2020. These figures are likely to be conservative however, as they do not include morbidity effects, and are based on an assumption that ozone has an impact on health only at levels above 35 ppb. It is now known to have an effect below this level.

Ozone can reduce the yield and affect the nutritional quality of important agricultural crops, including wheat, rice and soybean. In the EU in 2000 an estimated 6.7 billion euro was lost due to ozone damage to arable crops.

According to the report, crop losses due to ground-level ozone are likely to increase over the next two to three decades. In some developing regions, such as South Asia, ozone damage to staple crops may present a significant threat to regional food security.

Available evidence suggests that individual wild plants may be as sensitive to ozone as the most sensitive crop species. The areas of the world with the greatest potential impact on plant biodiversity are eastern North America, Central Europe, the northern half of South America, Central Africa, and South-East Asia.

The global modelling analysis performed for the report shows that it is the changes in anthropogenic emissions, mainly of nitrogen oxides (NO_x), but also of methane, carbon monoxide and non-methane volatile organic compounds, that will be the primary influence on ground-level ozone concentrations in 2050.

Existing emission controls will not be sufficient to reduce ozone concentrations to levels acceptable for human health and environmental protection, and there are calls for renewed global action to address ozone and its precursors.

Because of climatic changes such as more frequent summer droughts and heat waves it is expected that Europe

will experience more high pollution days with associated high ozone episodes. Increased levels of ozone will in turn make climate change worse because it acts as a greenhouse gas, trapping heat in the atmosphere, and also reduces the ability of plants to absorb carbon dioxide.

The Royal Society highlights the significance of ozone as a global air pollutant and as a greenhouse gas, and finds that in some parts of the world ozone may have as important an impact on food security as climate change.

In its recommendations, the Royal Society calls for additional measures to reduce ozone precursor emissions, including strengthened NOx controls to mobile and stationary sources. It notes that emissions from international shipping and aviation are increasing rapidly, and concludes that emissions from these two sectors must be reduced "as far as technically feasible".

Professor David Fowler, chairman of the Royal Society's ground level ozone working group said: "Ozone has become a global pollutant, with direct effects on human health, crop production, ecosystems and climate, yet control strategies are country- or region-based. A coordinated global strategy bringing ozone into international frameworks for controlling air pollutants and greenhouse gases is required. The reduction of methane emissions would for example contribute both to the reduction of climate change and ozone pollution, and all of the associated ecological and human health effects."

Christer Ågren

The report **Ground-level ozone in the 21st century: future trends, impacts and policy implications** is available at: http://royalsociety.org/document.asp?tip=0&id=8039. You can also find a shorter version of the report there: **Ground-level ozone in the 21st century: summary for policy makers**.

Note: When ozone occurs very high up within the atmosphere, in the stratosphere, it acts as a protective sunscreen that shields the earth from high levels of ultraviolet radiation from the sun. However, in the lower atmosphere – the troposphere – and at ground level, ozone is a major pollutant.

Widespread ozone damage to vegetation in Europe

A summary of the research over the period 1990–2006 shows that current ozone concentrations are damaging vegetation in Europe, even at concentrations below critical levels.

Visible damage symptoms have been recorded on over 30 crop and 80 (semi-) natural vegetation species. There have been over 500 records of damage from a total of 16 countries, representing every region of Europe, i.e. from northern as well as southern Europe.

Crops that have shown visible damage symptoms attributed to ozone include maize, bean, potato, lettuce, and watermelon. In some cases, damage symptoms were extensive, e.g. in Greece, 100 per cent of the leaves in an onion field and 85 per cent of the leaves in a watermelon field, were damaged by ozone in 1995 and 2004 respectively.

Generally, effects of ozone have been found to be more frequent/more severe in southern Europe, where the ozone concentrations are highest. However, significant impacts of ozone have also been demonstrated in northern Europe, where ozone concentrations are lower.

The report compares the geographic extent of damage with maps of estimated concentrations. This reveals that maps of exceedance of the AOT40-based critical level for agricultural crops appear to be underestimating the potential for ozone damage in Europe.

In some cases, reductions in biomass/yield of over 10 per cent have been recorded at ozone concentrations below the critical level. Results from biomonitoring studies show that the largest impacts of ozone are consistently found in Switzerland, Italy and Greece.

Compared with ozone concentration maps, maps of stomatal fluxes of ozone were found to be better at predicting the occurrence of damage to vegetation.

The report also identifies the need for further research in light of the changes that can be expected in the next few decades: changing ozone profiles (decreasing peaks, increasing background) and changes in climate, including factors such as temperature, carbon dioxide concentration and precipitation that will modify the stomatal flux of ozone, will also change the distribution and magnitude of effects of ozone across Europe.

Source: **Evidence of Widespread Ozone Damage to Vegetation in Europe 1990–2006**. By Felicity Hayes, Gina Mills, Harry Harmens, David Norris, Programme Coordination Centre for the ICP Vegetation. Can be downloaded at http://icpvegetation.ceh.ac.uk

The International Cooperative Programme on Effects of Air Pollution on Natural Vegetation and Crops (ICP Vegetation) is one of seven ICPs and Task Forces that report to the Working Group on Effects of the Convention on Long-range Transboundary Air Pollution. Its Annual Report 2007/8, "Air Pollution and Vegetation" can be downloaded from the same address as above.

