

IMO weakens NOx rules for ships

A hastily adopted compromise decision that was taken without any impact assessment, despite the risk that it will negatively affect the environment and the health of Europeans.

► Page 7

A changing climate creates pervasive risks

The effects of climate change are already being seen on all continents and across the oceans.

► Page 8

Hidden costs make coal expensive

Unexpected costs and technical disappointments have been recurrent while building the Moorburg power station – a project that is part of a 6 GW coal power expansion in Germany.

► Page 11

Diet shifts could reduce nitrogen pollution

Halving the consumption of meat, dairy and eggs in Europe could reduce ammonia and other nitrogen emissions by 40 per cent.

► Page 12

SCR can cut ship NOx emissions

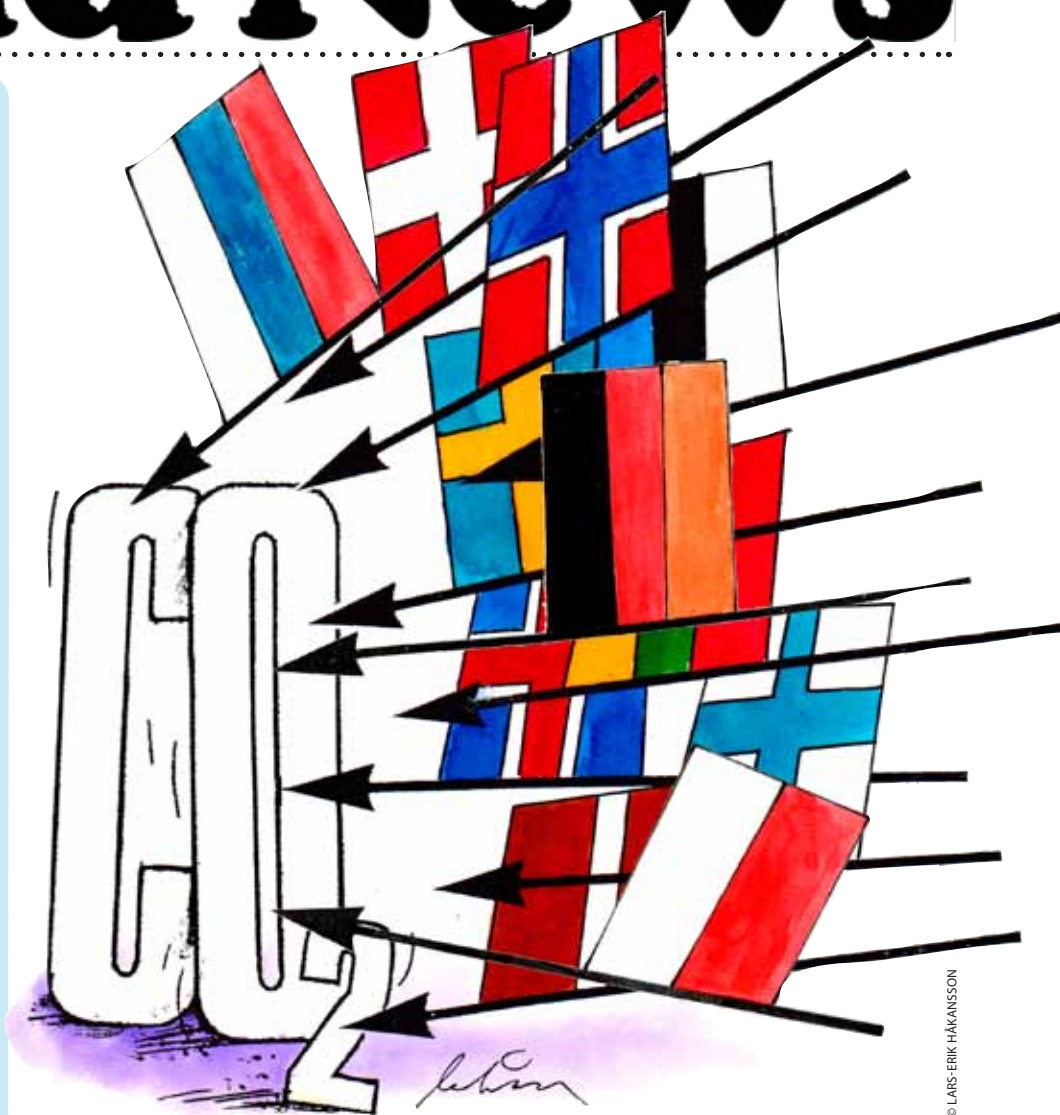
The technology to drastically cut ship NOx emissions is widely available, performs well, and may even slightly reduce ship fuel consumption.

► Page 16

Europe's biggest polluters

Twelve of Europe's most polluting point sources in 2012 were found in two countries: Germany and the UK.

► Page 23



© LARS-ERIK HÅKANSSON

150 ways to cut GHG emissions

NGOs from eleven countries in Northern Europe have evaluated national policies used to cut greenhouse gases. Result: some 150 measures. If all repeated some of the lessons learned by their neighbours, emissions would come down fast.

Deep cuts in greenhouse gas emissions can be achieved in all eleven northern European nations. That is the message from a common NGO effort to rank the ten best mitigation measures. They are about the same everywhere: more renewables, better-insulated buildings

and more efficient transport. The political instruments with which to achieve these ends are different. All are affordable, proven and mostly have positive side effects for the environment, jobs and quality of life.

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:

Air Pollution & Climate Secretariat

Norra Allégatan 5, 413 01 Göteborg, Sweden
Tel: +46 31 711 45 15
Fax: +46 31 711 46 20
E-mail: info@airclim.org
Internet: www.airclim.org

Editor: Kajsa Lindqvist

Assistant editors: Christer Ågren & Reinhold Pape

Printed by Trydells Tryckeri, Laholm, Sweden.
ISSN 0281-5087.

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.

Editorial

In April 2014, the UN Intergovernmental Panel on Climate Change (IPCC) issued a report that presented a scenario for a pathway on how to limit temperature rise to 1.5°C. The report says that to have a likely (more than 66%) chance of achieving this target by 2050 a global reduction in greenhouse gases of more than 90 per cent compared with 2010 emissions must be achieved.

