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Acid News

Proposal not enough

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Energy, climate and air quality policy synergies

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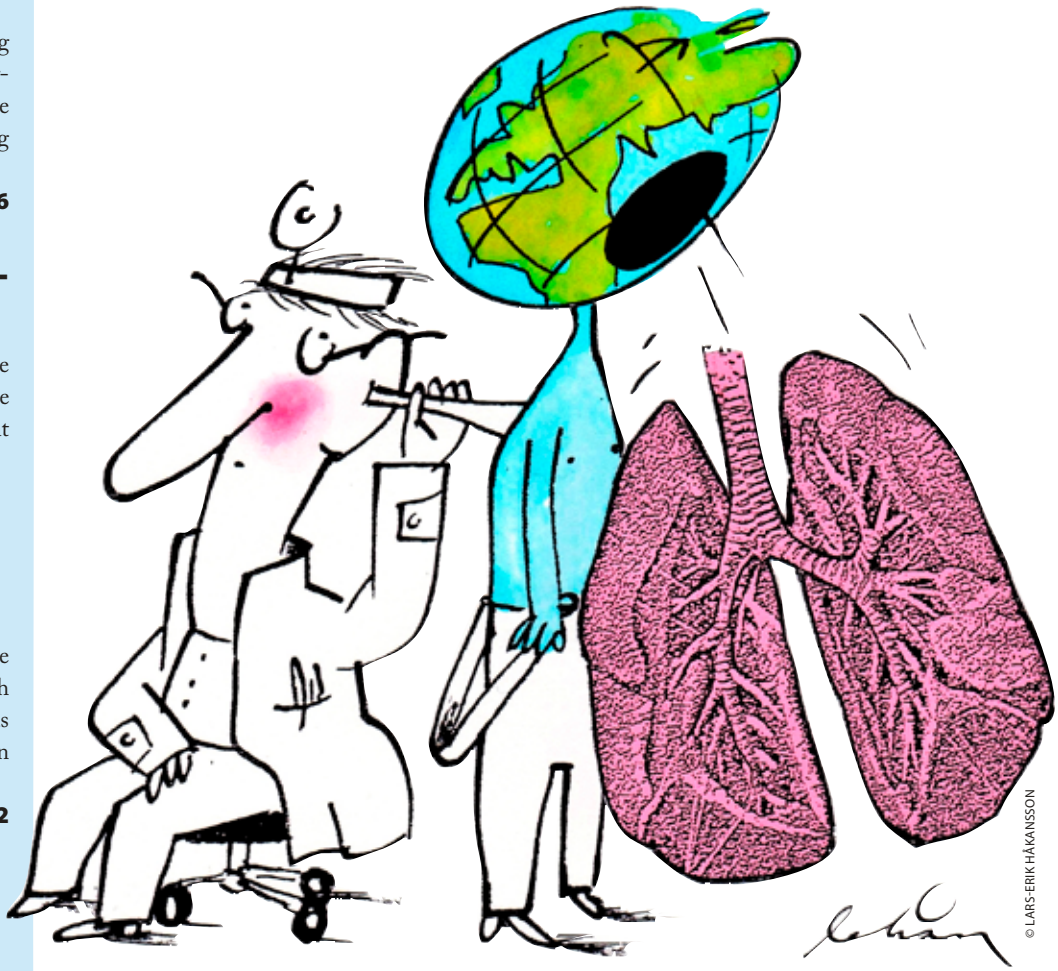

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Air pollution levels still much too high

More than 95 per cent of the EU's urban citizens are exposed to levels of $PM_{2.5}$ and ozone higher than the reference values recommended by the World Health Organization.

Europe's air pollution problem is far from solved. A new report by the European Environment Agency (EEA) points out that two specific pollutants, particulate matter and ground-level ozone, continue to be a source breathing problems, cardiovascular disease and shortened lives.

Between 2009 and 2011, up to 96 per cent of city dwellers were exposed to fine particulate matter ($PM_{2.5}$) concentrations above WHO guidelines and up to 98 per cent were exposed to ozone levels above WHO guidelines. New scientific find-

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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 fulfil 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 organisations: Friends of the Earth Sweden, Nature and Youth Sweden, the Swedish Society for Nature Conservation, and the World Wide Fund for Nature (WWF) Sweden.

The essential aim of the Secretariat is to promote awareness of the problems associated with air pollution and climate change, and thus, in part as a result of public pressure, to bring about the needed reductions in the emissions of air pollutants and greenhouse gases. The aim is to have those emissions eventually brought down to levels that man and 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 organisations, 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 organisations 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.

AirClim

Editorial

We are now approaching the end of 2013, the year declared by environment commissioner Janez Potočnik as the year of air and the year when the European Commission is to present its new clean air strategy.

More than 95 per cent of EU's urban citizens are exposed to harmful levels of $PM_{2.5}$ and ozone, and commissioner Potočnik recently confirmed that air pollution is the number one environmental cause of death in the EU, with over 400 000 premature deaths in 2010 - more than ten times the annual deaths from traffic accidents. For that same year, the external costs of health damage due to air pollution was estimated to amount to between €330-940 billion.

"Raising the ambition levels will create a better society for us all."

On top of these huge health impacts comes the damage to ecosystems and biodiversity. Deposition of airborne nitrogen compounds in the EU exceeds the critical loads – the limits of nature's tolerance – for eutrophication of vulnerable ecosystems over a total area of more than one million square kilometres. The critical loads for acidification are also exceeded over vast areas of vulnerable forest and freshwater ecosystems, and elevated levels of ozone harm crops and natural vegetation, including forest trees.

For air pollution, the EU's long-term objective is "to achieve levels of air quality that do not give rise to significant negative impacts on risks to human health and the environment." For health, this implies achievement of WHO health guidelines, and for the environment it means that the critical loads and levels should not be exceeded.

These objectives are not new, they have in fact been in place since the 5th Environmental Action Programme (EAP) was adopted in 1992, and were again confirmed in the 7th EAP, adopted on 20 November this year.

The Commission has promised to deliver a new Thematic Strategy on Air Pollution, to be accompanied by concrete legislative proposals, including a revised National Emissions Ceilings (NEC) directive, and other initiatives to further cut air pollutant emissions.

Now the expectation is for the Commission to come up with a strategy that aims to achieve these fundamental objectives, and for the member states and European Parliament to give their full support to such a strategy.

Environmental, health and citizens' organisations from across the EU have agreed three main priorities for which they would like legislative action in the Commission's 2013 air package:

- Ambitious emission reduction commitments for 2020 and 2025 in the revised NEC directive that should lead to the achievement of the EU's long-term objectives for air quality by 2030 at the latest
- Specific legislation to cut emissions from all major source sectors, especially domestic heating, agriculture, shipping, small- and medium-scale industrial combustion, road vehicles, non-road mobile machinery and solvent use.
- Implementation, enforcement and strengthening of current EU air quality standards in light of the most recent WHO recommendations and health research results.

There are close and important links between air pollution policies and climate policies, mainly in the energy and transport sectors. Phasing out fossil fuel use by improvements in energy efficiency, increased use of less- or non-polluting renewable sources of energy and behavioural change (e.g. reducing car usage) will result in significantly lower emissions of key air pollutants, as well as cutting emissions of the main greenhouse gas, carbon dioxide.

Raising the ambition levels for both climate policy and air pollution policy will benefit the economy, citizens and the environment, and create a better society for us all.

Christer Ågren

Massive dash for coal in Turkey

Ignoring its significant solar power potential, Turkey is planning a huge increase in coal burning with up to 86 new coal-fired plants in the pipeline.

At least fifty new coal-fired power plants with a total installed capacity of 37,000 MW are currently planned to be built in Turkey. This would rank Turkey first among OECD countries investing in new coal capacity and fourth globally, behind only China, India and Russia.

Some projections even suggest up to 86 new coal plant projects, including those that are in the process of seeking permits and those that have failed the application process. By 2030, electricity generated from coal in Turkey is expected to almost triple, resulting in significantly increased emissions of air pollutants, including the main greenhouse gas carbon dioxide (CO_2).

These are some of the findings of a new report "Black clouds looming – How Turkey's coal spree is threatening local economies on the Black Sea", by CEE Bankwatch Network and Greenpeace Mediterranean.

While Turkey joined the Kyoto protocol in 2009 as an Annex I country, it refused to adopt any emission reduction targets in the protocol's second commitment period (2013–2020). The country's main climate mitigation actions are summarised in the Climate Change Action Plan and in several sectoral strategic plans, and include increasing the share of renewables in the electricity sector, decreasing energy intensity by 20 per cent over the period 2008–2023, and decreasing the rate of greenhouse gas (GHG) emissions by seven per cent from a "business-as-usual" scenario.

Given that Turkish GHG emissions more than doubled between 1990 and 2010 and are projected to triple by 2020, a seven-per-cent reduction from the "business-as-usual" scenario is not ambitious enough.

Current GHG emissions total 422 million tonnes CO_2 equivalents ($mtCO_2eq$), an increase of 126 per cent when compared to 1990 levels. If government projections for increased coal use materialise, by 2023 the total annual emissions from new coal plants will be around 300 $mtCO_2eq$.

Solar and geothermal targets are negligible in the Turkish energy plans. The 2023 target for installed capacity of solar power is only 3,000 MW (i.e. ten per cent of what Germany already possesses). This is despite Turkey's huge solar thermal capacity potential, which is second best in Europe after Spain.

Some of the main findings of the report are that:

- Energy alternatives like solar installations, integrated energy efficiency measures and small-scale renewable energy projects that serve local needs, promote energy independence and the diversification of Turkey's energy sources, provide affordable energy, and create jobs more efficiently than developing coal power are neither analysed nor discussed at the policy or project levels;
- Environmental impact assessments for the planned coal power plants are incomplete, as are assessments of the cumulative impacts of the facilities planned to serve the coal plants;
- A strategic environmental assessment is missing for the power plants that expect approval for construction at both the national level and the regional level (13 coal plants are planned in the western Black Sea region within a distance of 70 kilometres from the coast);
- Project promoters and responsible national authorities exhibit a disregard of public concerns and offer limited access to information about the environmental, social and economic impacts of the proposed coal projects on local and national economies;
- The involvement of international financial institutions lacks a strategy to address the challenges facing the Turkish energy mix, with significant offshoot impacts on their investments elsewhere in energy efficiency, renewables and small and medium-sized enterprises.

Christer Ågren

The report: **Black clouds looming – How Turkey's coal spree is threatening local economies on the Black Sea (October 2013). By CEE Bankwatch Network and Greenpeace Mediterranean.** Available at: *http://bankwatch.org/*

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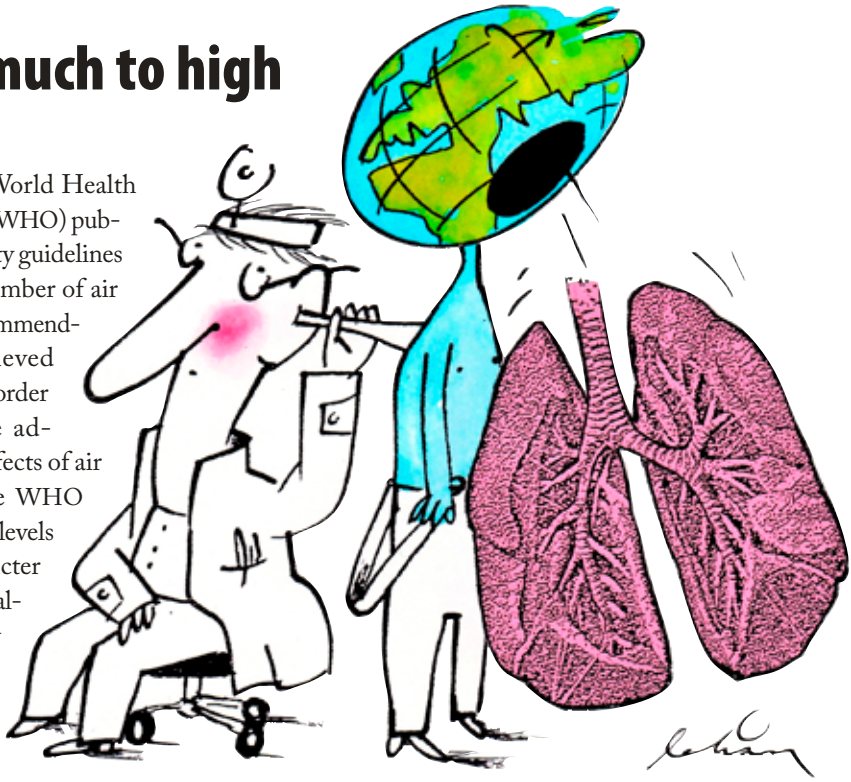
Protest against a planned coal power station in Gerze, Turkey.