Current policies are insufficient

A report[1] from WHO Europe published in November summarizes the results of a multidisciplinary analysis intended to assess the effects of ozone on health. It indicates that ozone pollution affects the health of most Europeans, leading to a wide range of health problems. The effects include some 21,000 premature deaths annually in the 25 EU countries on and after days with high ozone levels. Current policies are insufficient to significantly reduce ozone levels in Europe and their impact in the next decade.

[1] **Health risks of ozone from long-range transboundary air pollution**. Available at www.euro.who.int.

Downward trend in emissions flattens

In the last 25 years, European emissions of oxides of sulphur and nitrogen from land-based sources have fallen by 77 and 45 per cent respectively. But some of these reductions on land are countered by rising emissions from international shipping.

Air pollutant emissions from land-based sources in Europe are continuing to fall slightly, but considerably slower than in the 1990s. Since 1980, total European emissions of sulphur dioxide (SO_2) – the most significant acidifying pollutant – from land-based emission sources have fallen by more than three-quarters, from around 53 million tonnes in 1980 to 12.3 million tonnes in 2006.

Emissions of nitrogen oxides (NOx), non-methane volatile organic compounds (VOCs), and ammonia have also gone down, although to a lesser extent. VOCs have dropped by 42 per cent since 1990, NOx by 35 per cent, and ammonia by 30 per cent.

Since the late 1990s, emissions of fine particles ($PM_{2.5}$) have been gaining increasing attention. However, these emissions are not as well documented as those of other air pollutants, and many countries lack emission data for the 1990s. Between 2000 and 2006 it is estimated that emissions of $PM_{2.5}$ from land-based sources have only fallen by about five per cent, from 3.0 to 2.8 million tonnes.

Although emissions continue to fall, the downward trend appears to have flattened out over the last few years. In the case of NOx, small reductions in most countries were negated by an increase in Russian emissions of nearly 900,000 tonnes between 2000 and 2006.

Emissions from international shipping in European waters show a steady increase. Since 1990, ship emissions of SO_2 have gone up from 1.8 to 2.7 million tonnes, and those of NOx from 2.6 to 3.8 million tonnes – increases of 45–50 per cent.

The data in the table on the opposite page is taken from figures reported by the countries themselves to the Convention on Long-range Transboundary Air Pollution, and was compiled by EMEP.[1]

The Convention's EMEP programme keeps track of the ways in which emissions from one country affect the environment in others. The EMEP report also provides an overview of calculations for source-receptor relationships, covering acidifying, eutrophying, photo-oxidant, and particle pollution.

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

Table 2. Examples of European countries where the proportion of air pollutant depositions of sulphur and oxidised nitrogen coming from ships is most marked.

Sulphur		NOx-nitrogen	
Denmark	46%	Denmark	25%
Sweden	22%	Greece	22%
Norway	20%	Sweden	21%
Netherlands	19%	Ireland	20%
UK	19%	Norway	20%
Ireland	18%	UK	18%
Finland	11%	Netherlands	18%
Italy	11%	Italy	18%
France	11%	Portugal	17%
Belgium	10%	Spain	15%
Portugal	10%	Finland	15%
Spain	10%	France	13%
Germany	9%	Germany	10%

Source: EMEP, 2008.

It is true for most European countries that the biggest share of depositions of sulphur and oxides of nitrogen emanate from outside their own territory. Another similarity is that an increasing share of the depositions originates from international shipping.

For 2006 it was estimated that ship emissions were responsible for ten per cent or more of the total deposition of both sulphur and oxidised nitrogen compounds in at least thirteen European countries (see Table 2).

In some countries, such as Denmark, Sweden, Norway, the Netherlands, Ireland, and the United Kingdom, ship emissions already make up approximately one fifth or more of total pollutant depositions.

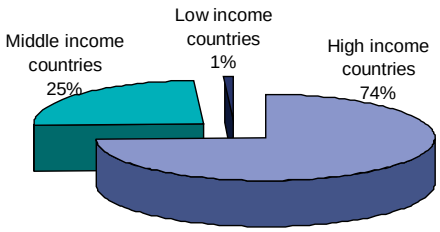
Christer Ågren

[1] The data reported by individual countries to the Convention on Long-range Transboundary Air Pollution is compiled by EMEP (The cooperative programme for monitoring and evaluating the long-range transmissions of air pollutants in Europe), and published both in printed form and on the EMEP website. The title of this year's report is **Transboundary acidification, eutrophication and ground level ozone in Europe in 2006**. EMEP Status Report 1/2008. Edited by L. Tarrason and A. Nytri. Available at the EMEP website: www.emep.int/index_facts.html

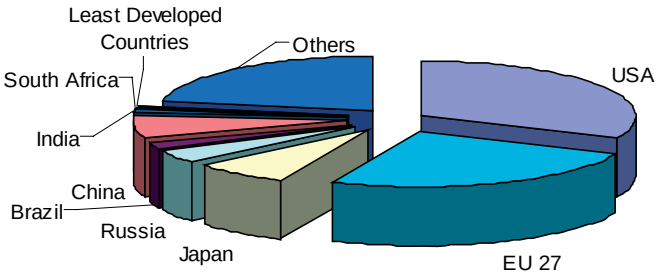
Table 1. European emissions of sulphur dioxide, nitrogen oxides (as NO_2), VOCs, and ammonia (thousand tonnes).