For any temperature rise above 1.5°C the IPCC expects negative consequences for mankind and ecosystems due to climate change, e.g. in food production and in marine, arctic and high-mountain ecosystems (see article on IPCC WG II on page). But the chair of the IPCC working group III explained to the public “that it doesn’t cost the world to save the planet”. He is referring here to the conclusion of the IPCC WG III report that diverting hundreds of billions of euro from fossil fuels into renewable energy and efficiency savings would cost just 0.06 per cent of the expected annual economic growth rates of 1.3–3 per cent. The report was written by 1,250 scientists and experts and approved by 194 governments.

The IPCC report judges renewable energy sources as the most favourable solutions, due to falling costs and large-scale deployments of these technologies in the last decade. Nuclear energy and Carbon Capture and Storage (CCS) technologies are by contrast judged by the IPCC to have considerable safety, waste management, technological and financial risks.

The instruments for mitigating climate change exist and have been tested (see article on front page), and now these instruments must be introduced worldwide and sharpened so that they contribute to keeping temperature rise below 1.5°C.

“responsible governments understand now that climate action is the key to long-term security and stability”

The 1.5°C target is already supported by more than 100 countries. Climate Action Network International, a coalition of more than 900 NGOs worldwide, is campaigning to keep temperature rise below 1.5°C, to reduce emissions from fossil fuels by

100 per cent globally by 2050 and to obtain 100 per cent of energy from renewable energy sources worldwide by 2050.

CAN argues that responsible governments understand now that climate action is the key to long-term security and stability. CAN says that “this year they have the opportunity to show that they will not withhold the benefits of climate action from their people and adopt therefore:

- Firm commitments for deeper cuts in carbon pollution under the Kyoto Protocol now.
- Determined leadership towards a globally coordinated approach to more broadly and speedily deploy renewable energy and energy efficiency initiatives.
- Utmost flexibility in negotiations aimed at making every nation’s ‘nationally determined contributions’ for the 2015 global climate agreement – due by the end of March 2015 – comparable.
- Making those national contributions meaningful by ensuring they feature convincing targets to reduce carbon pollution while providing money to help poorer countries take climate action as well.
- Real solidarity, ensuring the agreement includes provisions to help the most vulnerable communities adapt to climate impacts already being experienced and to account for the loss and damage caused by them.”

Reinhold Pape

Profitable to cut air pollution

The monetised health benefits alone of less air pollution are up to 42 times greater than the emission abatement costs. In addition there will be substantial benefits to ecosystems, forests, agricultural crops and materials.

In December last year, the European Commission presented its Clean Air Package, including a proposal to revise the directive on National Emissions Ceilings (NEC), by setting new country-by-country emission reduction requirements up to 2030 for six main pollutants.

While the suggested level of ambition did not impress environmental groups, it would still result in cutting EU-wide emissions of sulphur dioxide (SO₂) by 81 per cent; nitrogen oxides (NO_x) by 69 per cent; non-methane volatile organic compounds (NMVOCs) by 50 per cent; ammonia (NH₃) by 27 per cent; particulate matter (PM_{2.5}) by 51 per cent; and methane (CH₄) by 33 per cent by 2030, compared to the emission levels in the base year 2005. (See Acid News 1/2014.)

By 2030, and compared to the baseline (business as usual), the additional emission reductions are estimated to annually avoid more than 58,000 air-pollution-related premature deaths, 20,000 respiratory hospital admissions, 44,000 cases of chronic bronchitis, and 61 million restricted activity days. In addition, they would save 123,000 km² of ecosystems from eutrophication by excess nitrogen pollution, of which 56,000 km² are protected Natura 2000 areas, and save 19,000 km² of forest ecosystems from acidification.

A cost-benefit analysis¹ (CBA) has been made to compare the estimated cost for additional emission abatement measures beyond the baseline with the estimated health benefits.

It shows that the health benefits alone will by 2030 save society €38–139 billion per year in external damage costs and provide about €3 billion per year in direct

benefits due to higher productivity of the workforce, lower healthcare costs, higher crop yields and less damage to modern buildings.

It should be noted that for various reasons some of the health benefits

from less air pollution exposure were not included in the valuation. This applies, for example, to decreased chronic effects of ozone on mortality and reduced damage to health from nitrogen dioxide (NO₂) exposure.

Moreover, the presentation of the results of the cost-benefit analysis has

been limited geographically to the EU's 28 member countries, which means that no allowance has been made for the positive effects of reducing emissions in the EU on health and the environment in non-EU countries, such as Norway, Switzerland, Russia, Ukraine, Belarus, Serbia, Albania, Bosnia-Herzegovina, Macedonia, Moldova, Montenegro and Turkey. The reduced damage to human health in countries outside the EU was estimated at between €2.3 and 8 billion/year.

The additional cost of pollution abatement resulting from the proposed actions has been estimated to reach €3.3 billion per year in 2030, which represents about 0.02 per cent of the gross domestic product of EU countries in that year. Spread across the EU population, it is equivalent to an annual cost per person of about seven euro (or a daily cost of two euro cents).

This cost estimate appears however to be exaggerated. For example, it is based on the assumption that purely technical pollution control measures will be employed, thus ignoring other, often cheaper, methods of reducing emissions, including various structural measures such as fuel

switching, efficiency improvements and the expected increase in use of renewable energy sources. Moreover, it is assumed that these technical emission reduction measures when applied in 2030 will have the same efficiency and costs as current technology.

According to the Commission's own analysis, an alternative energy scenario that would result in a reduction of greenhouse gas emissions in the EU by 40 per cent between 1990 and 2030, could cut the cost of achieving the proposed new air pollution reduction commitments for 2030 by more than a third, from €3.3 to €2.1 billion/year. The same scenario could also reduce costs in 2030 for implementing already approved air pollution control policy by about €5 billion/year.

One overall conclusion is therefore that the expected costs given in the Commission's cost-benefit analysis are very probably exaggerated, while the estimated benefits are clearly underestimated.