Air pollution levels still much to high

Continued from front page



ings show that health can be harmed by lower concentrations of air pollution than previously thought.

The report presents an overview and analysis of the status and trends of air quality from 2002 to 2011 in 38 European countries, including the member states of the European Union. It is an EEA contribution to the European Commission's review of air quality policy and the EU "Year of Air".

While emissions of the main air pollutants in Europe have declined over the last ten years, due to the complex links between emissions and air quality, this has not always resulted in a corresponding reduction in pollutant concentrations in ambient air, especially for PM and ground-level ozone.

Some key findings for the different air pollutants covered by the report are given below and summarised in the table.

Particulate matter (PM) is the most serious air pollution health risk in the EU, leading to health damage and premature mortality. The EU limit and target values for PM_{10}, that should originally have been met by 2005, were exceeded widely in Europe in 2011, with the daily limit value being exceeded in 22 countries, and one third of the urban population being exposed to PM_{10} concentrations higher than the daily EU limit value.

In 2006, the World Health Organization (WHO) published air quality guidelines values for a number of air pollutants, recommended to be achieved everywhere in order to reduce the adverse health effects of air pollution. The WHO recommended levels for PM are stricter than the limit values imposed by EU law.

The EEA report shows that 88 per cent of EU urban dwellers were exposed to PM_{10} concentrations that exceed the WHO guidelines set for the protection of human health, and up to 96 per cent of the urban population were exposed to $PM_{2.5}$ concentrations in excess of the WHO guidelines.

PM in ambient air originates both from primary particles emitted directly into the air and from secondary particles produced as a result of chemical reactions of PM precursor pollutants, namely SO_2, nitrogen oxides (NOx), ammonia (NH_3) and volatile organic compounds (VOCs).

Air pollution effects

- Damage to human health caused by exposure to air pollutants, or by intake of pollutants transported through the air, deposited and then accumulated in the food chain;
- Acidification of ecosystems (both terrestrial and aquatic), which leads to loss of flora and fauna and to impoverishment of soils;
- Eutrophication in ecosystems on land and in water, which results in changes in species diversity;
- Damage and yield losses to agricultural crops and forests and damage to other plants due to exposure to ground-level ozone;
- Impacts of heavy metals or toxic metalloids and persistent organic pollutants on ecosystems, due to their environmental toxicity and due to bioaccumulation;
- Contribution to climate forcing and indirect effects on climate;
- Reduction in visibility;
- Damage to materials, buildings and cultural monuments through soiling and corrosion due to exposure to soot (PM), acidifying pollutants and ozone.

Ozone (O_3) can cause respiratory health problems and lead to premature mortality. It can also damage vegetation, including forest trees and agricultural crops. Ozone is a secondary pollutant, formed from precursor pollutants, primarily NOx, VOCs, methane and carbon monoxide. Exposure in cities is very high – 98 per cent of EU urban inhabitants were exposed to ozone concentrations above the WHO reference level in 2011, while 14 per cent were exposed to concentrations above the laxer EU target value.

Moreover, in 2010, one fifth of arable land in Europe was exposed to damaging concentrations of ozone, leading to agricultural losses. The critical level set for protection of forests was exceeded at 61 per cent of the total forest area in the EEA's 32 member countries in 2010 – the highest exceedances occurred in southern France and northern Italy.

Nitrogen dioxide (NO_2) is a major cause of eutrophication (over-fertilisation that may negatively affect biodiversity and cause excessive plant and algal growth in marine ecosystems) and acidification. NO_2 also contributes to the formation of PM and ozone. In 2011, five per cent of Europeans living in cities were exposed to NO_2 levels above the EU limit values.

Table. Percentage of the urban population in the EU exposed to air pollutant concentrations above the EU and WHO reference levels (2009–2011).

Pollutant	EU reference value	Exposure estimate (%)	WHO AQG	Exposure estimate (%)
$PM_{2.5}$	Year (20)	20–31	Year (10)	91–96
PM_{10}	Day (50)	22–33	Year (20)	85–88
O_3	8-hour (120)	14–18	8-hour (100)	97–98
NO_2	Year (40)	5–13	Year (40)	5–13
BaP	Year (1)	22–31	Year (0.12)	76–94
SO_2	Day (125)	< 1	Day (20)	46–54
CO	8-hour (10)	< 2	8-hour (10)	< 2
Pb	Year (0.5)	< 1	Year (0.5)	< 1
Benzene	Year (5)	< 1	Year (1.7)	12–13
Colour coding:	< 5 %	5–50 %	50–75 %	> 75 %

Eutrophication is still a widespread problem – 62 per cent of European ecosystem areas and 71 per cent of the area covered by Natura 2000 protected sites were exposed to nitrogen deposition in 2010 that exceeded eutrophication limits. National emissions of nitrogen oxides in many EU countries still exceed emission ceilings set by EU legislation that should have been met by 2010.

Benzo(a)pyrene (BaP) is a carcinogen. A considerable proportion of the urban population in the EU (22–31 per cent between 2009 and 2011) were exposed to concentrations exceeding the EU target value, which must be met by 2013. The increase in BaP emissions in Europe in recent years, especially from domestic solid-fuel combustion, is therefore a matter of concern.

Sulphur dioxide (SO_2) causes acidification and contributes to PM formation. Emissions of SO_2 have been reduced significantly in recent years and 2010 was the first year that the EU urban population was not exposed to SO_2 concentrations above the EU limit value. However, around half of the urban population was exposed to SO_2 levels exceeding the stricter WHO guideline. While exceedances of the critical loads for acidification have fallen significantly over the last few decades, excess acid fallout was still occurring in one tenth of the forest area and on one quarter of European lakes in 2010.

Carbon monoxide, benzene and heavy metals (arsenic, cadmium, nickel, lead, mercury) concentrations in outdoor air are generally low, localised and sporadic in the EU, with few exceedances of the limit and target values set by EU legislation. However, the deposition of heavy metals contributes to the build-up of these pollutants in soils and sediments, and since they are persistent in the environment they may bio-accumulate in food chains. Depositions of mercury are estimated to exceed the critical loads in more than half of the area of sensitive ecosystems in the EU.

Commenting on the report, EEA Executive Director Hans Bruyninckx, said: "Air pollution is causing damage to human health and ecosystems. Large parts of the population do not live in a healthy environment, according to current standards. To get on to a sustainable path, Europe will have to be ambitious and go beyond current legislation."

EU Environment Commissioner Janez Potočnik added: "Air quality is a central concern for many people. Surveys show that a large majority of citizens understand well the impact of air quality on health and are asking public authorities to take action at EU, national and local levels, even in times of austerity and hardship. I am ready to respond to these concerns through the Commission's air policy review."

Commissioner Potočnik pointed out that the report is "a powerful reminder of the scale of the challenges we are facing" and continued: "Our review analysis confirms that air pollution is the number one environmental cause of death in the EU, with over 400,000 premature deaths in 2010. More than ten times the deaths from traffic accidents! This is a huge cost to citizens' health and the economy. The external costs were between €330–940 billion per year in 2010. Among these are significant direct impacts on the economy: 100 million lost workdays each year, with a direct cost of about €15 billion in lost productivity. Bad air also adds €4 billion to our healthcare costs because of hospitalisation."

The European Commission is currently at the very final stages of its air quality policy review – at the time of writing a revised Thematic Strategy on Air Pollution and accompanying proposals for EU legislation are subject to internal negotiations within the Commission services, and adoption and publication of the proposals is expected by early December.

Christer Ågren

Air quality in Europe – 2013 report. EEA Report No 9/2013. Available at: *http://www.eea.europa.eu/publications/air-quality-in-europe-2013*

Commissioner Potočnik's speech at the launch of the EEA air quality report is available at: *http://europa.eu/rapid/press-release_SPEECH-13-822_en.htm?locale=en*

Proposal not enough to meet ship CO_2 target

The EU must remove unreliable monitoring methods from the MRV, ensure transparency and agree on a market-based measure to meet its climate targets for the shipping sector.

In 2009, the EU committed to include shipping in its climate policy, but so far all the Commission has come up with is a proposal to monitor ships' emissions of the main greenhouse gas carbon dioxide (CO_2).

While the Commission's proposal for Monitoring, Reporting and Verification of emissions from maritime transport (MRV) is a step in the right direction, it lacks ambition and will have little impact if left unchanged. It can and should be strengthened to create a MRV system that covers not only CO_2, but also other harmful air pollutants, in particular sulphur dioxide (SO_2) and nitrogen oxides (NOx). Moreover, unreliable monitoring methods should be removed, and data transparency needs to be ensured. Finally, there should be a path for transition from minimum MRV requirements to real emissions-reduction measures.

Notwithstanding claims of being the most carbon-efficient mode of transport, CO_2 emissions from international shipping are rapidly growing – up 90 per cent since 1990, and now represent over three per cent of global CO_2 emissions. If emissions remain unabated, they could grow to represent almost one fifth of the allowable global 2°C carbon budget in 2050. In Europe, the Commission estimates that CO_2 emissions from maritime transport in EU seas in 2010 amounted to some 180 million tonnes. If these emissions were reported as a country, shipping would be the 8th largest emitter in Europe.

In its 2011 Transport White Paper, the Commission called for "EU CO_2 emissions from maritime transport to be cut by 40% (if feasible 50%) by 2050 compared to 2005 levels". The MRV proposal does not however require emissions cuts – merely the reporting of emissions from ships arriving at and leaving from EU ports.

The Commission claims the MRV proposal will stimulate fuel savings of around two per cent, but the methods proposed make this questionable. The Commission's impact assessment shows that an EU market-based measure (MBM), such as emissions trading, could achieve significant emission cuts in a cost-effective manner.

Therefore the proposal should be amended to implement such a market-based measure and the MRV provisions strengthened to support such a measure.

Four reporting methods are specified in the MRV proposal. A recent study (see: *http://transenv.eu/bunkerfuel*) has confirmed that the first two of these are inaccurate and will add nothing new, while the last two are in fact capable of stimulating emissions reductions, potentially beyond the two per cent mentioned.

- *Bunker Fuel Delivery Notes* (BDN) and periodic stocktaking of fuel tanks relies on estimating the fuel consumed and hence the emissions by using fuel sales receipts (BDN) that ships are already required to retain onboard. Because these may be inaccurate and unreliable they are not considered to be a credible way to measure voyage fuel burnt.
- *Ship fuel tank monitoring*: Successive fuel level readings from tank soundings indicate the fuel consumed. The study suggests even higher uncertainty with this method than with BDNs due to human error, variations in fuel, inaccurate tables, etc.
- *Flow meters:* An accurate and reliable method already used in cars and trucks. It provides continuous readings of fuel flowing to the engines and thus fuel consumption. Low burden for ship's crew and verifiers (except for regular calibration).
- *Direct emissions measurement:* Continuous measuring of the emissions in the exhaust funnel. Can also measure emissions other than CO_2 (such as air pollutants). Low burden for ship's crew and verifiers (except for regular calibration). Requires new onboard equipment.

CO_2 is by no means the only emission from ship smokestacks worthy of monitoring. Other important pollutants include SO_2, NOx and particulate matter (PM). The EU recently implemented IMO's fuel sulphur content regulations – when

fully implemented by 2020 these will significantly cut ships' SO_2 and PM emissions. However, at present only about 0.1 per cent of ships are controlled for fuel sulphur content. At this rate, it is clear that ensuring strict enforcement will be next to impossible.

It should be noted that projections on future emissions show that the emissions of NOx from shipping around Europe are expected to exceed NOx emissions from all EU land-based sources combined by 2020.

It is therefore important to introduce a single MRV requirement for continuous monitoring and reporting of all relevant emissions such as CO_2, SO_2 and NOx. The MRV instrument would then become a simple and powerful indicator of the overall air pollution performance of ships and allow for accurate and cost-effective enforcement of the EU's Sulphur in Marine Fuels Directive.

Data transparency is essential if the information barriers preventing improved ship fuel efficiency at little or no cost are to be properly addressed. The required data should enable a full estimate of ship efficiency (including cargo data, etc.) and be made public to empower stakeholders such as charterers, who could then identify which ships operate in the most efficient manner. This would imply disclosure of more disaggregated data than the Commission's proposal, most importantly allowing the publication of data on a route basis.

In summary, the policy recommendations from Transport & Environment are to:

- Remove unreliable monitoring methods.
- Require monitoring of CO_2, SO_2 and NOx emissions to create an integrated MRV.
- Mandate data transparency to help remove market barriers.
- Agree now on a market-based measure for CO_2 emissions to ensure the EU emission reduction target will be met in a cost-effective manner.