	Sulphur dioxide				Nitrogen oxides (NO_2)				Volatile Organic Compounds (VOCs)				Ammonia			
	1980	1990	2000	2006	1980	1990	2000	2006	1980	1990	2000	2006	1980	1990	2006	2006
Austria	360	74	32	28	246	212	204	225	437	284	179	172	52	69	66	66
Belgium	828	361	171	139	442	382	330	278	274	305	201	150	89	112	87	73
Bulgaria	2 050	2 007	918	877	416	363	184	246	309	214	123	159	144	144	56	55
Cyprus	28	46	50	36	13	19	25	18	14	16	16	11	8	5	6	5
Czech Republic	2 257	1 876	264	211	937	742	398	282	275	374	266	179	156	157	76	63
Denmark	452	176	27	25	307	266	188	185	193	166	127	110	138	134	105	90
Estonia	287	274	96	71	70	74	37	30	81	71	38	34	24	26	9	9
Finland	584	259	74	85	295	299	235	193	210	221	154	133	39	38	33	36
France	3 213	1 333	613	452	2 024	1 829	1 390	1 351	2 734	2 414	1 658	1 336	795	787	789	740
Germany	7 514	5 289	630	558	3 334	2 878	1 855	1 394	3 224	3 584	1 569	1 349	835	758	646	621
Greece	400	487	493	536	306	299	328	315	255	281	295	291	79	79	73	73
Hungary	1 633	1 011	486	118	273	276	194	208	215	252	187	177	157	124	71	81
Ireland	222	186	131	60	73	119	129	119	111	111	90	60	112	114	123	110
Italy	3 441	1 795	752	358	1 585	1 945	1 377	1142	2 032	2 023	1 538	1 166	441	405	424	419
Latvia	96	97	10	7	83	69	34	44	152	73	58	65	38	47	12	15
Lithuania	311	263	43	43	152	158	49	61	100	136	78	78	85	82	43	35
Luxembourg	24	26	4	4	23	20	33	28	15	16	13	9	7	7	7	7
Malta	-	29	26	18	-	14	12	12	-	8	8	6	5	1	1	1
Netherlands	490	189	72	64	583	549	389	311	579	491	267	164	234	249	152	133
Poland	4 100	3 278	1 507	1 195	1 229	1 581	838	890	1 036	832	606	916	550	511	321	287
Portugal	253	317	306	190	158	243	285	267	189	273	282	312	96	55	64	70
Romania	1 055	1 310	727	863	523	527	331	326	829	517	378	353	340	289	252	199
Slovakia	780	542	127	88	197	215	109	87	252	122	86	78	63	66	32	27
Slovenia	234	198	99	18	51	63	60	47	39	53	51	41	24	25	20	19
Spain	2 913	2 166	1 489	1 129	1 068	1 247	1 477	1361	1 392	1 135	1 162	926	285	329	388	421
Sweden	491	117	52	39	404	306	217	175	528	443	282	195	54	55	58	52
United Kingdom	4 852	3 699	1 173	676	2 580	2 932	1 857	1595	2 100	2 396	1 348	910	361	382	337	315
Total EU27	**38 868**	**27 405**	**10 372**	**7 888**	**17 372**	**17 627**	**12 565**	**11 190**	**17 575**	**16 811**	**11 060**	**9 380**	**5 206**	**5 050**	**4 251**	**4 022**
Albania	72	74	32	31	24	23	22	26	31	30	29	32	32	23	22	24
Belarus	740	888	162	91	234	379	208	174	549	497	340	180	142	215	142	134
Bosnia & Herzegov.	482	484	420	429	79	73	53	52	51	48	40	42	31	21	17	17
Croatia	150	178	60	63	60	88	77	79	105	105	80	112	37	53	53	42
Iceland	18	9	9	8	21	9	9	12	8	12	9	12	3	4	4	4
Norway	136	53	27	21	191	224	224	191	173	295	379	196	20	20	23	23
Macedonia	107	110	90	87	39	46	39	30	19	21	25	45	17	15	14	7
Moldova	308	175	13	16	115	131	27	25	105	123	42	37	53	61	28	27
Montenegro	-	-	-	48	-	-	-	21	-	-	-	21	-	-	-	9
Russia	7 323	6 113	2 263	1 724	3 634	3 600	2 457	3 350	3 410	3 659	2 445	2 798	1 189	1 204	663	602
Serbia[1]	406	593	396	400	192	165	137	51	142	158	141	126	90	74	64	57
Switzerland	116	42	19	18	170	156	101	82	323	262	130	101	77	68	60	59
Ukraine	3 849	3 921	1 599	1 446	1 145	1 753	861	488	1 626	1 053	641	295	729	682	485	227
Total Non-EU	**13 707**	**12 640**	**5 090**	**4 382**	**5 904**	**6 647**	**4 215**	**4 581**	**6 542**	**6 263**	**4 301**	**3 997**	**2 420**	**2 440**	**1 575**	**1 232**
Total Europe	**52 575**	**40 045**	**15 462**	**12 270**	**23 276**	**24 274**	**18 780**	**15 771**	**24 117**	**23 074**	**15 361**	**13 377**	**7 626**	**7 490**	**5 826**	**5 254**
Int. ship: Baltic Sea	139	168	216	225	215	236	303	347	5	8	10	12	-	-	-	-
Int. ship: Black Sea	35	45	58	66	52	62	80	91	1	2	3	3	-	-	-	-
Int. ship: Mediterran.	725	858	1 108	1 277	1 000	1 234	1 593	1 831	21	41	54	62	-	-	-	-
Int. ship: North Sea	277	361	464	484	395	508	652	747	9	18	23	26	-	-	-	-
Int. ship: N.E. Atlantic	550	384	492	566	772	565	724	828	15	19	24	28	-	-	-	-
Total internat. ship.	**1 726**	**1 816**	**2 338**	**2618**	**2 434**	**2 605**	**3 352**	**3 844**	**51**	**88**	**114**	**131**	**-**	**-**	**-**	**-**
Total Europe+ships	**54 301**	**41 861**	**17 800**	**14 888**	**25 710**	**26 879**	**20 132**	**19 615**	**24168**	**23 162**	**15 475**	**13 508**	**7 687**	**7 490**	**5 826**	**5 254**
Turkey	1 030	1 519	2 122	1 682	364	691	942	928	359	636	563	552	321	373	403	408