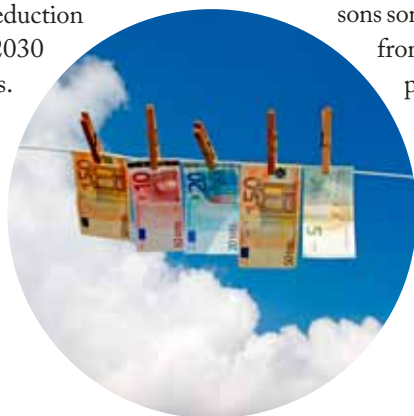
Despite this, the Commission's analysis shows that the health benefits alone that would arise from the proposed measures in the EU's 28 member countries exceed the costs by a factor of at least 12 (lowest valuation) and as much as 42 (highest valuation). In addition, there will be substantial environmental benefits from reduced ecosystem damage, but these are difficult or in many cases impossible to monetise.

This shows that a higher level of ambition is socioeconomically motivated, a conclusion that is further reinforced if clean air policy is seen in combination with a tougher climate policy.

Christer Ågren

¹ Cost-benefit Analysis of Final Policy Scenarios for the EU Clean Air Package (Version 2, March 2014). Report to the European Commission by Mike Holland, EMRC.

Link: http://ec.europa.eu/environment/air/review_air_policy.htm



© M. SCHUPPICH - FOTOLIA.COM
Health benefits alone will save €38–139 billion per year if a new NEC directive is implemented.

150 ways to cut GHG emissions

Continued from front page

Eleven NGO expert groups have each reported their ten best GHG mitigation measures: initially the eight Nordic-Baltic countries – Denmark, Finland, Iceland, Norway, Sweden, Estonia, Latvia, and Lithuania – previously presented¹ in 2013. Now three big countries with a Baltic coast have been added: Poland, Germany and Russia in a new report².

Though the differences between these new entrants are enormous, the combined top ten list does not change very much.

It is not possible to give a fully objective and transparent rating of all the measures in all the countries, but they can almost all be grouped into eleven families of measures.

The top measure in northern Europe is CO₂ and energy taxation. CO₂ is by far the most important greenhouse gas and was responsible for 85 per cent of the warming effect³ in 2002–2012. The tax is well proven in Sweden, Denmark and Norway, and has also been effective in Germany. Economic instruments work: the first step is to stop subsidising fossil fuels, and then to tax them, upstream or downstream. The tax revenue can be used either for more useful spending or just to cut taxes. The essential thing is that the

price signal is clear. The energy/CO₂ tax works best for electricity and heating, but is problematic for heavy industry and not of much use for decarbonising transport.

Emission trading, once called the flagship of European Climate Policy, also belongs to this family. Everybody agrees that it is a great idea, but it has not delivered much. The reason for this is of course the ludicrously low target of 20 per cent emission reductions between 1990 and 2020, which has largely been achieved by now. The CO₂ price is now way too low to influence decisions on energy use. Perhaps the leaking ship will be repaired someday, but meanwhile national economic instruments must keep the climate policies floating.

The reason why some national NGOs have not mentioned energy taxation is not because they do not think it is efficient, but because they have no experience to report.

The second best measure on the northern Europe list is feed-in-tariffs, which comes top of the German list. This is a well-proven measure in several countries, but best in Denmark and Germany. They brought wind power from nowhere to become the fastest growing low-carbon energy source in the world. Then Germany brought solar power from nowhere to a multi-gigawatt

industry. Germany produced 30 TWh of solar power in 2013, making it the largest producer in the world – no mean feat for a country with Germany's climate. Bio-energy has also grown spectacularly.

This success is now being replicated in much of the world, especially in China and (for solar) in Japan.

The tremendous success of the feed-in tariffs (FIT) has been pioneering for wind and solar. An alternative method for supporting renewables is renewables obligations or green certificates, which oblige consumers or producers to buy a certain percentage of renewable electricity. The difference is that FIT is tailored to give each technology as much support as needed, and then cut the subsidies as it takes off. Renewable obligations focus on benefits of scale and cost-effectiveness, fostering competitiveness between renewable sources and between projects.

Renewable obligations has also produced remarkable results. With this policy Poland and Sweden are now among the world leaders in wind power installation. On the world top 10 list of wind power in 2013, Poland and Sweden came in at number 9 and 10 respectively.

Energy-efficient buildings are prominent for all countries covered, sometimes divided by the kind of building (apartment, government, factories, commercial) or with respect to building codes for new buildings or requirements/subsidies for simple or extensive renovation. The technologies for reducing heat losses are essentially the same: better insulation, draughtproofing, better windows, recovery of heat from outgoing air, and better control systems and more metering. These also apply for cooling. The way to make this happen for new buildings is through building codes, energy efficiency requirements for energy utilities or white certificates for existing buildings, qualified subsidies, energy performance contracting and various innovative schemes for government buildings and energy labelling, for example.

Other areas for improving efficiency (aside from electricity and heating) include lighting, household appliances and office equipment. In the EU/EEA countries, in other words all except Russia, this is mainly



© LARS-ERIK HÅKANSSON

an issue to be tackled at EU level. This is where the battles are fought, often within the Eco-design directive, such as the ban on incandescent bulbs and the very much improved efficiency of refrigerators.

District heating efficiency can be much improved in at least all former communist countries through better insulation, and through more cogeneration, where the heat is put to better use as it also generates power. In all countries district heating can increasingly be used to carry renewable heat from solar, heat pumps, and in some countries geothermal heat.

Vehicle efficiency standards are similarly dependent on EU legislation everywhere except Russia. But as Russia has as many people as the other ten nations put together, it is an important exception.

Other measures to reduce traffic CO₂ feature in most NGO reports, varying from road tolls, vehicle taxation, CO₂-related sales tax or annual vehicle tax, road tax for trucks, levies on air traffic, support for lightweight rail vehicles, and in some countries support for electric vehicles.

Whereas emissions from heat and electricity generation can be controlled by just a few instruments, the markets for cars and their usage need much more political intervention.

Traffic infrastructure and long-term planning may be grouped together. More railways do not constitute a quick and cheap way to cut emissions, but may be necessary for long-term sustainability. New railways take a long time to build, though closing old railways can happen rather fast. Sustainable urban planning is a prerequisite for good public transport and for higher levels of district heating and cooling. Another critical aspect for the integration of wind and solar power is more high-voltage transmission lines or cables.

Waste management is of importance in many countries. Reduction and sorting of waste at source are well developed in some countries, and contribute to resource efficiency, lower greenhouse gas emissions and reduced environmental impact in several ways. Methods to reduce waste include bans on landfill disposal of some

waste categories, such as in Sweden and Denmark, and taxes on waste.