Aoife O'Leary
T&E Transport Policy Officer

Transport & Environment: *http://www.transportenvironment.org/publications/ghg-emissions-ships-mrv-proposal*

European Commission: *http://ec.europa.eu/clima/policies/transport/shipping/index_en.htm*

American cruise lines to control SO_2 and PM

Cruise line Carnival has announced an agreement with US and Canadian agencies to invest USD180 million in emission-reduction technology on 32 of its cruise ships to comply with the Emission Control Area (ECA) standards. The ECA sulphur standards require ships operating within 200 nautical miles of the US or Canadian coasts to use fuel containing less than 0.1 per cent sulphur by 2015. A 1 per cent sulphur limit on fuel took effect in August 2012.

Under the agreement the company will install scrubbers and diesel particulate filters on its ships to cut emissions of sulphur dioxide (SO_2) and fine particulate matter (PM), pollutants that exacerbate smog and damage human health.

The agreement follows a similar deal between the US Environment Protection Agency and the other major cruise line operating in the country, Royal Caribbean, which also called for the installation of pollution controls on a trial basis, in lieu of using lower-sulphur fuel.

Source: Car Lines No 5, October 2013

Russia blocked Baltic Sea NOx ECA application

When environment ministers of the Baltic Sea countries came together at a HELCOM meeting in Copenhagen in early October, it was anticipated that they would finally agree to proceed with the designation of the Baltic Sea as a NOx Emission Control Area (NECA) under the MARPOL Convention of the International Maritime Organization (IMO).

A principal agreement on the issue was reached back in 2010, and all the preparatory groundwork, including a final application text, has been in place since late 2011. Moreover, a draft ministerial declaration was prepared, saying that an application for NOx ECA designation should be sent to the IMO so that it could be considered at its forthcoming session in early April 2014.

But Russia firmly blocked any such moves. After lengthy negotiations the meeting concluded by recalling the earlier commitment regarding the designation, i.e. that the application to the IMO would be submitted at some undecided time in the future. Paradoxically, it was also stressed that the achievement of a Baltic Sea unaffected by eutrophication relies on additional emission reduction efforts by the shipping sector.

Sources: HELCOM press release, 3 October 2013 and Miljörapporten Direkt, 4 October 2013.

Italy's urban air quality worsening

Air quality in the period 2010–12 continued to deteriorate in Italy, with levels of particulate matter (PM_{10}), nitrogen dioxide and carbon monoxide on the rise, especially in the industrial north and centre of the country along with the island of Sicily, and Campania (the region around Naples), according to the "Urban Environmental Quality" report, issued on 11 October by the Institute for Environmental Protection and Research (ISPRA).

One bright spot was a reduction in vehicle traffic in six of the eight largest cities, though it rose in the two biggest – Rome and Milan. ISPRA said the four largest cities, including Turin and Naples as well as Rome and Milan, still had too much car traffic for their populations.

Source: Car Lines No. 5, October 2013

Bikes are outselling cars

Bicycle sales outpaced new-car sales last year in all EU countries, except Belgium and Luxembourg. The top five countries where bikes outsold cars the most in 2012 were Lithuania, Greece, Romania, Slovenia and Hungary.

The slump in car sales across Europe as a result of the financial crisis could partly explain this trend. Another reason might be that today's younger generation is less interested in buying cars.

Source: NPR, 24 October 2013

http://www.npr.org/blogs/parallels/2013/10/24/240493422/in-most-every-european-country-bikes-are-outselling-cars

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Roadmap for less-polluting vehicles

In the absence of new policies, premature deaths from vehicle-related PM exposure in urban areas will increase by 50 per cent worldwide by 2030.

Without new actions to limit vehicle emissions, air pollution and associated health impacts from road transportation are projected to increase in many countries around the world. However, setting stringent limits on vehicle emissions can force the introduction of technologies that will drastically cut emissions of local air pollutants. This would temporarily decouple pollutant emissions from growing vehicle activity and significantly reduce emissions that contribute to serious health problems.

This is shown in a new report by the International Council on Clean Transportation (ICCT) that estimates global pollution from vehicles through 2030 and premature mortality associated with exposure to direct emissions of fine particles from vehicles in urban areas over the same period. The report lays out a global policy roadmap that could significantly alter trends in pollution and mortality, ultimately preventing more than 210,000 early deaths annually.

Regulations in North America, the EU and Japan have resulted in lower vehicle tailpipe emissions. The application of advanced after-treatment technology and engine tuning, in combination with ultra-low sulphur diesel fuel (less than ten parts per million, ppm), can reduce tailpipe particulate matter (PM) emissions by over 99 per cent compared with uncontrolled engines. In countries that have adopted strict standards, the health impacts of vehicle emissions are expected to drop through 2030.

Many countries around the world have adopted policies patterned on the European regulation, but the significant majority of these have not implemented the Euro 6/VI stage, the latest and most stringent regulatory level.

The ICCT study found that if that lag persists and present trends in vehicle activity continue, the result will be a 70 per cent increase in early deaths from tailpipe PM emissions by 2030, compared to the present.

Conversely, if all countries were to follow an accelerated roadmap to vehicle emission regulations equivalent to Euro 6/VI standards, in tandem with fuel-quality regulations limiting the sulphur content to ten ppm, early deaths globally from road vehicle emissions would fall by 75 per cent in the year 2030, representing a cumulative gain of 25 million additional years of life. As this analysis does not capture rural impacts or secondary pollutant formation in the atmosphere, these results should be considered a lower bound estimate. The policy road map would also reduce emissions of black carbon, a short-lived climate pollutant that causes near-term warming effects.

Diesel vehicles, primarily heavy-duty trucks and buses, are prime targets for emission reduction. Heavy-duty diesels accounted for more than 80 per cent of fine particulate matter ($PM_{2.5}$) and nitrogen oxides (NOx) emissions from on-road vehicles in 2010.

The introduction of selective catalytic reduction (SCR) and diesel particulate filter (DPF) technologies has enabled significant tailpipe emission reductions from diesel vehicles. SCR reduces nitrogen oxides (NOx) and allows for engine tuning that produces a 75 per cent reduction in PM with the use of a diesel oxidation catalyst, while DPFs provide an additional 90–95 per cent PM reduction. Low-sulphur diesel (less than 50 ppm, but ideally 10 ppm) must be available to enable these technologies to function effectively.

As vehicles in countries with advanced vehicle emission standards are becoming less polluting, the share of global

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Stricter standards could reduce health costs in China by USD 150 billion by 2030.

adverse health consequences from road vehicles is shifting from North America and Europe to other regions with higher vehicle fleet growth and more-polluting vehicles. China and India will bear the two largest single-country health risks, accounting for 65 per cent of the global increase in early deaths by 2030 without further policy action. In contrast, the accelerated policy timelines of this report could prevent 90,000 premature deaths in these two countries in 2030 alone.

Less-polluting fuels and vehicles are a good investment. In the US, control of heavy-duty highway diesel emissions alone will result in environmental and public health benefits of USD70 billion annually, at a cost of USD4 billion per year. In China, a national programme of fuel and vehicle standards could garner USD150 billion in public health benefits in 2030, and in India, every dollar invested to reach the most stringent emission standards and ultra-low-sulphur fuel by 2020 would return nine dollars in benefits.

For countries that have implemented the most stringent tailpipe emissions and fuel sulphur-content limits, the California LEV III and US EPA Tier 3 standards form the basis for a next generation of standards, promising additional reductions in NOx and hydrocarbon emissions for both light-duty and some heavy-duty vehicles.

Christer Ågren

The report: **The impact of vehicle and fuel standards on premature mortality and emissions (November 2013). Published by ICCT.** Available at: *http://www.theicct.org/global-health-roadmap*

New EU energy goals would save billions of €

Meeting the energy and climate targets for 2030 that are currently under discussion in the European Commission would save up to €35 billion euro per year in health costs as air pollution declines. It would also add an estimated 0.5 per cent to gross domestic product, due mainly to lower oil and gas imports.

The numbers are from a draft Commission assessment of the impact of 2030 goals expected to be announced early next year. The Commission's 2030 scenarios range from a 40 per cent cut in greenhouse gas (GHG) emissions with no other targets, to a GHG target of 40 per cent plus a 30 per cent renewables goal, and a GHG target of 45 per cent combined with a renewables target of 35 per cent.

None of the scenarios include an energy savings target, which is the obvious way to meet EU goals for lower energy costs, better energy security and lower emissions. While there are no efficiency targets, there are energy savings assumptions, ranging from 24 to 33 per cent, saving up to between €11.1 billion and €34.5 billion per year in health costs, the impact assessment found.

Source: PlanetArk, 7 November 2013 *http://planetark.org/enviro-news/item/70291*

UK breaches of EU air quality rules continue

The latest annual air quality compliance assessment published by the UK environment department DEFRA shows that 38 of the country's 43 air quality zones exceeded the EU's annual average NO_2 limit of 40 micrograms per cubic metre ($\mu g/m^3$) in 2012.

There were also breaches of the 200 $\mu g/m^3$ hourly average limit for NO_2 in Greater London and the city of Oxford, where respective levels of up to 281 $\mu g/m^3$ and 252 $\mu g/m^3$ were recorded. Simon Birkett, director of campaign group Clean Air in London (CAL) said the EU executive should launch infraction proceedings against the UK "urgently".

Source: Ends Europe Daily, 2 October 2013

European emissions keep on slowly shrinking

Sulphur emissions show the biggest reductions, while there is much less improvement for ammonia and particulate matter. Cuts in land-based emissions are countered by rising emissions from international shipping.

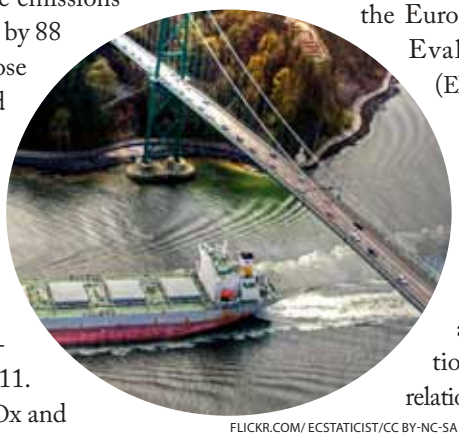
Since 1980, total European emissions of sulphur dioxide (SO_2) – the most significant acidifying pollutant and an important precursor to health-damaging secondary fine particles ($PM_{2.5}$) – from land-based emission sources have fallen by 84 per cent, from around 53 million tonnes in 1980 to 8.2 million tonnes in 2011.

Emissions of nitrogen oxides (NOx), non-methane volatile organic compounds (VOCs), and ammonia have also gone down, although to a lesser extent. VOCs have more than halved (-58 per cent) since 1980, while NOx and ammonia emissions have dropped by 46 and 35 per cent, respectively.

Since the late 1990s, emissions of primary fine particles ($PM_{2.5}$) have been attracting increasing attention, mainly because of their negative impacts on health. However, these emissions are not as well documented as those of other air pollutants, and many countries lack emissions data for the 1990s. Between 2000 and 2011 it is estimated that emissions of PM2.5 from land-based sources have fallen by 35 per cent, from 2.8 to 1.8 million tonnes.

Looking specifically at the 28 member states of the European Union, between 1980 and 2011 the emissions of SO_2 came down by 88 per cent, while those of NOx, VOCs and ammonia fell respectively by 50, 61 and 30 per cent. The emissions of $PM_{2.5}$ were only reduced by 24 per cent between 2000 and 2011.

Emissions of NOx and SO_2 from international shipping in European waters show a steady increase. Since 1980, ship emissions of SO_2 have gone up from 1.7 to 2.4 million tonnes (a 36 per cent increase), and those of NOx from 2.4 to 4.1 million tonnes (67 per cent).



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Shipping's contribution to the overall pollution load is increasing, while emissions from land-based sources are decreasing.

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

Sulphur		NOx-Nitrogen	
Ireland	27%	Ireland	29%
Portugal	26%	Norway	27%
Denmark	24%	Denmark	26%
Netherlands	23%	Sweden	26%
Norway	19%	Portugal	25%
France	18%	Estonia	22%
UK	17%	Netherlands	21%
Sweden	16%	UK	21%
Spain	16%	Spain	20%
Italy	15%	Finland	19%
Belgium	11%	Greece	19%
Greece	7%	Italy	17%

The data in Table 1 is taken from figures reported by countries themselves to the Convention on Long-range Transboundary Air Pollution, and was compiled by the European Monitoring and Evaluation Programme (EMEP). The Convention's EMEP 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 (including transboundary movements between countries), covering acidifying, eutrophying, photo-oxidant, and particle pollution.

For most European countries the biggest share of depositions of sulphur and nitrogen emanate from outside their own territory, and an increasing share of the depositions originate from international shipping.

Since land-based emissions are gradually coming down, while those from international shipping show a continuous increase, shipping's contribution to pollutant depositions and concentrations is getting bigger and bigger. For 2011 it was estimated that ship emissions were responsible for ten per cent or more of the total depositions of both sulphur and oxidised nitrogen compounds in many countries (see Table 2). In the coastal areas of these countries, shipping's contribution to the overall pollution load is even higher. Countries that are particularly exposed to air pollution from shipping include Ireland, Denmark, Sweden, Norway, the Netherlands, Portugal and the United Kingdom.