[1] Figures for 1980,1990 and 2000 including Montenegro emissions.



Burden sharing under the SEI's proposal for Greenhouse Development Rights



Time for fair climate agreement

How will the countries of the world reach agreement on a plan to reduce greenhouse gas emissions that simultaneously places sufficient demands on rich countries and allows continued development by poor countries? Is it possible to share the burden fairly?

Finding a system that enables a fair division of the responsibility for reducing emissions is a key issue in ongoing climate negotiations. SEI, Stockholm Environmental Institute, has drawn up a proposed solution it calls "Greenhouse Development Rights" (GDR) that was received with great interest by many parties to the climate summit in Bali in December 2007.

"We have a shared duty to allow others the right to development at the same time as we reduce global emissions," says Johan Rockström, head of SEI.

The proposal identifies an "emergency exit" – a development path that enables the world to avoid dangerous levels of climate change while at the same time providing the opportunity for development by the poorest nations.

"We know that it will be very difficult to achieve the UN's millennium goal of halving poverty by 2015, and there is a risk that the climate problem could pull the rug out from under the feet of poor people all over the world. We also know that we have nudged the planet out of its normal rhythm," points out Johan Rockström.

Almost any form of development, whether it be improved access to water, food, communications, education or health, means increased energy usage. There is a conflict here between the climate and development that has deadlocked climate negotiations for some time. The SEI proposal aims to break this deadlock.

GDR means that the rich nations must start to reduce their emissions soon, by the year 2013 at the latest, and then make cuts of around six per cent each year, with the aim of achieving an overall reduction of 90 per cent by 2050. Emissions from poor nations would be allowed to peak some years later, around 2020, and these countries would receive financial aid from the rich nations in accordance with their ability to take reduction measures.

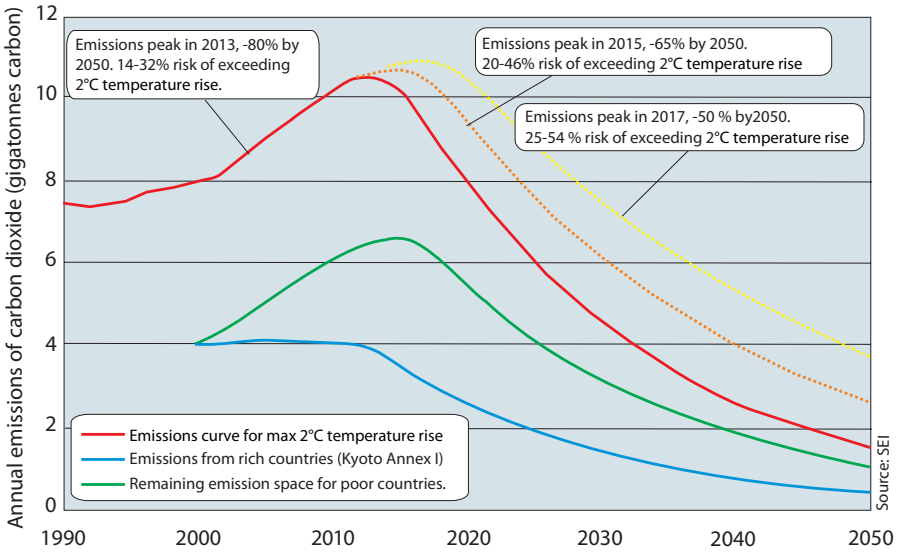
"Even if the developed world phased out emissions completely we would still be facing a global climate crisis if the poor countries do not reduce their emissions as well, which they will not do without clear commitments by the richer nations," says Johan Rockström.