Land use is not a main theme in this report. NGOs are wary about LULUCF, as it invites cheating with emission statistics. It nevertheless features in the reports from Iceland (wetland reclamation, afforestation), Denmark (afforestation, though not top ten) Lithuania (afforestation), Poland (good agricultural practice) and above all Russia. Russia has by far the largest forested area in the world. What Russia does with its forests, and how they change with rising temperature and higher CO₂ content in the atmosphere is important for the whole planet, for biodiversity, for air quality and for the climate. At stake in the 2050 perspective, this could represent a sink of 500 million tons CO₂eq net – or a large source of carbon that could be released into the atmosphere. This is however by no means unique to Russia. All our nations are at the same crossroads, especially those that also have large forests.

The eleven NGO national reports are each different, but each one can also serve as a mirror for policymakers in every other country.

It is the differences that show the potential for change.

Denmark increased its solar power production from 104 GWh in 2012 to 518 GWh in 2013, or 92 kWh/capita. This pales into insignificance compared to Germany's 30 TWh, almost 400 kWh/capita. But it is still an annual increase of 398 per cent, almost all due to one simple measure: net metering. There is a lot of sunshine in Poland and Sweden too, but they have almost no solar power.

The opportunities to cut greenhouse gases are huge, and the knowledge to do so is right on our doorsteps. We need more of the same ... much more.

Fredrik Lundberg &
Gunnar Boye Olesen

¹APC 30 The 10 best climate mitigation measures in the Nordic-Baltic region (2013). At www.airclim.org

²APC 31 the 10 best climate mitigation measures in Northern Europe (2014). At www.airclim.org

³http://www.wmo.int/pages/mediacentre/press_releases/pr_991_en.html



© EDYTA PAWLOWSKA - FOTOLIA.COM

More bikes, more jobs

Cycling can create at least 76,600 jobs and save 10,000 lives every year in major European cities, according to a new report "Unlocking new opportunities" by UNECE and the WHO regional office in Europe. These numbers indicate what could be achieved if all cities encouraged the same level of cycling as Copenhagen, which has a modal share of 26 per cent.

The new jobs would be found in bicycle retail and maintenance, provision of clothing and accessories for cyclists, urban development and new mobility schemes. Lives would be saved due to improved air quality, fewer road accidents and more physical activity.

WHO report, Unlocking new opportunities: jobs in green and healthy transport (April 2014)

Vans meet CO₂ target four years early

Carbon dioxide emissions from vans sold in 2013 fell by 3.8 per cent compared to the previous year, which gives an average figure of 173.3g/CO₂ km, according to data collected by the European Environment Agency. This means that the target to reduce emissions to 175g/CO₂ km by 2017 has been achieved four years early.

"The result of an extremely weak and unambitious target," commented the green group Transport & Environment, arguing that this shows the need for more ambitious targets by 2025.

The most fuel-efficient vans were registered in Malta, Portugal and France. At the other end of the spectrum were Slovakia, Germany and the Czech Republic, where average emissions were approximately a third higher.

A similar trend has been observed for passenger cars. The average emissions of cars registered in 2013 were 127g/CO₂ km, which is way below the target of 130g/CO₂ km by 2015.

EEA Press release 21 May 2014

Transport & Environment Press release 21 May 2014

Cleaning up container ship emissions

Implementation of the three key emission abatement measures on container ships could cut emissions of air pollutants, such as SO₂, NO_x, PM (including black carbon) and other air toxics, by 97–99 per cent, according to a new report by German environmental group NABU. And the impact on shipping or product prices would be very small.

Switching from high-sulphur heavy fuel oil to low-sulphur (0.005 per cent or 50

Low-emission ship freight may increase shoe prices by 3 cents.



STONE FLY SPA/FLICKR.COM/CC BY-NC-ND

Huge health impacts of road transport

Air pollution is costing advanced economies plus China and India an estimated US\$3.5 trillion a year in premature deaths and ill health, and these costs will rise unless government action is taken to limit vehicle emissions, a new OECD report says.

In OECD countries, around half the cost is from road transport, with diesel vehicles producing the most harmful emissions. Traffic exhaust is a growing threat in fast-expanding cities in China and India, as the steady increase in the number of cars and trucks on the road undermines efforts to curb vehicle emissions.

The report, “The cost of air pollution: Health impacts of road transport”, calculates the cost to society across the OECD’s 34 members to be about US\$1.7 trillion. It puts the cost at nearly US\$1.4 trillion in China and nearly US\$0.5 trillion in India.

Source: OECD press release 21 May 2014.

Link: www.oecd.org/environment/cost-of-air-pollution.htm

ppm) diesel fuel would increase fuel cost by approximately 45 per cent, based on market prices in the second half of 2013. As fuel costs account for around 26 per cent of the freight costs, such a fuel shift would only increase the shipping costs by twelve per cent – a cost that could be offset by means of slow steaming, i.e. reducing speed and saving fuel.

Even without such offsetting, the higher cost for diesel fuel is calculated to increase the price of a tablet PC by only by 1 eurocent, and the price of a T-shirt or a pair of shoes would go up by respectively 0.2 and 3 eurocents.

For air quality to be significantly improved, NABU argues that shipping companies should not only switch to

low-sulphur diesel fuel, but also introduce efficient exhaust gas cleaning technology. Adding a selective catalytic reduction (SCR) system and a diesel particulate filter (DPF) to a large container ship would each cost around €500,000. This adds up to about 1 per cent of the construction cost for a ship with a loading capacity of 10,000 to 12,000 standard containers, which is around €100 million.

Even if the cost for SCR and DPF were passed on in their entirety to the customers, this would not have a significant impact on freight rates and would therefore not significantly affect the shipping companies’ profits.

Air pollution from container ships (May 2014). Published by NABU. Link: www.NABU.de/ships

Sustainable shipping study

Emission Control Areas (ECAs) around Europe should be expanded, both in terms of area and the inclusion of nitrogen oxides (NO_x), and incentives should also be considered to reduce NO_x emissions from the existing fleet of ships. This is one of several recommendations by a recent report from the European Panel of Sustainable Development (EPSD) – a network of universities and other research organisations.