EMEP has also studied the contribution of air pollutants to the input of nitrogen to the Baltic Sea. It is estimated that atmospheric deposition typically accounts for about one quarter to one third of the total nitrogen load to this sea. The three main contributors to the deposition of oxidised nitrogen compounds are Germany, Poland and ship traffic in the Baltic Sea, accounting together for almost 40 per cent of the input.

Christer Ågren

Report: **Transboundary acidification, eutrophication and ground-level ozone in Europe in 2011.** EMEP Status Report 1/2013. *www.emep.int*

Table 1: European emissions of sulphur dioxide, nitrogen oxides (as NO_2), VOCs, ammonia, and $PM_{2.5}$ (kilotonnes). Data for 2000 and 2011 is from the 2013 EMEP report, while data for 1980 and 1990 is from earlier EMEP reports. Russia in the table refers only to the western parts of the Russian Federation.

	Sulphur dioxide				Nitrogen oxides				VOCs				Ammonia				$PM_{2.5}$	
	1980	1990	2000	2011	1980	1990	2000	2011	1980	1990	2000	2011	1980	1990	2000	2011	2000	2011
Austria	360	74	32	19	246	195	206	183	437	276	178	128	52	65	65	62	23	19
Belgium	828	362	172	56	442	401	332	210	274	315	206	101	89	120	86	67	34	17
Bulgaria	2,050	1,100	861	515	416	249	126	136	309	620	87	91	144	133	52	48	24	29
Croatia	150	174	62	39	60	95	74	66	105	113	85	73	37	51	39	37	10	10
Cyprus	28	31	48	21	13	17	22	18	14	17	14	10	8	5	6	5	4	2
Czech Rep.	2,257	1,876	264	169	937	742	321	226	275	374	227	140	156	157	74	66	28	17
Denmark	452	176	29	14	307	275	199	126	194	166	134	81	138	114	91	74	22	23
Estonia	287	274	97	73	70	74	38	36	81	70	46	33	24	25	10	10	21	26
Finland	584	263	79	61	295	323	201	153	210	239	168	107	39	38	37	37	39	37
France	3,214	1,354	644	255	2,024	1,865	1,602	1,005	2,734	2,589	1,712	734	795	704	699	674	368	173
Germany	7,514	5,292	653	445	3,334	2,882	1,925	1,293	3,224	3,128	1,391	1,008	835	692	602	563	143	111
Greece	400	473	495	270	306	329	362	296	255	268	264	187	79	85	71	62	49	54
Hungary	1,633	1,010	486	35	273	238	185	129	215	205	173	100	157	124	71	65	26	31
Ireland	222	182	140	23	73	121	135	71	111	93	73	44	112	107	113	109	11	8
Italy	3,440	1,794	749	195	1,585	2,014	1,421	930	2,032	2,015	1,607	989	441	468	449	382	178	128
Latvia	96	105	16	3	83	65	36	32	152	102	65	70	38	48	13	13	23	25
Lithuania	311	222	43	36	152	158	47	51	100	108	61	69	85	84	25	29	17	11
Luxembourg	24	15	3	2	23	39	45	48	15	19	12	9	7	5	6	5	3	2
Malta	26	29	24	8	9	14	8	8	2	8	3	3	5	1	2	2	1	1
Netherlands	490	192	73	34	583	566	398	259	579	477	238	144	234	355	161	119	24	14
Poland	4,100	3,210	1,511	910	1,229	1,280	838	851	1 036	831	599	652	550	508	322	270	135	139
Portugal	253	295	281	47	158	234	266	176	189	295	254	176	96	63	61	47	74	44
Romania	1,055	1,311	759	331	523	546	296	222	829	616	519	356	340	300	206	159	116	109
Slovakia	780	542	127	68	197	215	107	85	252	122	66	68	63	66	32	24	23	29
Slovenia	234	198	92	11	51	60	50	45	39	55	44	32	24	20	19	17	14	15
Spain	2,913	2,097	1,470	489	1 068	1 224	1 282	915	1 392	1 006	957	596	285	316	378	381	96	71
Sweden	491	105	42	30	404	269	205	145	528	359	223	177	54	55	59	52	28	29
UK	4,852	3,707	1,228	379	2,580	2,885	1,791	1,033	2,100	2,762	1,586	752	361	360	328	290	100	67
Total EU28	39,044	26,463	10,480	4,538	17,441	17,375	12,518	8,748	17,683	17,248	10,992	6,930	5,248	5,069	4,077	3,669	1,634	1,241
Albania	72	78	39	21	24	22	21	24	31	43	23	28	32	28	29	24	9	11
Belarus	740	888	162	63	234	379	208	171	549	497	340	346	142	215	142	154	40	49
Bosn. Herz.	482	484	420	431	79	73	53	51	51	48	40	43	31	21	17	17	20	19
Iceland	18	21	35	81	21	27	27	21	8	12	7	5	3	3	3	5	1	0
Macedonia	107	110	90	101	39	46	39	40	19	21	25	25	17	15	14	10	9	7
Moldova	308	175	13	6	115	131	27	31	105	123	21	33	53	61	25	20	2	5
Montenegro	0	0	14	28	0	0	9	9	0	0	10	8	0	0	6	3	4	4
Norway	136	52	27	19	191	190	210	178	173	289	379	138	20	20	23	26	60	37
Russia	7,323	4,671	1,997	1,302	3,634	3,600	2,357	2,369	3,410	3,668	2,450	2,081	1,189	1,191	650	830	694	367
Serbia	406	593	210	303	192	165	149	208	142	158	122	154	90	74	82	86	18	20
Switzerland	116	41	16	10	170	145	110	74	323	289	144	86	77	73	66	63	12	10
Ukraine	3,849	3,921	1,599	1,320	1,145	1,753	871	603	1 626	1 053	641	357	729	682	485	25	289	41
Total Non-EU	13,557	11,034	4,622	3,685	5,844	6,531	4,081	3,779	6,437	6,201	4,202	3,304	2,383	2,383	1,542	1,263	1,158	570
Total Europe	52,601	37,497	15,102	8,223	23,285	23,906	16,599	12,527	24,120	23,449	15,194	10,234	7,631	7,452	5,619	4,932	2,792	1,811
Int. ship: Baltic Sea	139	168	188	82	215	236	276	339	5	8	10	14	-	-		-	22	13
Int. ship: Black Sea	35	45	56	72	52	62	81	100	1	2	3	4	-	-		-	6	8
Int.ship: Mediterran.	725	858	1,068	1,365	1,000	1,234	1,562	1,935	21	41	53	71	-	-		-	123	159
Int. ship: North Sea	277	361	443	192	395	508	649	798	9	18	23	30	-	-		-	50	31
Int.s.: N.E. Atlantic	550	384	494	644	772	565	723	887	15	19	24	32	-	-		-	57	75
Total internat. ship.	1,726	1,816	2,249	2,355	2,434	2,605	3,291	4,059	51	88	113	151	-	-		-	258	286
Tot. Europe + ships	54,327	39,313	17,351	10,578	25,719	26,511	19,890	16,586	24,171	23,537	15,307	10,385	7,631	7,452	5,619	4,932	3,050	2,097
Turkey	1 030	1 519	2 000	2 652	364	691	1118	1112	359	636	794	729	321	373	402	510	305	247

Livestock behind 7.1 gigatonnes of GHGs

There is potential to decrease greenhouse gases from the livestock sector by as much as 30 per cent by just improving methods and techniques – this is the conclusion of a recent report from the FAO.

The livestock sector causes greenhouse gas emissions corresponding to 7.1 gigatonnes of CO_2-equivalents each year. That is 14.5 per cent of the total human-induced global greenhouse gas emissions, according to the report "Tackling climate change through livestock", published by the Food and Agriculture Organization of the United Nations (FAO) in August. This can be compared to the often-cited figure of 18 per cent from their previous report "Livestock's long shadow" from 2006. The model behind it has since been adjusted, resulting in lower estimates for the contribution from land use change, while the impact from methane is assessed as being higher than before. However it all adds up to a heating potential quite similar to the old model. The 3.5 per cent decrease in the relative contribution from livestock is explained by the fact that overall global emissions have increased over the past seven years.

Cattle production is by far the largest emitter, with dairy and beef respectively accounting for 41 per cent and 22 per cent of the sector's emissions (figure 1). Beef is also the product with the highest intensity of emissions (figure 2). One reason why cattle production scores so highly is that ruminants (which also include sheep and goats, but in smaller numbers) produce methane during the natural process of enteric fermentation. This methane constitutes 39 per cent of the sector's total contribution to global warming (figure 3). Another reason is that cattle production requires more feed than other forms of livestock production. Since cattle only produce one offspring each year there will be a larger overhead for the parent generation (which also needs to eat), compared to pigs and chickens. Emissions from all livestock feed production represent 45 per cent of the total sector's emissions. This includes carbon dioxide emissions from land use change, fertilizer production and transport, as well as nitrous oxide emissions from fertilizers and manure applied to arable land.

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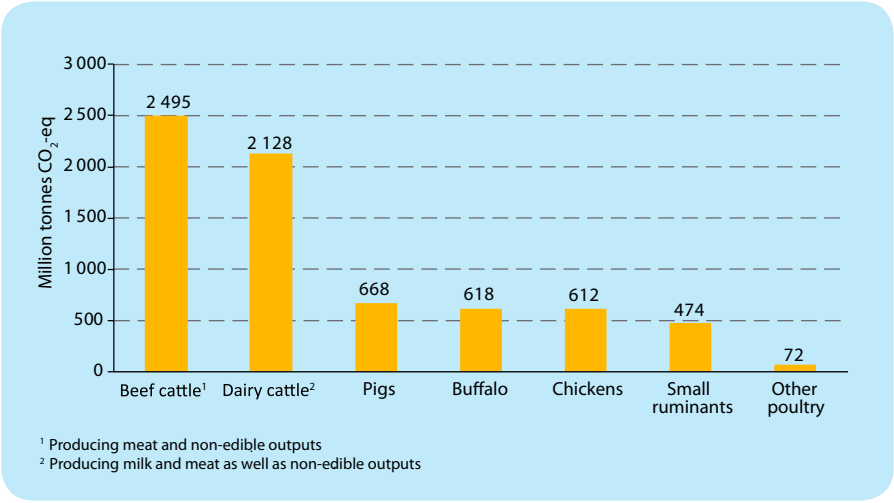
Figure 1 (right) Global estimates of emissions by species (includes emissions attributed to edible products and to other goods and services, such as draught power and wool).



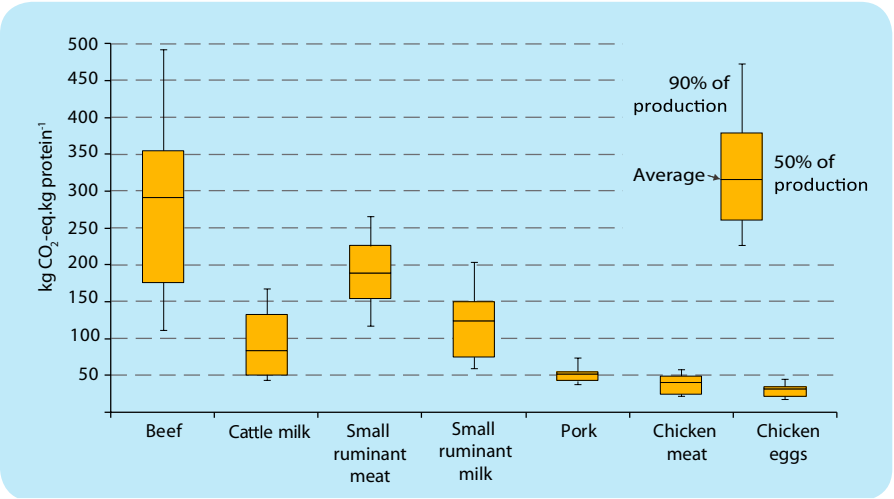


Figure 2 Global emission intensities by commodity.

Turning to geographical differences, emissions are highest (tonnes of CO_2-equivalents per land area) in some regions with intensive livestock production in Europe, India and China. However the highest emission intensities (CO_2-equivalents per kilogram of edible protein) are found in extensive systems in Africa and Latin America. The production system with the highest overall emissions is beef cattle farming in Latin America, with more than a tenth of all global emissions.

There are also variations within production systems in specific regions. This fact is taken into account in the study by modelling the potential reduction of emissions if all farms in the region were to adopt the practices and the technology of the farms with the lowest emission intensities, while keeping production outputs constant. In the report this is called "to close the emission intensity gap". If this was done globally and all farms adopted the standard of the best twenty-five per cent within their region and system, emissions could be reduced by 18 per cent (1.1 gigatonnes) and if all farms adopted the management and technology of the best ten per cent, emissions could decrease by 30 per cent (1.8 gigatonnes).