Burden sharing under the proposal uses an index based on each country's per capita emission level (responsibility), relative to its development level (capability). The proportion of the population that earns less than a threshold of 20 dollars per person per day is totally exempted from the emission reduction requirements. In the USA this is a very small proportion, while in India it is the majority of the population. Everyone above this development threshold is regarded as being part of the global consumer society and is expected to contribute to emission reductions.

In total, the rich countries would account for three-quarters of the reduction burden, while newly industrialised countries, such as China, Brazil and South Africa would be expected to account for 24 per cent, and the poorest countries (with 40 per cent of the world's population) would be responsible for one per cent.

Despite everything the proposal would also require substantial emission reductions in the southern hemisphere, at the same time as the populations of these countries struggle to overcome poverty and improve their conditions.

Burden sharing under GDR allows the rich countries to meet some of their reduction obligations in other countries,



Climate rescue plan. If we can ensure that global emissions of carbon dioxide peak by 2013 at the latest and then reduce emissions by 80 per cent by the year 2050 there is a good chance, according to calculations by SEI and IPCC (Intergovernmental Panel on Climate Change), that we will keep the mean global temperature rise below two degrees and thus avoid harmful climate changes. Just a few years' delay will reduce chances drastically.

Industrialized countries must bring about the majority of the reductions (blue curve), so that room is left for developing to keep on developing (green curve). The industrialized countries must also expect to pay for both their own reductions and a large share of the reductions of developing countries.

while they finance the reduction and adaptation measures of poorer countries through a global climate fund. Contributions to the fund need to be large, perhaps 1–1.5 per cent of annual global GDP. In terms of burden sharing the USA would be responsible for 32 per cent of the costs, the EU for 25 per cent and China for 6.6 per cent, while India would be responsible for 0.8 per cent.

"Even under our proposal there is still a 15–30 per cent risk that the temperature rise will edge beyond the two-degree mark," says Johan Rockström. "We cannot rule out serious climate changes even if we succeed in keeping the carbon dioxide level in the atmosphere below 420 ppm (compared with today's figure of around 385 ppm)," concludes Johan Rockström.

Politically, the SEI proposal is very radical. However, several commentators believe, like SEI, that if the countries of the world are to minimize global emissions within a few decades a mechanism must be put in place for sharing the burden fairly and transferring resources from the northern to the southern hemisphere. GDR has inspired several countries, including Mexico, to put forward similar proposals in climate negotiations.

SEI's proposal also prompts a number of questions. How should this transfer of resources be achieved? How do we ensure that the wrong solutions are not chosen, that aid is not misdirected and that changes in the way we use energy are supported democratically? Who will be responsible for the money, the UN or the World Bank?

Emissions trading is another tricky area. CDM, the current mechanism for climate projects in the South, is not working well. What should we replace it with? Could we perhaps subsidise new energy technology in the market place, instead of providing project support on a massive scale?

There are many questions, and the answers should come from climate negotiations over the next few years. The world is in urgent need of a solution. The climate crisis does not allow us the luxury of waiting, but it remains to be seen whether the world's leaders can reach an agreement.

Anders Friström

This article was previously published (in Swedish) in Sveriges Natur, issued by the Swedish Society for Nature Conservation.

Emerging economies can cut emissions at low cost

Six developing countries – Brazil, China, India, Mexico, South Africa and South Korea – produce more than 50 per cent of non-Annex I parties' emissions of greenhouse gases. A report[1] from the German environment agency provides a detailed overview of the national circumstances, emission levels, mitigation potential and policies and measures in those countries.

The so-called no-regret and co-benefit mitigation potential in the six countries is substantial, according to the report. It is possible to reduce emissions at no net costs (9 per cent below reference by 2020) and with a co-benefit other than climate (together 17 per cent below reference).

[1] **Proposals for contributions of emerging economies to the climate regime under the UNFCCC post 2012**. Available at www.umweltdaten.de

China makes demands

In the run-up to the coming climate negotiations China is demanding that the rich nations should contribute more than one per cent of their GDP before the developing countries take action. China takes the position that responsibility lies with the countries that underwent early industrialization and have therefore had an impact on the climate for a longer period.

A global mechanism for the transfer of technology and resources, as proposed by China, would make it possible to reduce the gap between developed and developing countries, and provide additional economic benefits for the developing countries, while simultaneously reducing global emissions of harmful greenhouse gases.