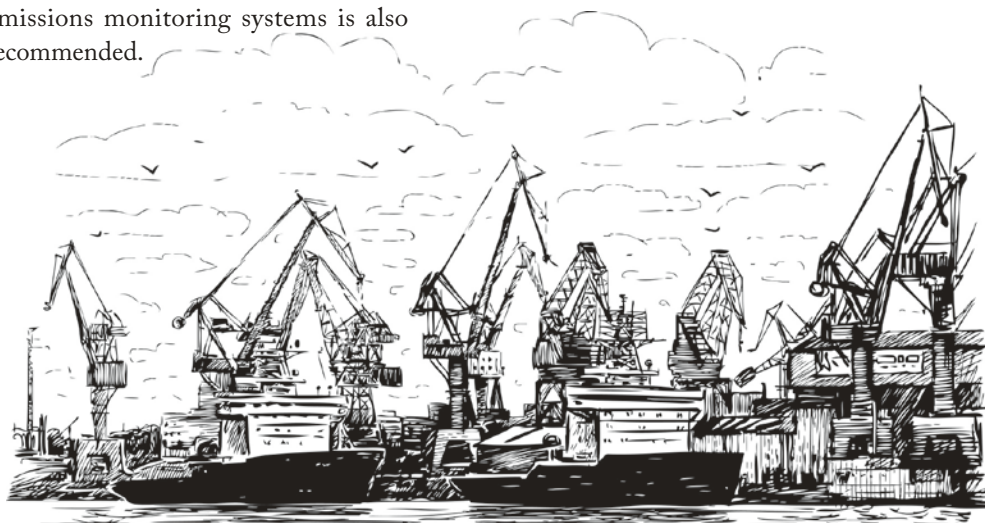
The report is said to provide science-based knowledge on various aspects linked to sustainable shipping, such as emissions of air pollutants and greenhouse gases, ship wrecks, ship recycling, and intermodal transport.

Support for further development of marine particle filters, remote monitoring of exhaust gas emissions, and continuous emissions monitoring systems is also recommended.

Regarding emissions of greenhouse gases, the report concludes that “in the absence of any truly effective IMO regulation of greenhouse gas emissions from ships, unilateral regulatory action within the EU should be considered”, and that such action could be in the form of a cap-and-trade system for maritime transport emissions, an emissions tax with hypothecated revenues, a mandatory efficiency limit for ships in EU ports or a baseline and credit system based on an efficiency index.

The report: Targeting the Environmental Sustainability of European Shipping: The Need for Innovation in Policy and Technology (May 2014). EPSD report no 6.

Link: www.gmv.gu.se/english/collaborations-and-projects/collaboration-with-industry-and-society/european-panel-on-sustainable-development-epsd/





JONAS K./FLICKR.COM/CC BY-NC-SA

IMO weakens NOx rules for ships

A hastily adopted compromise decision that was taken without any impact assessment, despite the risk that it will negatively affect the environment and the health of Europeans.

In early April the International Maritime Organization (IMO) decided to abandon the fixed start date for the stricter Tier III emission standards that will apply to new ships when plying in NOx Emission Control Areas (NECAs). Instead, the IMO will replace the 2016 application date with flexible provisions for any NECAs established after that date.

The law on NECAs, including the 2016 application date, was adopted unanimously by the IMO in 2008 as part of the revision of MARPOL Annex VI, the global instrument that regulates air pollutant emissions from international shipping.

Under the original 2008 rules, all ships built after 1 January 2016 sailing in designated NECA waters would have to comply with stricter NOx standards. As a result of the change adopted on 4 April, only ships built after the adoption of a NECA would have to comply, which means that if a new NECA enters into force in 2020 for example, the Tier III standards would not apply to ships built in the four years 2016–2019.

The North American NECA, which has already been approved and adopted, will not be affected and here the Tier III standards will apply as from 2016.

However, over the last few years, the countries surrounding the Baltic Sea

and the North Sea have been preparing submissions to the IMO in a move to get these two sea areas – which are both already designated as Sulphur Emission Control Areas (SECAs) – also designated as NECAs. The new amendment means that delays in the adoption of these, or any other, sea areas as new NECAs will result in even higher NOx emissions.

“The IMO’s decision to delay NOx regulations is a serious setback for efforts to tackle the biggest source of nitrogen oxides in Europe, which is an invisible killer causing cancer and lung disease,” said Bill Hemmings, programme manager for shipping at the green group Transport and Environment (T&E).

The outcome was, however, welcomed by Russia, which last year proposed a five-year delay for the entry into force of the Tier III NECA standards. Russia has for some time now also been blocking a decision by the Baltic Sea countries to submit the Baltic Sea NECA proposal to the IMO.

Some countries argued that without a delay for the Tier III standards for new NECAs, the prospect of having a NECA approved in the near future for the Baltic Sea would be slim, and that the same might apply to other prospective NECAs as well.

“It remains to be seen whether this decision will enhance the prospects for the establishment of NECAs in the Baltic and North seas. If such applications are not soon forthcoming, it may have the reverse effect of hastening the need for retrofitting of ships serving ports in Europe in order to curb growing emissions. We urge the Baltic and North Sea countries to submit their applications for new NOx emissions control areas as soon as possible,” Hemmings concluded.

The Clean Shipping Coalition pointed out that the decision risks bringing the IMO’s credibility as a regulatory body into question, making future negotiations at IMO more difficult and protracted, as negotiators will have no assurance that agreements made today will be respected tomorrow. Moreover, it may signal to shipowners and manufacturers of engines and after-treatment technologies that the IMO rulemaking process is arbitrary and that adopted IMO regulations cannot be relied on but should be treated as provisional only.

Christer Ågren

A changing climate creates pervasive risks

The effects of climate change are already being seen on all continents and across the oceans.

The Intergovernmental Panel on Climate Change (IPCC) issued a report in March 2014 that details the impacts of climate change to date, the future risks from a changing climate, and the opportunities for effective action to reduce risks. The report, called “Climate Change 2014: Impacts, Adaptation, and Vulnerability”, concludes that responding to climate change involves making choices about risks in a changing world and that the nature of the risks of climate change is increasingly clear. The report identifies vulnerable people, industries, and ecosystems around the world.