The authors note that this estimate may be conservative, since it does not take into account all readily available abatement techniques, some of which are currently used only by a fraction of all farmers. But one could also argue that it is optimistic since it is based on the assumption that all the barriers that prevent the lowest performing farms from applying the practices of the best can actually be removed.

As a complement to this rather raw statistical exercise, the FAO also made five case studies of regional livestock systems and estimated the scope for improvements within each system. The highest potential from an emission intensity point of view among those studied was West African sheep and goat production, where emissions per kilo of edible protein could be reduced by 27 to 41 per cent through higher feed quality, preventive health measures, improved breeding and better grazing management.

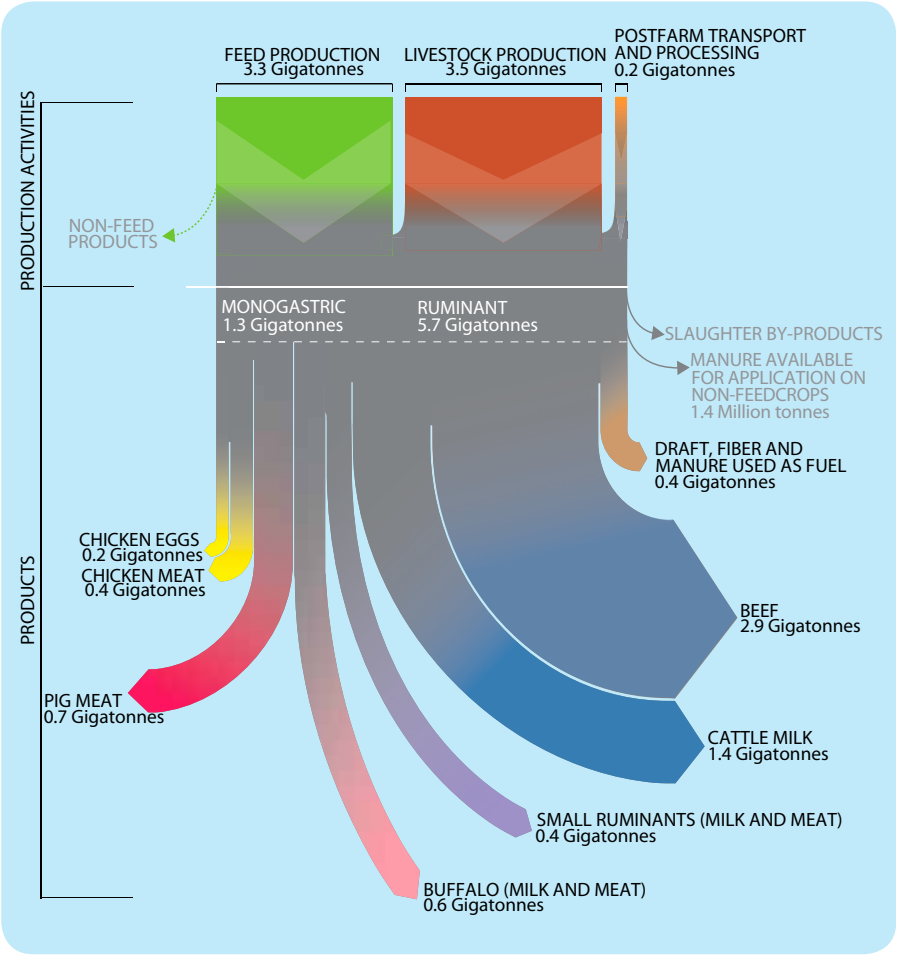
The system with the highest potential in absolute numbers was Latin American beef production. Here it would be possible to reduce emissions by between 190 and 310 million tonnes of CO_2-equivalents by improving animal health and husbandry, grazing management and forage quality.

Dairy production in OECD countries was the only element of the systems scrutinised that is based in developed countries. These systems are already highly efficient when it comes to kilogram of product per animal unit, which also means rather low greenhouse gas emissions per kilogram of product. However three areas for intervention were identified. The first is the use of dietary fat supplements made from linseed oil or cottonseed oil, which limit the production of methane from enteric fermentation. Another mitigation area applies to farms that use liquid manure treatment. A wider adoption of techniques for anaerobic treatment and production of biogas could reduce methane emissions as well as replacing fossil fuels. The third option is to adopt energy-efficient technology and use low-carbon energy sources. These measures could together reduce emissions by 25–28 per cent in North America and 11–14 per cent in western Europe. The difference is mainly due to the fact that liquid manure systems are more common in North America, which therefore has greater scope for improvement.

It should be noted that there are two deliberate but important limitations in the scope of the report:

- There is a high risk of various rebound effects. Increased efficiency might induce increased production, due to more opportunities to increase animal density, lower prices of products that stimulates demand or higher revenues that permit investment in expansion. This risk is to some extent considered and the authors suggest that it could

Figure 3 (right) Greenhouse gas emissions from global livestock supply chains, by production activities and products.



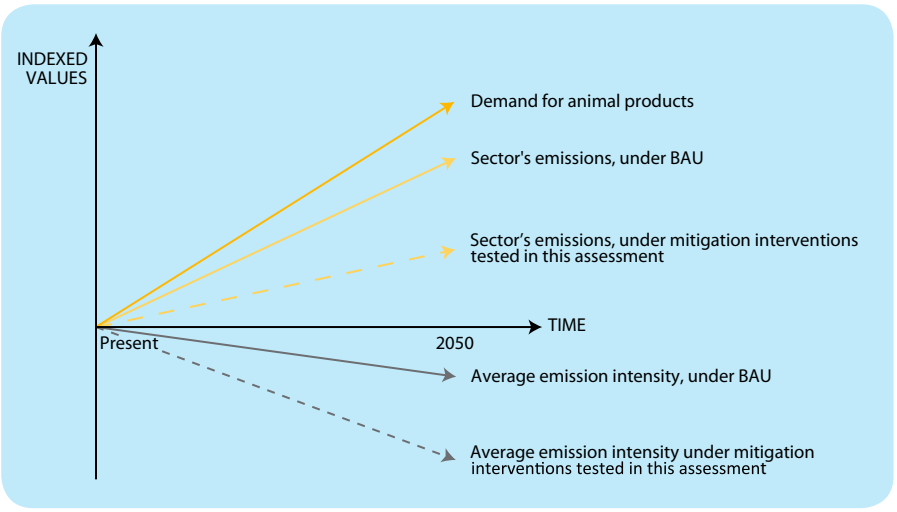


Figure 4 Interactions between trends in livestock production, GHG emissions and mitigation efforts.

be addressed by setting a ceiling for total emissions through tradable or non-tradable emission permits.

- Secondly the report only considers measures in the area of production. Another important area for intervention is to limit demand for animal products. Even if the sector managed to close the 30 per cent emission intensity gap, emission reductions would be offset by an increase in production induced by growing demand in the coming decades (figure 4).

But the need for demand-side measures does not exclude production measures. One interesting aspect is that most greenhouse gas emissions from the sector can be linked to losses in nutrition, energy or soil organic matter. Or in other words there are potential wins in other areas for farmers to be made along with greenhouse gas mitigation. If nitrous oxide emissions from the soil are reduced, more nitrogen will stay within the system and less money will be spent on fertilizers. More energy-efficient production will reduce costs for electricity and heating. Sequestration of carbon or less decomposition of carbon will improve the quality of the soil.

But of course there are often issues such as finances or lack of knowledge that prevent farmers from picking these win-win fruits of greenhouse gas mitigation. The last chapter deals with how policy could be designed to facilitate the dissemination of low-carbon practices.

- This could include providing infrastructure for knowledge transfer such as demonstration farms, field schools, farmer networks or sector round-tables.
- Support for research and development.
- Financial instruments, such as low-interest loans or micro-financing for investments.

There are also some pitfalls that policy makers must watch out for. For small farmers in developing countries, animals are not only kept simply for production reasons. Some animals are kept for risk-mitigation, financial services, draught power and the provision of manure from crops. With a pure production perspective some of these services could be lost.

Carbon sequestration is another area of concern. The FAO estimates that improved grassland management has a global potential to sequester 409 million tonnes of CO_2-equivalents per year (6 per cent of all agricultural emissions). The main limitation of carbon sequestration as a measure is that it is extremely difficult to guarantee its permanence. Researchers have observed large losses of soil carbon in Europe during droughts. Additionally, the report notes that most grasslands probably reach a saturation level with time and that the potential then subsides.

Kajsa Lindqvist

Report: **Tackling climate change through livestock.** Available at: *http://www.fao.org/ag/againfo/resources/en/publications/tackling_climate_change/index.htm*

Climate policy targets for 2020 – is the EU on track?

The European Union as a whole has reduced greenhouse gas emissions by 18-27 per cent between 1990 and 2012. To achieve 20 percent reductions by 2020 will be an easy walk.

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Amount of effort required by the European Union to reach the common 20 per cent target.

Environmental NGOs have demanded for many years that the EU should reduce emissions of domestic emissions of greenhouse gases least 40 per cent from 1990 levels by the year 2020. This is based on conclusions in reports from the UN climate science body, the IPCC, that outline the steps we need to take to avoid global warming of 2 degrees from pre-industrial levels. But the EU's present targets include only a 20 per cent reduction in greenhouse gas emissions from 1990 levels.

Other EU targets are to raise the share of energy consumption produced from renewable resources to 20 per cent, and to improve energy efficiency by 20 per cent. According to a new European Environment Agency (EEA) assessment report[1] the EU is largely on track towards its 20-20-20 targets, but member states are showing mixed progress towards these targets. Nevertheless the EEA says in the report that the EU as a whole could reduce greenhouse gases emissions by 21 per cent in 2020 with the set of national measures already adopted.

According to the report, the EU reduced emissions between 1990 and 2012 by approximately 18 per cent – so it is already close to the target of a 20 per cent reduction in emissions by 2020. The EU was also on track towards its common target for renewable energy consumption; renewables contributed 13 per cent of final energy consumption in 2011, which should increase to 20 per cent by 2020.

Emissions fell almost 1 per cent in 2012, according to approximate 2012 greenhouse gas emissions data published recently. The EEA report also builds on these figures, providing for the first time a complete picture of emission reductions achieved under the first commitment period of the Kyoto Protocol (2008–2012).

The EEA report concludes that the 15 member states with a common commitment under the Kyoto Protocol (EU-15) are estimated to have reduced emissions between 2008 and 2012 by 12.2 per cent, well beyond the 8 per cent target required under the Kyoto Protocol.

Moreover, almost all European countries with an individual greenhouse gas reduction target under the Kyoto Protocol (26 member states of the European Union plus Iceland, Liechtenstein, Norway and Switzerland) were on track towards their respective targets. Two EU member states do not have an individual target for 2008–2012.

The EEA report says that the EU Emissions Trading System (EU ETS) supported many member states in achieving Kyoto targets. When targets were agreed for ETS and non-ETS sectors, some countries put more emphasis on achieving emission reductions in economic sectors that are not part of the ETS, such as road transport and households. The EEA finds that these countries need to acquire relatively large quantities of Kyoto emission credits to reach their individual targets. This concerns in particular Austria, Liechtenstein, Luxembourg and Spain.

An analysis by Greenpeace[2] shows that the European Union (EU), with its 28 member states, is the world's third-largest emitter of greenhouse gases, accounting for about 10 per cent of today's annual global emissions and 13 per cent of 1990–2010 cumulative emissions. Renewable energy accounted for 13 per cent of the EU's final energy consumption in 2011. Looking at Gross Inland Consumption in 2011, the share of oil was 35 per cent, gas 24 per cent, coal and other solid fuels 17 per cent, nuclear 14 per cent and renewables 10 per cent.

Concerning the EU pledge to cut its emissions by 20 per cent by 2020, compared to 1990 levels, Greenpeace also considers the EU's 2020 effort as inadequate because in 2012 the EU's emissions were already 18 per cent below 1990 levels, while GDP has grown by more than 40 per cent over the same period. Taking into account emission reductions elsewhere (offsets), EU emissions had fallen nearly 27 per cent below 1990 levels by 2012.

The analysis says that the EU's Emission Trading Scheme (ETS) has been a less successful policy. According to Greenpeace the ETS is becoming a barrier to Europe's environmental progress, based on the following assumptions: "The scheme was expected to deliver 2.8 billion tonnes of emission reductions by 2020, but over-allocation, an influx of international offset credits and the economic recession, have created a huge oversupply of allowances, and undermined the functioning of the ETS. The price of EU emission allowances is currently around €5 per tonne. The EU is poised to temporarily remove 900 million tonnes of carbon allowances from the scheme, storing these allowances for use after 2020 ("back-loading"). But EU policymakers have failed to provide a structural solution for the ETS. Moreover, the reintroduction of the stored ETS allowances after 2020 will significantly weaken any post-2020 climate action by the EU".