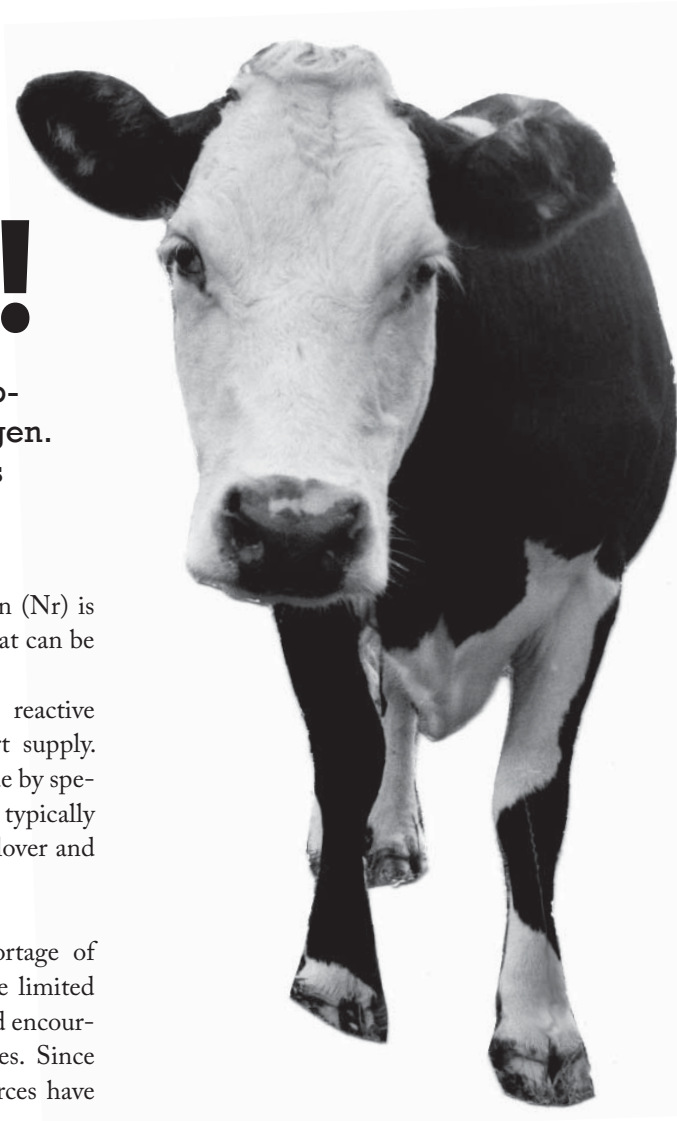
Source: **Planet Ark** (Reuters), 29 October 2008.

Hidden cost of China's coal is $250 billion

China's coal mining industry cost the country a hidden US$250 billion last year. Pollution affected water, land and air around mines, thousands died and many more were hurt in mining accidents, and sulphur dioxide and mercury were among dangerous emissions when coal is burnt in factories and power plants. None of this is reflected in low coal and power prices, according to the study "The True Cost of Coal", researched over three years by Chinese economists and environmentalists.

Source: **Planet Ark** (Reuters), 28 October 2008.

Eat less meat!



Farming and industry are producing too much of a substance we ought to be concerned about, namely nitrogen. And the nitrogen challenge for developed countries is clear, writes Mark Sutton: Eat less meat!

There is a global threat out there, yet the world seems not to notice!

In many regions of the world, humans are producing too much nitrogen, creating a host of different environmental threats.

Most of this nitrogen is made for a reason – we need it to fertilise crops and feed ourselves. Without it, it has been estimated that around half of the world's population would not be alive.

The result is what we might call the "NitroNet" – a complex web of nitrogen interactions that are difficult to explain and even harder for governments to manage.

There are many different nitrogen forms, from atmospheric ammonia, nitrogen oxides and particulate matter, to the greenhouse gas nitrous oxide and nitrates in aquatic systems.

Each has different effects: increased air pollution threatens human health and biodiversity, disturbance of the greenhouse gas balance, and loss of drinking and bathing water quality.

It is the kind of complexity that is not easy to chat about casually on a bus journey.

All this makes for a double challenge to the scientific community; to understand and deal with an extremely complex system, while distilling out the simple messages.

We can divide nitrogen into two main forms – unreactive and reactive.

There is plenty of unreactive nitrogen in the world; this is the gaseous nitrogen (N_2) that makes up 78 per cent of the earth's atmosphere. But it can't be used directly by most plants or animals.

By contrast, reactive nitrogen (Nr) is all the other nitrogen forms that can be used.

Under natural conditions, reactive nitrogen is in extremely short supply. Biologically, it can only be made by special nitrogen-fixing bacteria, typically associated with legumes like clover and beans.

A century ago, a serious shortage of reactive nitrogen in agriculture limited food production in Europe, and encouraged careful re-use of manures. Since that time, two major new sources have appeared.

Firstly, high temperature combustion in vehicles and industry now oxidises more N_2 to Nr. This contributes to acidification, photochemical smog and particulate air pollution.

Secondly, development of the Haber-Bosch process has allowed industrial-scale manufacture of reactive nitrogen fertilisers.