Increasing magnitudes of warming increase the likelihood of severe and pervasive impacts that may be surprising or irreversible according to the IPCC. “Observed impacts of climate change have already affected agriculture, human health, ecosystems on land and in the oceans, water supplies, and some people’s livelihoods. The striking feature of observed impacts is that they are occurring from the tropics to the poles, from small islands to large continents, and from the wealthiest countries to the poorest.”

Rajendra Pachauri, Chair of the IPCC, said: “The Working Group II report is another important step forward in our understanding of how to reduce and manage the risks of climate change. Along with the reports from Working Group I and Working Group III, it provides a conceptual map of not only the essential features of the climate challenge but the options for solutions.”

The report communicates the degree of certainty in each key finding of the assessment based on evidence (limited, medium, or robust); agreement (low, medium, or high); confidence (very low, low, medium, high, and very high).

The IPCC says that evidence of climate-change impacts is strongest and most

comprehensive for natural systems. Many terrestrial, freshwater, and marine species have shifted their geographic ranges, seasonal activities, migration patterns, abundances, and species interactions in response to ongoing climate change (high confidence). While only a few recent species extinctions have been attributed as yet to climate change (high confidence), natural global climate change at rates slower than current anthropogenic climate change caused significant ecosystem shifts and species extinctions during the past millions of years (high confidence).

For the major crops (wheat, rice, and maize) in tropical and temperate regions, climate change without adaptation is projected to negatively impact production for local temperature increases of 2°C or more above late-20th-century levels, although individual locations may benefit (medium confidence). Projected impacts vary across crops and regions and adaptation scenarios, with about 10% of projections for the period 2030–2049 showing yield gains of more than 10%, and about 10% of projections showing yield losses of more than 25%, compared to the late 20th century. After 2050 the risk of more severe yield impacts increases and depends on the level of warming. Climate change is projected to progressively increase inter-annual variability of crop yields in many regions. These projected impacts will occur in the context of rapidly rising crop demand.

All aspects of food security are potentially affected by climate change, including food access, utilization, and price stability (high confidence). Redistribution of marine fisheries catch potential towards higher latitudes poses risk of reduced supplies, income, and employment in tropical countries, with potential implications for food security (medium confidence). Global temperature increases of ~4°C

or more above late-20th-century levels, combined with increasing food demand, would pose large risks to food security globally and regionally (high confidence). Risks to food security are generally greater in low-latitude areas.

The key risks for coastal zones, small islands and oceans, all of which are identified with high confidence, are the following according to the IPCC:

- Risk of death, injury, ill-health, or disrupted livelihoods in low-lying coastal zones and small island developing states and other small islands, due to storm surges, coastal flooding, and sea-level rise.

- Systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services.

- Risk of loss of marine and coastal ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the tropics and the Arctic.

- Unique and threatened systems: Some unique and threatened systems, including ecosystems and cultures, are already at risk from climate change (high confidence). The number of such systems at risk of severe consequences is higher with additional warming of around 1°C. Many species and systems with limited adaptive capacity are subject to very high risks with additional warming of 2°C, particularly Arctic-sea-ice and coral-reef systems.

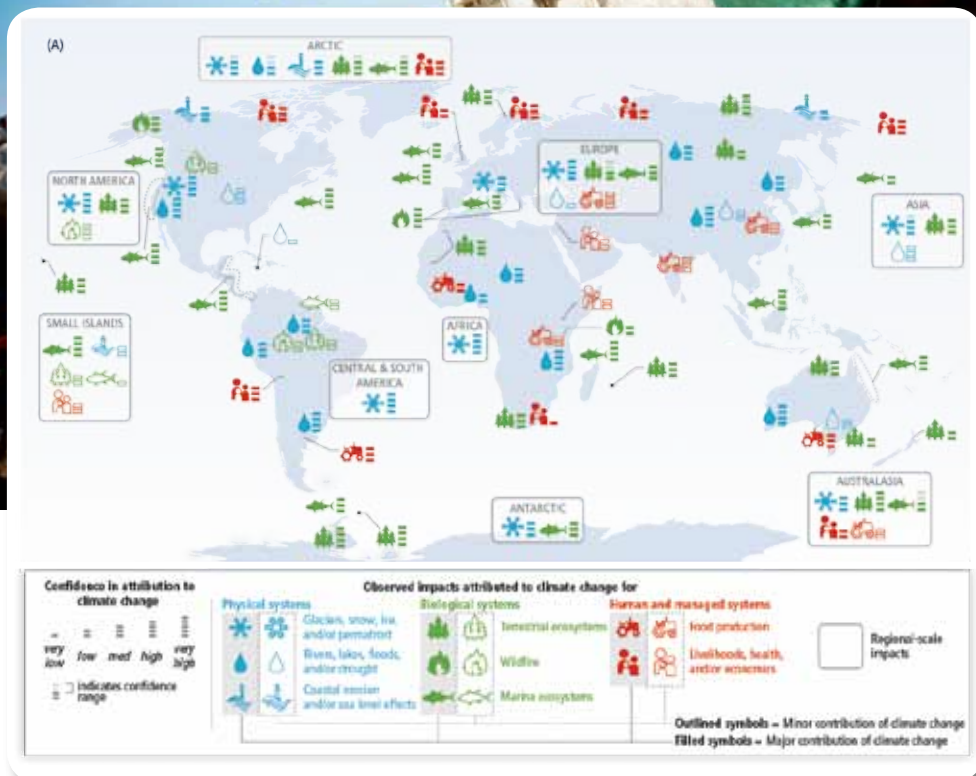
- Large-scale singular events: With increasing warming, some physical systems or ecosystems may be at risk of abrupt and irreversible changes. Risks associated with such tipping points become moderate between 0–1°C additional warming, due to early warning signs that both warm-water coral reef and Arctic ecosystems are already experiencing irreversible regime



UNITED NATIONS PHOTO/Flickr.com/CC BY-NC-ND

Top: Climate change is projected to increase inter-annual variability of crop yields in many regions. Here a Somali woman waiting for medical assistance during a drought in 2011.

Left: Impacts of climate change and where they are expected to hit.



shifts (medium confidence). Risks increase disproportionately as temperature increases between 1–2°C additional warming and become high above 3°C, due to the potential for a large and irreversible sea-level rise from ice sheet loss. For sustained warming greater than some threshold, near-complete loss of the Greenland ice sheet would occur over a millennium or more, contributing up to 7m of global mean sea-level rise.