Reinhold Pape

[1]EEA report: *http://www.eea.europa.eu/publications/trends-and-projections-2013*

[2]Greenpeace report: *http://www.greenpeace.org/international/Global/international/briefings/climate/COP19/Briefing-EU.pdf*

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Parliament backs deal on leisure boats

The European Parliament has endorsed an agreement reached with EU member states in May on slightly stricter exhaust emission standards for leisure watercraft such as motorboats, sailing yachts and water scooters.

Originally proposed by the European Commission in 2011, and in line with standards in place in the US for several years, the new EU standards mean that new engines will be designed to emit 20 per cent less nitrogen oxides and hydrocarbons and 34 per cent less particulate matter.

Manufacturers will be given three years to comply following the directive's entry into force. Small companies selling spark ignition engines below 15kW will have three more years The precise date of entry into force will be determined once the new law has been published in the EU's official journal. The directive needs to be formally endorsed by the Council of Ministers before becoming law.

Source: Ends Europe Daily, 9 October 2013

Ship NOx control imperative for US ozone cuts

Air regulators in the United States fear that their long-running efforts to curb ozone forming emissions in order to meet national ozone ambient air standards could be undermined if the International Maritime Organization (IMO) agrees to delay by five years a global deal to cut air pollution from ships.

In May 2013, Russia and some other countries urged the IMO to amend and delay by five years (from 2016 to 2021) the mandate for ships within emission control areas (ECAs) to apply Tier III standards that will cut NOx emissions by some 80 per cent. A final decision on the issue will be taken by IMO in early April.

The delay would not stall the Tier III mandate for US-flagged ships because the Environment Protection Agency (EPA) has already issued domestic Clean Air Act rules to implement the ECA, but it would mean that the mandate for foreign-flagged vessels would be delayed. As a result, anticipated NOx cuts from foreign flagged vessels – which make up the vast majority of ocean-going vessels that enter US ports – could be delayed by five years, exacerbating the ozone problem.

Chris Salmi, a regulator with New Jersey's Department of Environmental Protection and chair of the Ozone Transport Commission's (OTC) mobile source committee, said that a five-year delay in NOx control for ships in coastal waters would endanger "huge benefits" that would otherwise flow from the pact. The ECA as planned could cut ozone levels in the US by two parts per billion (ppb), a significant cut. "We don't want to see that eroded," he said.

Source: Car Lines No. 5, October 2013

A five-year delay of Tier III standards within ECAs will maintain high ozone levels in the US.

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CO_2 emissions limits for new US power plants proposed

On 20 September the United States Environmental Protection Agency (EPA) proposed the country's first Clean Air Act standards to cut carbon pollution from new power plants to combat climate change and improve public health.

Power plants are responsible for roughly one-third of the country's greenhouse gas emissions.

The proposed rules will require new fossil fuel fired power plants to capture and store a portion of the carbon dioxide (CO_2) they produce. Coal emits about twice as much CO_2 as natural gas when burned to make power.

According to the EPA's proposal, new coal-fired units should meet a limit of 1,100 pounds of CO_2 per megawatt-hour (MWh). The limit for new large natural gas-fired turbines is set at 1,000 pounds of CO_2/MWh, while new small natural gas-fired turbines would need to meet a limit of 1,100 pounds.

A new coal plant without carbon capture is expected to emit some 1,600 pounds of CO_2/MWh while the average US coal plant emits 1,768 pounds. To meet the new limit, coal plants would have to capture and store about one third of the CO_2 they produce. Natural gas plants would not be required to capture their emissions.

David Goldston at the Natural Resources Defence Council said: "The most important thing about the new plant rule is that it's crossing the Rubicon to say that we are going to put limits on carbon pollution. It's important as a precursor for existing-plant rules."

A more far-reaching set of final rules governing emissions from existing power plants is due by June 2014. With low-cost natural gas displacing coal in many power facilities, rules on existing plants will take on heightened importance.

The proposed rules will be open for public comment for 60 days before becoming final.

Sources: US EPA press release and bloomberg.com, 20 September 2013.

More information: http://www2.epa.gov/carbon-pollution-standards

Carbon dioxide causes 80% of global warming

Radiative forcing increased by 32 per cent between 1990 and 2012, of wich 25 per cent is due to carbon dioxide. The remaining is from other greenhouse gases.

Carbon dioxide, mainly from fossil-fuel-related emissions, accounted for 80 per cent of global warming since 1990 according to the World Meteorological Organization's (WMO) latest report from November 2013. Between 1990 and 2012 there was more than a 25 per cent increase in radiative forcing – the warming effect on our climate – because of carbon dioxide (CO_2).

Carbon dioxide is the single most important greenhouse gas emitted by human activities such as fossil fuel burning and deforestation. CO_2 lingers in the atmosphere for hundreds if not thousands of years and so will determine global mean surface warming by the late 21st century and beyond, states the WMO. "Most aspects of climate change will persist for centuries even if emissions of CO_2 are stopped immediately."

The WMO says that on the global scale, the amount of CO_2 in the atmosphere reached 393.1 parts per million in 2012, or 141 per cent of the pre-industrial level of 278 parts per million. The amount of CO_2 in the atmosphere increased by 2.2 parts per million from 2011 to 2012, which is above the average 2.02 parts per million per year for the past 10 years, showing an accelerating trend.

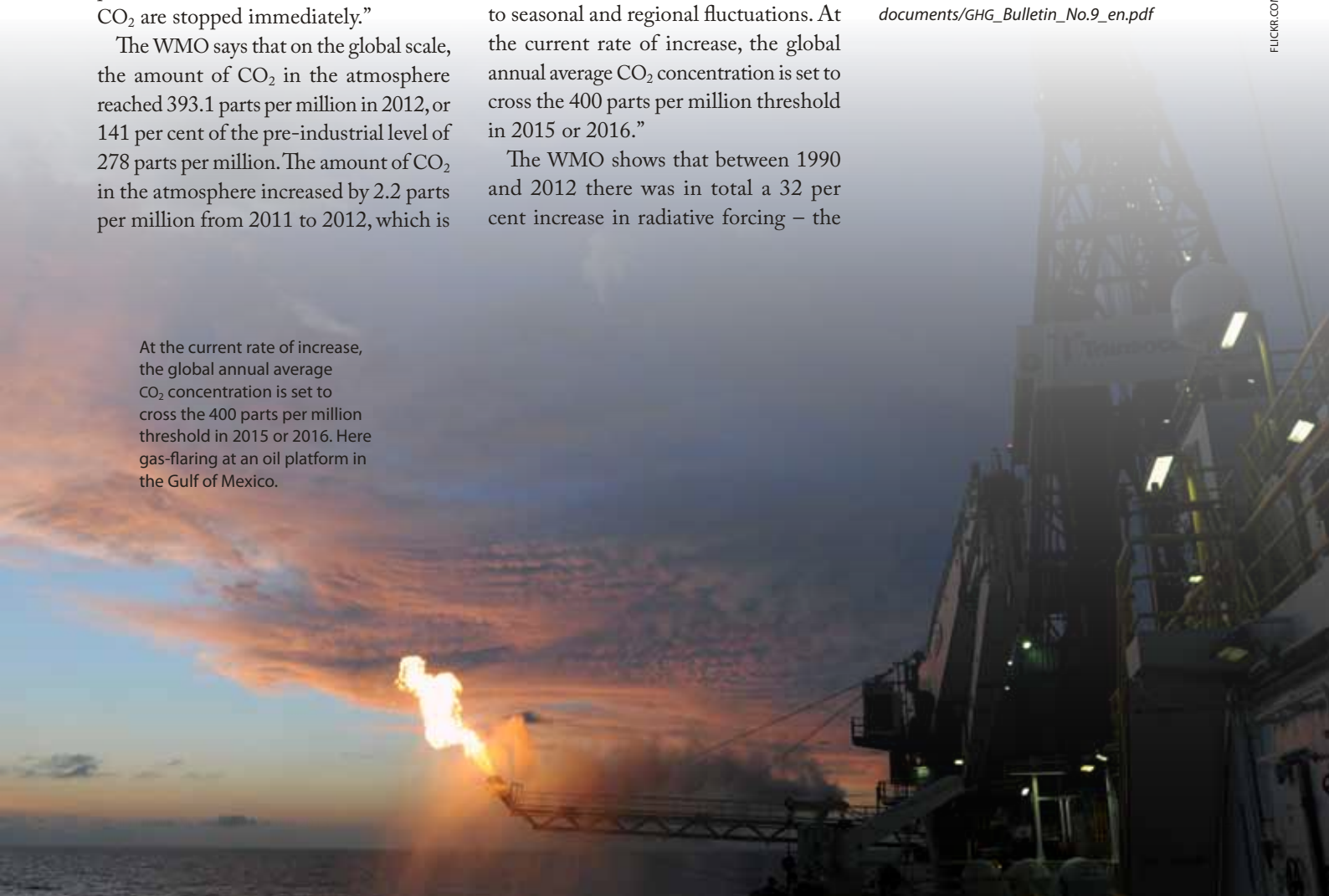
According to the WMO, since the start of the industrial era in 1750, the global average concentration of CO_2 in the atmosphere has increased by 41 per cent. "Monthly observed concentrations of CO_2 in the atmosphere exceeded the symbolic 400 parts per million threshold at several Global Atmosphere Watch stations in the Arctic during 2012. During 2013, hourly and daily concentrations passed this threshold in other parts of the world, including at Mauna Loa, Hawaii, the oldest continuous atmospheric measurement station in the world which is widely regarded as a benchmark site in the Global Atmosphere Watch. Concentrations of CO_2 are subject to seasonal and regional fluctuations. At the current rate of increase, the global annual average CO_2 concentration is set to cross the 400 parts per million threshold in 2015 or 2016."

The WMO shows that between 1990 and 2012 there was in total a 32 per cent increase in radiative forcing – the warming effect on our climate – due to greenhouse gases. In addition to the 25 per cent increase due to carbon dioxide (CO_2) mentioned above, the remaining 7 per cent comes from other heat-trapping long-lived gases such as methane, nitrous oxide, ozone-depleting chlorofluorocarbons (CFCs), as well as hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs).

The total radiative forcing by all long-lived greenhouse gases in 2012 corresponds, according to WMO, to an equivalent CO_2 concentration of 475.6 parts per million, compared to 473.0 parts per million in 2011.

Reinhold Pape

WMO Greenhouse gas bulletin, The state of greenhouse gases in the atmosphere based on global observations through 2012. Available at: *http://www.wmo.int/pages/prog/arep/gaw/ghg/documents/GHG_Bulletin_No.9_en.pdf*



At the current rate of increase, the global annual average CO_2 concentration is set to cross the 400 parts per million threshold in 2015 or 2016. Here gas-flaring at an oil platform in the Gulf of Mexico.

Global warming unequivocal

The first IPPC carbon budget to limit global warming to 2 degrees will be exceeded in three decades with current rate of carbon dioxide emissions.

After a four-day meeting in Stockholm, on 27 September, the Intergovernmental Panel on Climate Change (IPCC) Working Group I presented its long-awaited contribution to the fifth assessment report on Climate Change. The over 1,000-page report by 259 lead authors has been reviewed by more than one thousand experts, who made 54,677 comments.

In the fourth report from 2007 the IPCC concluded that it is "very likely" that human emissions of greenhouse gases, rather than natural variations, are warming the planet's surface. In this report, the wording has intensified to "extremely likely". (BOX) Warming of the climate system is described as "unequivocal". Each of the past three decades has "very likely" been warmer than any of the preceding decades since 1850. However global warming is also observed over much longer time periods. In the northern hemisphere, the period 1983–2012 was "likely" the warmest 30-year period of the last 1,400 years. This time period includes the medieval climate anomaly (AD 950–1250), a warm period sometimes highlighted by climate sceptics as evidence against human-induced global warming.

Levels of carbon dioxide, methane and nitrous oxide are "unprecedented" in at least 800,000 years. Concentrations of carbon dioxide have increased by 40 per cent since pre-industrial times, most of it originating from fossil fuels, but also from land-use change. Oceans have absorbed about 30 per cent of the emitted carbon dioxide, a process that has caused ocean acidification.

How the IPCC describes probability

Term	Likelihood of the outcome
Virtually certain	99–100 %
Extremely likely	95–100 %
Very likely	90–100 %
Likely	60–100 %
More likely than not	>50–100%
About as likely as not	33–66%
Unlikely	0–33 %
Very unlikely	0–10 %
Extremely unlikely	0–5 %
Exceptionally unlikely	0–1 %

For the first time the IPCC presents figures for how much CO_2 can be emitted to give different probabilities of limiting warming to less than 2 degrees compared to 1850 (table). Of the total carbon budget for the higher degree of probability (66%) (3,670 $GtCO_2$) more than half (1,890 $GtCO_2$) was already emitted by 2011. Taking into account other anthropogenic non-CO_2 forcers such as nitrous oxide, methane and particles the space left for future emissions is even smaller. Assuming that current emission levels remain constant (they are actually increasing), there is less than 30 years before the entire emissions budget is exhausted. For a higher degree of probability or a lower temperature target, time is even scarcer.