The benefits of this process for global food production have been immense. But along with the benefits have come hidden costs, as the extra reactive nitrogen pollutes air, land and water.

There are clear choices to be made. How much nitrogen do we really need for food production? And how can we weigh up the environmental costs and benefits?

For example, Nobel Prize laureate Paul Crutzen has recently argued that emissions of nitrous oxide from fertilised biofuel crops can outweigh the carbon benefits of avoided fossil fuel use.

Others have highlighted a possible benefit of nitrogen in making forests grow faster, absorbing more carbon dioxide from the atmosphere.

But the decisions get even harder when dealing with multiple nitrogen threats.

For example, policies to reduce nitrates in water have banned wintertime spreading of farm manures across much of Europe's farmland. The resulting focus on springtime manure spreading has intensified peak ammonia emissions, giving a new threat to biodiversity and air quality.

Future policies will, I hope, emphasise a smarter overall management of reactive nitrogen in agriculture. The big

Which is more important?

One molecule of reactive nitrogen can give rise to multiple effects in the environment. What priority would you give to minimizing the following threats: water quality, air pollution, climate change, biodiversity and soil quality?

Have your say at the "NitroNet Poll":
www.nine-esf.org/?q=nitronet_poll

challenge, however, will be for governments to weigh up trade-offs between the different nitrogen threats, and make better informed choices in international agreements.

Yet, there is also a simple challenge for each of us. Eating meat and dairy products adds an extra step to the food chain, massively increasing the Nr losses. This observation can help us in our search for clear messages.

At its very simplest, the carbon story might be summarised in three short words: use less fuel.

At this level, the matching nitrogen challenge for developed countries becomes clear: eat less meat.

Of course, we all know that both stories are more complicated. But for nitrogen, this is a message that needs to be shouted much more loudly.

According to World Health Organization guidelines, many of us eat more animal products than is good for us.

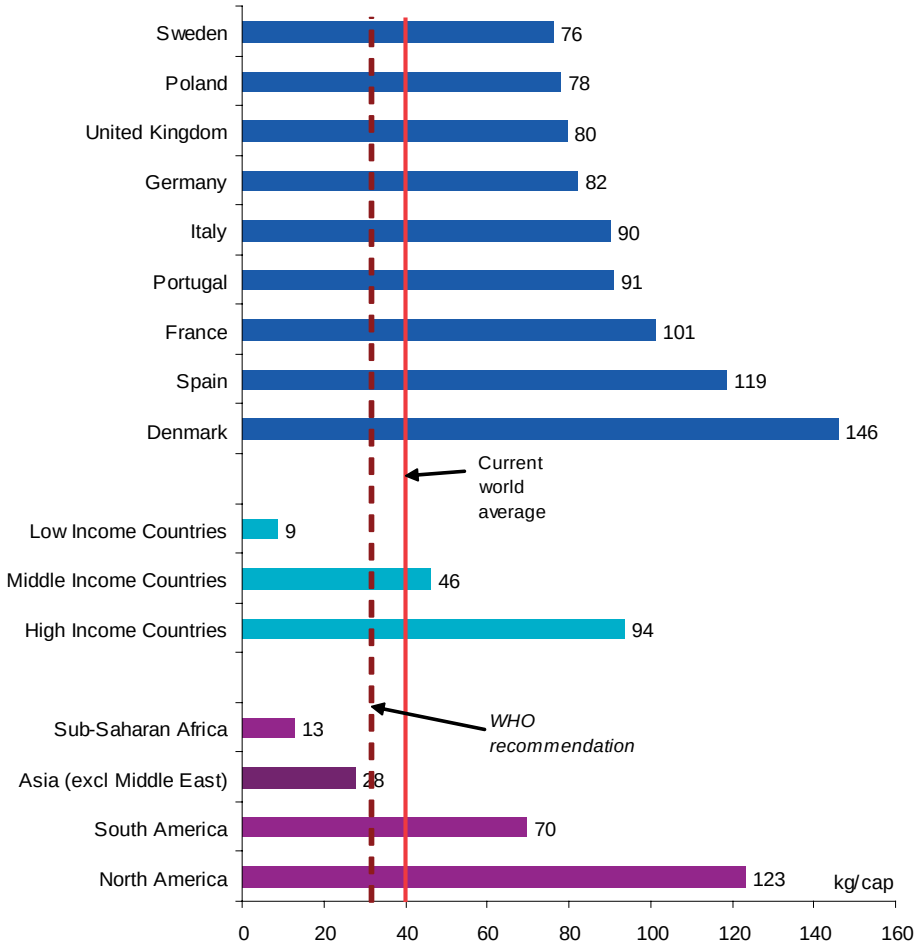
As we begin to untangle the NitroNet, we could even find some health benefits too.

Mark Sutton

This is an edited summary of the 'NitroNet' article originally appearing on the BBC's 'Green Room' (http://news.bbc.co.uk).

Mark Sutton is based at the Edinburgh Research Station of the Centre for Ecology & Hydrology. He is co-chair of the Task Force on Reactive Nitrogen of the Convention on Long-Range Transboundary Air Pollution, director of the European Centre of the International Nitrogen Initiative (INI) and co-ordinator of the NitroEurope Integrated Project.