- Due to sea-level rise projected throughout the 21st century and beyond, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and coastal erosion (very high confidence). The population and assets projected to be exposed to coastal risks as well as human pressures on coastal ecosystems will increase significantly in the coming decades due to population growth, economic development, and urbanization (high confidence).

- Due to projected climate change by the mid-21st century and beyond, global marine-species redistribution and marine-biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and other ecosystem services (high confidence). Spatial shifts of marine species due to projected warming will cause high-latitude invasions and high local-extinction rates in the tropics and semi-enclosed seas (medium confidence).

- For medium- to high-emission scenarios, ocean acidification poses substantial risks to marine ecosystems, especially polar ecosystems and coral reefs, associated with impacts on the physiology, behaviour, and population dynamics of individual species from phytoplankton to animals (medium to high confidence). Highly calcified molluscs, echinoderms, and reef-building corals are more sensitive than crustaceans (high confidence) and fish (low confidence), with potentially detrimental

consequences for fisheries and livelihoods. Ocean acidification acts together with other global changes (e.g. warming, decreasing oxygen levels) and with local changes (e.g. pollution, eutrophication) (high confidence). Simultaneous drivers, such as warming and ocean acidification, can lead to interactive, complex, and amplified impacts for species and ecosystems.”

Further impacts of climate change on humans and the natural environment identified by the IPCC in the report will be presented in the next issue of Acid News

Reinhold Pape

The Working Group II contribution to the IPCC Fifth Assessment Report (WGII AR5) is available at www.ipcc-wg2.gov/AR5 and www.ipcc.ch.

Persistent problems in meeting NOx limits

Eleven EU countries breached at least one of their air pollutant emission ceilings in 2012, preliminary data from the European Environment Agency shows.

The National Emission Ceilings (NEC) directive sets legally binding national limits for maximum allowed emissions for four air pollutants, namely sulphur dioxide (SO₂), nitrogen oxides (NOx), ammonia (NH₃) and non-methane volatile organic compounds (NMVOCs), that were to be achieved by 2010 and not to be exceeded in the years to follow.

An early analysis of the officially reported emissions data for 2012 shows that eleven countries breached at least one NEC, compared to ten countries in 2011 and eleven in 2010. The most commonly breached ceiling was that for NOx, with nine member states exceeding their limits. Road transport contributes around 40 per cent of total NOx emissions in the EU and is one of the main factors behind the large number of NOx exceedances. Reductions from this sector – and especially from diesel-driven cars – have not been as large as originally anticipated.

Denmark and Finland exceeded their ceilings for NH₃, while only Luxembourg

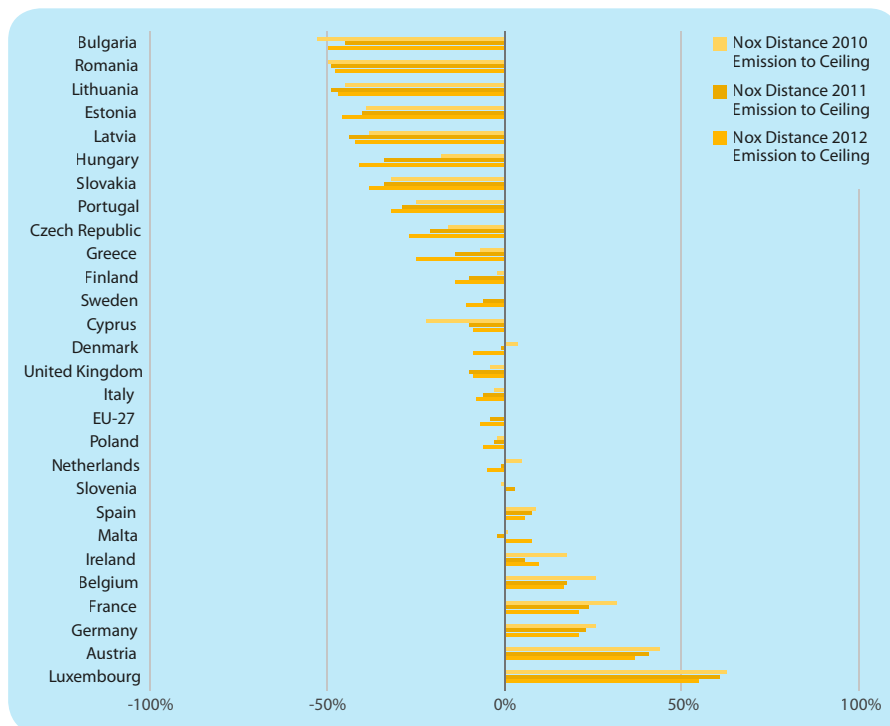


Figure: Chart above/below ceiling — Progress by EU Member States in meeting their national emission ceilings for nitrogen oxides (NOx) set in the EU NEC Directive.

breached the ceiling for NMVOCs. For the third year in a row, all member states met their SO₂ limits.

Several countries have persistent problems meeting their national emission limits – for example, Austria, Belgium, France, Germany, Ireland, Luxembourg and Spain breached their NOx ceilings in 2010, 2011 and 2012. Denmark and Finland have exceeded their NH₃ ceilings for all three years. Despite multiple breaches of these ceilings, emissions of all four pollutants have decreased in the EU overall between 2011 and 2012.

A detailed assessment of the data delivered by the member states will be published by the EEA in June.

In December 2013 the European Commission presented a new Clean Air Policy Package, including a proposal to revise the NEC directive, with new 2020 and 2030 national emission reduction commitments for the four currently covered pollutants, as well as new ceilings for two additional pollutants – fine particulate matter (PM_{2.5}) and methane (CH₄).

Christer Ågren

Source: EEA, 24 March 2014

Link: <http://www.eea.europa.eu/highlights/eleven-countries-exceed-air-pollutant>



Nine countries breached their NOx ceiling and two their NH₃ ceiling.

Hidden costs make coal expensive

Unexpected costs and technical disappointments have been recurrent while building the Moorburg power station – a project that is part of a 6 GW coal power expansion in Germany.

Coal combustion accounts for over 20 per cent of European electricity production. In contrast to natural gas and renewable energies, the dependability of coal power is unaffected by geopolitical instabilities or meteorological conditions. According to a Reuters analysis of April 2014, increased coal usage supplemented by renewable energies could eliminate a quarter of EU gas imports from Russia by 2020.