In its press release the IPCC calls for "substantial and sustained reductions of

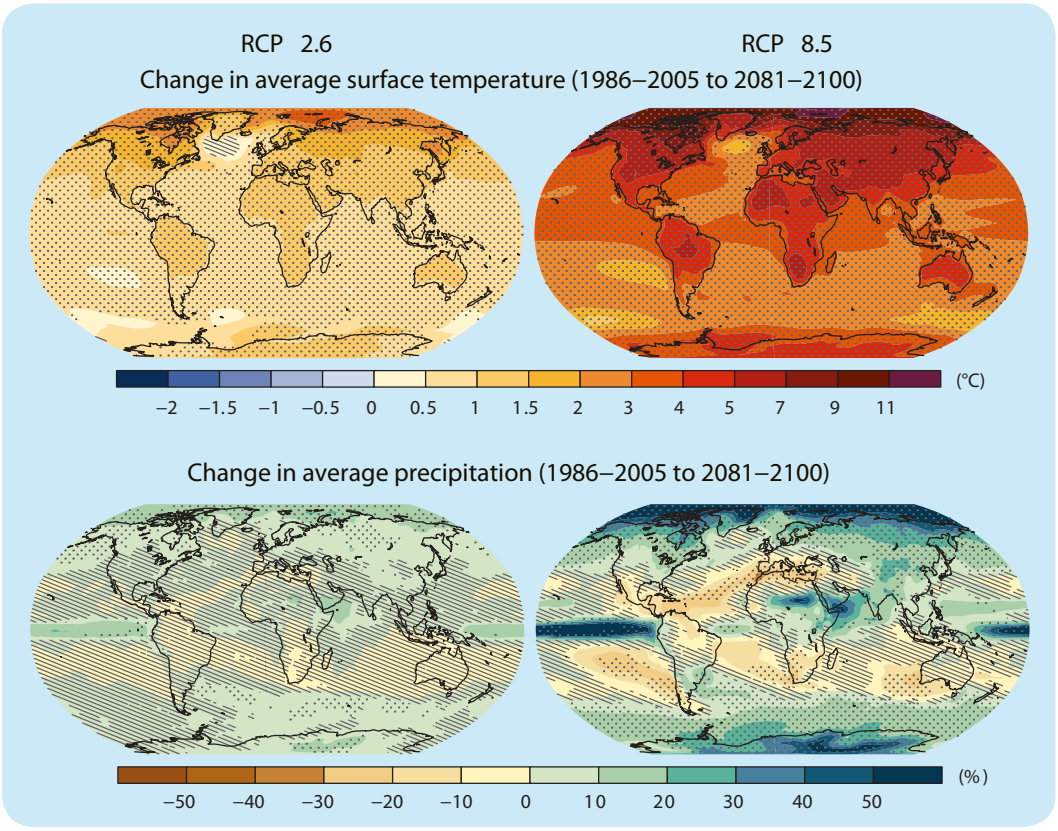


Figure: Maps of CMIP5 multi-model mean results for the scenarios RCP2.6 and RCP8.5 in 2081–2100 of annual mean surface temperature change, average percent change in annual mean precipitation.

greenhouse gas emissions" to limit climate change.

The IPCC also presents a set of new emission scenarios, known as Representative Concentration Pathways (RCPs). Unlike the scenarios presented in the previous reports these cover four greenhouse gas concentration (not emissions) trajectories and describe possible climate futures, all of which are considered conceivable depending on how much greenhouse gases are emitted in the years to come. The four RCPs, RCP2.6, RCP4.5, RCP6 and RCP8.5, are named after a possible range of radiative forcing values in the year 2100 (+2.6, +4.5, +6.0, and +8.5 W/m^2, respectively).

The advantage of using concentrations in the atmosphere instead of emission pathways is that you avoid uncertainties related to the global carbon cycle.

In the scenario with the lowest greenhouse gas concentrations (RCP2.6), global mean temperatures are expected to increase by 0.3–1.7°C compared to the period (1986–2005) at the end of the century. For the RCP8.5 scenario a warming of 2.6–4.8°C is expected. In all scenarios heating is expected to be greatest in the Arctic region and larger over land than over the oceans (figure).

Even under the RCP2.6 scenario the Arctic sea ice will reduce by half (-43 per cent) in summer by the end of the century and almost disappear (-94 per cent) under the RCP8.5 scenario. Spring snow cover in the northern hemisphere is also expected to shrink by 15–55 percent for RCP2.6 and by 35–85 per cent for RCP8.5.

Table: Remaining scope for CO_2-emissions according to the IPCC for different probabilities if warming is to be limited to 2 degrees compared to 1850. As the impact of non-CO_2 forcing can vary between different scenarios, the IPCC budget has been based on a calculation that only takes into account warming caused by carbon dioxide and assumes non-CO_2 forcing according RCP2.6. However it is unlikely that all of the non-CO_2 forcing could be eliminated, so the first figure should be considered more as a theoretical maximum. By dividing the remaining carbon budget by the 2012 annual emission level of 35 $GtCO_2$, we get an idea of how much time is left before the margin is used up, provided that future emissions remain at the 2012 level.

Probability of limiting warming to less than 2 degrees	Total cumulative emissions left after 2011, not accounting for non-CO_2 forcing	Total cumulative emissions left after 2011, when accounting for non-CO_2 forcing	Time left at present emission levels, not accounting for non-CO_2 forcing	Time left at present emission levels, when accounting for non-CO_2 forcing
>33%	3,870 $GtCO_2$	1,410 $GtCO_2$	111 years	**40 years**
>50%	2,550 $GtCO_2$	1,120 $GtCO_2$	73 years	**32 years**
>66%	1,780 $GtCO_2$	1,010 $GtCO_2$	51 years	**29 years**

Global sea level rise is affected directly by the melting of glaciers and ice sheets, but also by thermal expansion when oceans get warmer. Oceans have accumulated 90 per cent of the additional energy added to the climate system over the past four decades (1971–2010). Uncertainties here are rather larger, but the rate of sea-level rise will probably increase more than we have seen in the past 40 years. Under a low concentration pathway (RCP2.6) it is expected to rise by 0.26–0.40 metres in the coming century and if greenhouse gas concentrations are allowed to increase more (RCP8.5) sea levels would rise by 0.45–0.82 over the same period.

Changes in the global water cycle are even harder to predict, but we can expect that the contrast between wet and dry regions and dry and wet seasons will be greater as the climate gets warmer, though there will be regional exceptions. More instances of extreme rainfall are also to be expected as temperatures increase.

During spring the IPCC Working Group II and Working Group III will release their reports. A synthesis report of the entire fifth assessment cycle will finally be presented in October 2014.

Kajsa Lindqvist

Report: **Climate Change 2013: The Physical Science Basis, IPCC Working Group I Contribution to AR5.** Available at: *http://www.ipcc.ch/*

Anti-coal movement in Europe is growing

New coal power stations are planned to be built around Europe, but there is also growing resistance in many countries including Germany, Poland and Czech Republic.

All over Europe people are mobilising to oppose new coal projects and demand the phasing out of coal for energy production. The International Energy Agency has announced that no new coal power stations should be built in Europe if UN climate targets are to be reached. Climate Action Network argues for net zero emissions of greenhouse gases by 2050 globally.

In many parts of Europe citizen initiatives are organising resistance against new coal power stations, coal mining and plans to build carbon capture and storage infrastructure and projects. Lignite mining is threatening many historic villages, the livelihoods of people and destroying landscapes. But often this resistance has already been going on for decades without attracting significant public attention. Villages now destroyed by lignite mining, such as Lacoma and Heuersdorf[1] in Germany or Libkovice[2] in the Czech Republic, have been fighting for many years and have become symbols for this anti-coal movement.

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Anti-coal protest in North-Rhein Westfalia, Germany.

Many new coal power stations are planned to be built in eastern and southeastern Europe, but the local resistance against these projects is now starting to pick up momentum. In Poland, for example, Greenpeace organised protest demonstrations in November 2013 at six different coal power stations[3] and, like the Institute for Sustainable Development in Poland, has proposed plans for phasing out coal.

In Germany, the movement is very active in the states of Brandenburg[4], Sachsen and North-Rhein Westfalia[5]. Dozens of villages with thousands of inhabitants face the threat of losing their homes. In the states of Niedersachsen and Schleswig-Holstein, as in Denmark and the Netherlands, villages are fighting CCS projects[6] and one can see anti-CCS banners and flags in many locations.

In the state of Hamburg[7], citizens and politicians have tried to stop the building of a new 1,600 MW hard-coal power station at Moorburg in the harbour using all possible legal means, including reference to German and EU air pollution, nature conservation and water management legislation, but without success. Environmental NGOs such as BUND and NABU have organised street demonstrations, public hearings and public referendums.

Gruene Liga Umweltgruppe Cottbus has very actively supported the local villagers in Brandenburg in their fight for many years. In North Rhine-Westphalia, BUND has run one legal action after the other against old and new coal power stations and mining projects. But the experience seems to be that present water, air and landscape protection legislation in Germany and the EU is not strong enough to stop such coal projects, and has mostly only been successful in delaying the planning process.

Another 1,600 MW RWE coal-fired power station at Hamm in North-Rhine Westphalia is planned to go into operation soon. According to news from Platts, German power plant operators plan to add 7.3 GW of new coal-fired capacity by 2015, with almost 5 GW set to come online next year.

On the other hand there are also some good signs. Germany's renewable energy industry has shown its strength according to news reports from Global Call for Climate Action (GCCA). "Shattering through another solar power record last summer (2013) utility company RWE announces it will close fossil fuel power plants as they are no longer competitive. RWE said 3.1 GW of generating capacity would be taken offline, as it suspends or shuts down some of its gas and coal-fired power stations. This represents 6 per cent of RWE's total capacity. It said a boom in solar energy meant many of its power stations were no longer profitable. The RWE statement read: 'Due to the continuing boom in solar energy, many power stations throughout the sector and across Europe are no longer profitable to operate. During the first half of 2013, the conventional power generation division's operating result fell by almost two-thirds'." According to GCCA, German rival E.On has also said it has shut down or left idle 6.5 GW of generating capacity.

Environmental NGO networks in Europe such as Friends of the Earth, WWF, Greenpeace, Climate Action Network and the European Climate Foundation, are now all actively campaigning to phase out coal in Europe as soon as possible.

Reinhold Pape

[1] Heuersdorf: *http://www.heuersdorf.de/*

[2] Libkovice: *http://www2.oakland.edu/shatteringearth/iconography.cfm?Icon=16*

[3] Greenpeace press release 9 November 2013, *http://www.greenpeace.org/international/en/press/releases/Greenpeace-protests-at-six-coal-plants-across-Poland/*

[4] Brandenburg: *http://www.lausitzer-braunkohle.de/english.php*

[5] North-Rhine Westfalia: *http://www.bund-nrw.de/themen_und_projekte/braunkohle/*

[6] CCS: *http://www.kein-co2-endlager.de/index.php?option=com_content&view=article&id=54&Itemid=2*

[7] Hamburg: *http://www.kohle-protest.de/hamburg/*

Fuel-efficient cars one year further away. FLICKR.COM/FRANKSTEINER/CC BY

Watered down car deal

A one-year delay in implementation and an extension of super credits was the result when member states and the European Parliament renegotiated a CO_2 deal for cars.

It was in June that Germany demanded to re-open the already finalised deal on how the 95 g CO_2/km target for cars should be achieved. Germany then persuaded the current Lithuanian presidency to take this item off the agenda until after the German federal elections in September. It was not until the end of November that member states and representatives of the European Parliament managed to settle on a new agreement with some "additional limited flexibility", as the Lithuanian presidency chose to phrase it.

In the original deal all cars had to comply with the 95-gram target by 2020, but in the new one there will be a phase-in period, so that by 2020 just 95 per cent of the car-sales will be included, and all new sales will not be covered until 2021.

In addition, the car industry will be able to use a 7.5 g CO_2/km super credit for sales of electric cars between 2020 and 2022. That is an increase of 5g compared to the original deal this summer. The super-credit system also implies that there will be no full implementation of the 95 g CO_2/km target until 2023.

"We accepted a very limited phase-in of one year only, combined with super credits. We regret that some member states in the Council have tried to delay confirmation of a deal between the institutions. This could have dragged the procedure out until the next Parliament, while the automotive sector needs long-term certainty for its investments," said Environment Committee chair Matthias Groote (S&D, DE).