Meat Consumption per capita in the world



The diagram illustrates meat consumption (kg/person in 2002) in selected EU countries and the average for countries in different income groups and different parts of the world. In 2002 the global average was 40 kg per person. The World Health Organization, WHO, recommends global convergence to 90 grams per day, which corresponds to around 33 kg/year. Figures from World Resources Institute, http://earthtrends.wri.org. See also WHO recommendations, www.who.int/world-health-day/toolkit/dyk_whd2008_annex1.pdf

Recent publications

Nordic perspectives on the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (2008)
113 pp. A report by Danish scientists that looks at European progress on air pollution control, describes and assesses developments in the Nordic countries, and discusses possible instruments to cut emissions even further.

Published by the Nordic Council of Ministers. Available at www.norden.org/pub/sk/showpub.asp?pubnr=2008:572

Socio-economic costs of continuing the status quo of mercury pollution (2008)
73 pp. An analysis of the damage costs of continuing mercury pollution assuming that no further measures are taken until 2020. Main focus is on IQ losses due to the exposure to methyl mercury via ingestion of contaminated fish. Other damage is also discussed, as are costs of controlling mercury emissions. Societal benefits of reducing mercury emissions are presented for two scenarios.

Published by the Nordic Council of Ministers. Available at www.norden.org/pub/sk/showpub.asp?pubnr=2008:580

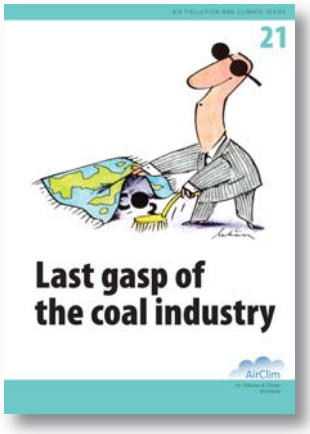
Hemispheric Transport of Air Pollution 2007 (2008)
United Nations Air Pollution Studies no. 16. 146 pp. The first report from the Task Force on Hemispheric Transport of Air Pollution under the Convention on Long-Range Transboundary Air Pollution. Available at www.unece.org/env/lrtap/conv/conclusi.htm

Green Harbours: Hong Kong & Shenzhen. Reducing Marine and Port-Related Emissions (2008)
44pp. The second research report by Civic Exchange on marine emissions reduction in Hong Kong and the Pearl River Delta. It examines international and local measures, and provides a series of specific local and regional policy recommendations to significantly reduce the region's marine emissions.

Available at www.civic-exchange.org/eng/upload/files/200806_Gports.pdf

Floating Smokestacks: A Call for Action to Clean Up Marine Shipping Pollution
46 pp. Report by the Environmental Defence Fund showing the growing public health threat due to emissions from ocean-going vessels and urging that the international community and the US Environmental Protection Agency work together to finalize protective international standards for ocean-going ships without further delay. Available at www.edf.org/article.cfm?contentID=8611

Recent publications from the Secretariat

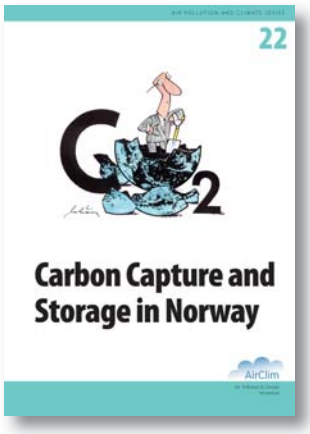


Last Gasp of the Coal Industry

By Gabriela von Goerne and Fredrik Lundberg, October 2008.

By employing carbon capture and storage (CCS) we can continue to use fossil fuels and at the same time greatly reduce carbon dioxide emissions. This frequently painted picture sounds almost too good to be true, and that is probably the case.

This report takes a look behind the bright vision of CCS given by proponents of this technology. It is not intended to damn CCS but is an appeal for wise decision-making.



Carbon Capture and Storage in Norway

By Tore Braend, October 2008. Strong economic and political motives, combined with a partly positive and partly silent NGO community, has contributed strongly to the present powerful commitment towards the use of CCS in Norway.

The overall effect of this commitment has been a negative impact on efforts to reduce emissions of greenhouse gases in other sectors, especially the transport sector, where emissions are growing fastest.

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

By Mark Barrett, UCL, and Mike Holland, EMRC, April 2008.

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 SO_2 by approximately 40 per cent and emissions of NOx 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.

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.airclim.org

Change of name

Since 1 October the Swedish NGO Secretariat on Acid Rain has a new name.

From now on we are the **Air Pollution & Climate Secretariat**

Please note our new web address, **www.airclim.org**, and new mail addresses: info, christer.agren, reinhold.pape, acidnews; all followed by @airclim.org

Coming events

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

UN Climate Change Conference. COP 14, CMP 4 and sessions of the Subsidiary Bodies. Poznañ, Poland, 1-12 December. *Information*: www.unfccc.int.

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

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