The watering down of the June agreement will lead to additional fuel consumption that will cause approximately 50 million tonnes of extra CO_2 emissions, according to Transport and Environment (T&E).

Though they are not happy about the deal, Greg Archer from T&E feels that it is time to move on: "Fuel economy standards are Europe's single most effective policy to drive down fuel consumption and CO_2 emissions. The outcome of this law could have been so much better, but at least we can start talking about the future. Europe should stay ahead in the race for efficient vehicles, so now we need an ambitious target for 2025, and fuel efficiency standards for trucks too".

Kajsa Lindqvist

California to adopt new ultra-low NOx standards

The California Air Resources Board (CARB) plans to adopt in December new, optional ultra-low nitrogen oxides (NOx) emission standards for diesel truck engines. CARB says it wants to use incentives to encourage engine makers to introduce new technologies to reduce NOx below the current mandatory diesel engine emission standards for model years 2010 and later, set at 0.2 grams NOx per brake horsepower-hour. The proposed new standards will be between 50 and 90 per cent stricter than the current one. The board is also considering a future mandatory low-NOx engine standard, but is waiting on pending research to support such a rulemaking.

Source: Car Lines No 5, October 2013

US states join forces to promote electric cars

The governors of California, New York and six other states have agreed to put 3.3 million so-called zero-emission vehicles on the road within twelve years, which they said will help the environment and boost the economy. Zero-emission vehicles include battery-electric vehicles, plug-in hybrid-electric vehicles and hydrogen fuel-cell electric vehicles. Electric vehicles will reduce emissions of air pollutants and greenhouse gases and also save drivers on fuel costs over time.

The states will start by harmonising building codes to make it easier to construct electric car charging stations and will consider financial incentives to promote zero-emission vehicles. The governors of Connecticut, Maryland, Massachusetts, Oregon, Rhode Island and Vermont also signed the agreement.

Source: PlanetArk, 25 October 2013
http://planetark.org/enviro-news/item/70172

Energy, climate and air quality policy synergies

Significant co-benefits can be realised for health, ecosystems and the economy by linking climate change policies with those for air pollution control and energy security.

Reducing our reliance on fossil fuels is necessary to stop global climate change. But it will also cut air pollution, thereby improving the protection of health and ecosystems, and it can improve energy security. The co-benefits of climate policy are getting increasing attention, not least since they also bring significant financial savings. Four examples of recent scientific studies on this topic are summarised below.

Switching to clean energy would pay for itself almost immediately, according to a study[1] published recently in Nature Climate Change. This is because actions to reduce greenhouse gas emissions often also reduce co-emitted air pollutants, thus bringing co-benefits for air quality and human health. So reducing the burning of fossil fuels will cut air pollution, save lives and therefore money.

The co-benefits of global greenhouse gas (GHG) reductions on air quality and human health were simulated using a global atmospheric model and consistent future scenarios, and by including two mechanisms: reductions in co-emitted air pollutants, and the effects on air quality of slowing climate change.

Relative to the reference scenario, the GHG reduction scenario results in significant lowering in the concentrations of health-damaging particulate matter ($PM_{2.5}$) and ozone. The global health co-benefits of GHG mitigation result in an estimated 0.5 million avoided premature deaths in 2030, increasing to 1.3 million in 2050, and to 2.2 million in 2100.

From estimates of how much society values a human life, it is deduced that investing in alternative energy supplies should be worth the cost. The global average marginal co-benefits of avoided mortality are US$50–380 per tonne of carbon dioxide (CO_2), which exceed the marginal abatement costs for CO_2 in 2030 and 2050, and are within the low range of costs in 2100. East Asian co-benefits are 10–70 times the marginal cost in 2030.

Note that the co-benefits are likely to be underestimated because some health impacts are not included, such as mortality to people younger than 30 years of age and morbidity effects of air pollutants. Moreover, reduced air pollution damage to ecosystems is not accounted for.

Overall, the conclusion offers a strong incentive to countries to start cutting back on fossil fuels as soon as possible, not least as the co-benefits of avoided air pollution mortality alone can justify substantial reductions in GHG emissions. Air quality and health co-benefits, especially as they are mainly local and near-term, can therefore provide strong additional motivation for transitioning to a low-carbon future.

Another study[2], published in Climatic Change, points to the benefits of better integration between policies on climate change mitigation, air pollution control and energy security. Here, an integrated assessment model of the global energy system was used to develop and analyse different energy futures up to 2030.

It was shown that an early introduction of climate change mitigation measures, such as renewable energy sources and energy efficiency, would reduce both GHG emissions and air pollutant emissions and related health impacts. Although a strong climate policy could lead to increased spending, these costs could be partly offset by lower costs for air pollution control. According to the study, overall savings could amount to USD100–500 billion a year by 2030, i.e. almost half the level of today's investments in the global energy system.

Improving energy efficiency and focussing on regionally sourced renewables will also benefit energy security by leading to lower imports of fuel, making countries less reliant on foreign supplies. Moreover, it will result in a more diverse energy mix and improve the resilience of national or regional energy systems. The study suggests that early spending on climate measures could save up to USD130 billion a year by 2030 that would otherwise had to have been invested in measures to achieve energy security.

Published in Global Environmental Change, the third study[3] examines scenarios of outdoor and household air pollution and related health impacts in 2030, given different sets of policies on air pollution, climate change and access to clean cooking fuels.

It is estimated that up to 80 per cent of the global population is still exposed to levels of air pollution that far exceed the recommended air quality guideline established by the World Health Organisation (WHO) of no more than 10 micrograms per cubic metre ($\mu g/m^3$) as an annual mean for $PM_{2.5}$.

In developing countries, like those in South Asia and Africa, emissions from cooking stoves account for more than half of the PM emissions, and recent research has been looking into the public health and climate co-benefits of improved access to modern cooking fuels and stoves in developing countries.

From the scenario analysis it was found that by 2030 implementation of all current and planned air pollution legislation would be inadequate to meet the WHO guideline, with global population-weighted anthropogenic $PM_{2.5}$ concentrations rising to 34 $\mu g/m^3$, compared to 26 $\mu g/m^3$ in 2005.

However, significant health improvements would result under scenarios where current and planned air pollution legislation are coupled with increased clean energy access for households. Even greater health

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Switching to clean energy would pay for itself almost immediately.

improvements were seen under scenarios combining more stringent air pollution controls with enhanced energy access and climate change measures.

It was found that the direct costs of air pollution control are significantly reduced in the combined scenarios, as the fuel shifts and efficiency improvements resulting from climate policy measures limit the need for end-of-pipe technologies.

It is concluded that the greatest improvements in global air quality are achieved through a combination of stringent pollution control policies, climate change policies and improved energy access.

Conducted as part of the EU Climate Cost project, the fourth study[4] assessed the impacts on air pollution of international climate change policies consistent with meeting the target of limiting global warming to below 2°C. To achieve this target, global CO_2 emissions were reduced by 80 per cent by 2050.

As a result of the lower fossil fuel use in the climate scenario, emissions of air pollutants also came down – by 2050 the emissions of SO_2, NOx and $PM_{2.5}$ fell by 70, 60 and 30 per cent respectively, compared to the baseline scenario. These reductions would in turn cut global air pollution control costs by 54 per cent, equivalent to a cost saving of about €250 billion per year in 2050. Around one third of these financial benefits would occur in China

Specifically for the EU, energy efficiency improvements and phasing out of fossil fuel use needed to meet the climate target would halve air pollution control costs to about €35 billion per year in 2050.

In addition, the anticipated reductions in air pollutant emissions from climate policy measures would bring significant health and ecosystem benefits. For example in China, current ambient concentrations of PM are responsible for a loss in the average life expectancy of about 40 months. In the climate policy scenario, this figure would be halved by 2050.

Christer Ågren

[1] **Co-benefits of mitigating global greenhouse gas emissions for future air quality and human health.** J. J. West, S. J. Smith, R. A. Silva, V. Naik, Y. Zhang, Z. Adelman, M. M. Fry, S. Anenberg, L. W. Horowitz & J-F Lamarque. In Nature Climate Change 3 (September 2013) pp. 885–889.

[2] **Climate policies can help resolve energy security and air pollution challenges.** D. L. McCollum, V. Krey, K. Riahi, P. Kolp, A. Grubler, M. Makowski, N. Nakicenovic. In Climatic Change 119 (July 2013) pp. 479–494.

[3] **Better air for better health: Forging synergies in policies for energy access, climate change and air pollution.** S. Rao, S. Pachauri, F. Dentener, P. Kinney, Z. Klimont, K. Riahi, W. Schoepp. In Global Environmental Change Vol. 23, (October 2013) pp. 1122–1130.

[4] **Co-benefits of post-2012 global climate mitigation politics.** P. Rafaj, W. Schoepp, P. Russ, C. Heyes, M. Amann. In Mitigation and Adaptation Strategies for Global Change Vol. 18 (August 2013) pp. 801–824.

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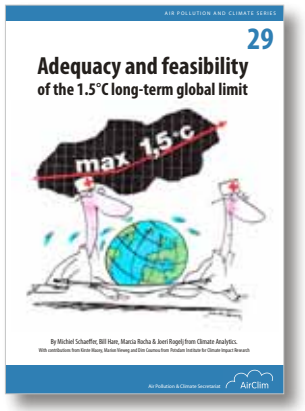
Ship emissions

Shipping is a major cause of harmful air pollution in Europe and by 2020 shipping emissions of SO_2 and NOx could exceed the emissions of these pollutants from all other EU sources.

This pollution must be reduced dramatically to protect health and the environment and to make shipping a more sustainable form of transport.

Technical measures exist that could cut the level of pollution from ships by at least 80-90 per cent and doing so would be much cheaper than cutting the same amount from land-based sources.



The 1.5°C long-term global limit

Scientific assessments have shown that impacts are projected to worsen significantly above a global warming of 1.5, or 2°C from pre-industrial levels. Such assessments have contributed to the adoption of 2°C as a global goal. In Cancun in 2010 Climate Convention Parties agreed to review the global goal with the perspective of strengthening this to 1.5°C.

This report is an atempt to answer the questions: Does a long-term global goal actually help to streamline global efforts to reduce greenhouse-gas emissions and inspire local initiatives? Is the level adequately low to prevent dangerous interference with the climate system? Is the goal feasible, given socio-economic and technical constraints?

The 10 best climate measures in the Nordic Baltic Region

A number of national environmental NGOs where asked to describe and rank their ten best climate measures.

There is a great diversity. Hardly any country seems to have noticed what their neighbours are doing. So all climate policymakers should take a look, not only at the ten winners, but at the full smorgasbord of measures in neighbouring nations.

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Coming events

EU Environment Council. 3 March 2014. Information: *http://europa.eu/newsroom/calendar/*

South-East European Exhibition on Energy Efficiency and Renewable Energy. Sofia, Bulgaria, 5 - 7 March 2014. Information: *http://via-expo.com/en/pages/ee-re-exhibition*

Green Ship Technology Conference. Oslo, Norway, March 2014, Information: *http://www.informamaritimeevents.com/event/greenshiptechnology*

Air Quality 2014. 9th International Conference on Air Quality – Science and Application. Garmisch-Partenkirchen, Germany, 24-28 March 2014. Information: *http://www.airqualityconference.org/*

IPCC. Approval and release of AR5 Working Group II report on impacts, adaption and vulnerability. Yokohama, Japan 25 - 29 March 2014. Information: *http://www.ipcc.ch/*

IMO MEPC (Marine Environmental Protection Committee). London, UK, 31 March - 4 April 2014. Information: *www.imo.org*

IPCC. Approval and release of AR5 Working Group III report on mitigation of climate change. Berlin, Germany, 7 - 11 April 2014. Information: *http://www.ipcc.ch/*

World Bioenergy 2014. Jönköping, Sweden, 3 - 5 June 2014. Information: *http://www.elmia.se/sv/worldbioenergy/*

FCCC Meetings of Subsidiary Bodies. Bonn, Germany, 4 - 15 June 2014. Information: *http://unfccc.int/*

EU Environment Council. 13 June 2014. Information: *http://europa.eu/newsroom/calendar/*

CLRTAP Working Group on Strategies and Review. Geneva, Switzerland, 30 June - 4 July 2014. Information: *http://www.unece.org/env/lrtap/*

UN Climate Summit led by Ban Ki Moon. New York City, USA, 23 September 2014. Information: *http://www.un.org/climatechange/summit2014/*

IMO MEPC (Marine Environmental Protection Committee). London, UK, 13 - 17 October 2014. Information: *www.imo.org*

IPCC. Approval and release of AR5 Synthesis Report. Copenhagen, Denmark, 27 - 31 October 2014. Information: *http://www.ipcc.ch/*

FCCC COP 20 (Conference of the Parties). Lima, Peru, 1 - 12 December 2014. Information: *http://unfccc.int/*