Germany will be adding nearly 6 gigawatts (GW) of new hard coal generation before the end of next year, including the 1.64 GW Moorburg dual-turbine power station in Hamburg. Construction by the Swedish state-owned Vattenfall GmbH, however, has been plagued by costly delays due to faulty design assumptions. Scheduled operation in 2012 was postponed for two years to replace more than 10 per cent of the T24 boiler steel after riveting seams became brittle at high firing temperatures.

Flow-through plant cooling from the Elbe River would also have heated 64 cubic metres of discharge water per second above the legal maximum limit of 28°C during the summer months. Full-year operation has now been achieved by installing two recirculation cooling towers for €200 million to reduce water intake to 1 cubic metre per second.

In 2009, Greenpeace estimated that all required technical revisions had added €600 million to the original Moorburg construction price of €2 billion. Further costs of €200 million have since been incurred by boiler modifications. Recent unspecified problems will nevertheless prevent half of the power station from entering scheduled service in autumn 2014.

Output generation at Moorburg can be adjusted from 35 per cent to 103 per cent depending on the amount of renewable electricity on the power grid. Despite this adaptable performance, however, the long-term reliance on coal remains incompatible with European climate policy.

Up until 2010, a carbon capture and storage (CCS) retrofit design was foreseen as a means of fulfilling EU decarbonisation objectives. However, the electrical power

demand by CO₂ capture and compression processes could have reduced the grid output capacity by nearly a third. Since internal plant thermal losses increase as a result, additional cooling water would have been required, which could not have been provided by the Elbe River.

Furthermore, no nearby site had been made available for installing the necessary CO₂ separation and compression equipment. Public opposition to supercritical overland pipelines and geological storage sites has finally caused all CCS projects in Germany to be abandoned. For Vattenfall, this development has providentially alleviated the need for additional equipment expenditures. Those costs might never have been recovered from grid power sales, which would have been reduced to almost two thirds by CCS parasitic energy losses.

Hamburg's CO₂ emissions, which are currently on a trajectory declining below 15 million tonnes annually, will soon rise by over 50 per cent when 12,000 tonnes of coal are burned per day at Moorburg. The smooth transition to 4 Mt carbon dioxide once envisioned for 2050 may also not be realized for an additional reason.

Vattenfall has cancelled original plans to deliver municipal heat from the power station, which would have raised coal usage efficiency from 46.5 to 55 per cent. A separate gas-powered plant in the nearby city of Wedel will instead provide district heating services, further increasing total greenhouse gas emissions.

This separate arrangement, however, is actually better suited to the growing market penetration of renewable energies. During blustery cold weather, greater amounts of wind energy are fed into the grid. Heating demand increases under the same conditions, while the need for

conventional power generation declines.

As a result, combined heat and power production at the new Trianel €1.4 billion coal plant in the German city of Lünen will result in operational losses of €100

million this year alone. Electricity generated in synchronization with heat cannot compete with surplus wind energy fed into the grid at the same time.

As licensed, the Moorburg power station may emit up to 400 tonnes of particulates annually. However, effluent dispersal at high altitudes will not be detected by municipal air quality monitoring. Vattenfall also maintains that legal requirements for sulphur dioxide

and nitrogen oxides will be “significantly undercut” during all phases of operation.

Prevailing regulations nevertheless do not guarantee state-of-the-art pollution control. Although Germany is smaller than the US state of Montana, just nine lignite generation sites produce 11 per cent of the mercury effluents measured in the entire United States at over 1,300 coal and oil fired installations. The Vattenfall Lippendorf power station near Leipzig is the largest German toxic metal point source with 482 kilograms of Hg per year, about 1.8 per cent of total large-plant US mercury emissions.

Expensive filter upgrades would nevertheless be difficult to fund from coal power revenues increasingly in competition with renewable energies. CCS ventures already constitute premeditated stranded investments. Relatively clean-burning natural gas is an expensive alternative, but it can be sparingly deployed in inverse proportion to expanding renewable power usage.

Jeffrey H. Michel



Activists with the message: “Coal is just for barbecues”.

Diet shifts could reduce nitrogen pollution

Halving the consumption of meat, dairy and eggs in Europe could reduce ammonia and other nitrogen emissions by 40 per cent.

It is a long-known fact that animal husbandry causes emissions of nitrogen and greenhouse gases. Additionally the growing of feed for animals occupies vast land areas – land that has other potential uses. Another common piece of knowledge is that the average European eats far more meat and cheese than is recommended on health grounds. In particular, this leads to a high intake of saturated fats that cause cardiovascular diseases.

If EU citizens could halve their consumption of products from land animals, several targets could be achieved with one shot. Using a biophysical model, a new study has for the first time quantified the effects this would have for nitrogen, greenhouse gases, land use and health.

As meat consumption varies between member states, the reductions were made proportionally greater in member states with higher consumption than others. Goat and sheep meat were kept at the same levels as today, since they have an important role in the management of biodiverse grasslands. Fish consumption was also maintained at present levels.

It was assumed that the reduced consumption would have a proportional effect on the number of livestock, which in turn affects the demand for feed. Another assumption made was that permanent grasslands and fodder by-products from the food industry would be used to the same extent as today. On the other hand, soymeal imports would be reduced by 75 per cent, forage grown on arable land would go down by 90 per cent and the use of cereal feed would drop by 52 per cent. In areas this would mean that 9.2 million hectares of intensively managed grassland and 14.5 million hectares of arable land in the EU would be free for other use. In total, this is an area roughly the same size as Romania.

It is difficult to assess what would be the most likely alternative land use. In this study two rather schematic scenarios are investigated. In the first, cereals are grown on the entire area for export, assuming a high global demand. In the other, perennial energy crops are grown on the part that is arable land today.

Under the energy crop scenario, the use of mineral nitrogen fertilisers would be reduced by 30 per cent. Emissions of nitrogen into the water, as nitrate (NO_3^-), and into the atmosphere, as ammonia (NH_3), would drop by 40 per cent, reducing the area where critical loads for nitrogen in ecosystems are exceeded (figure). The reductions would be greatest in areas with the most intensive livestock systems.

The level of nitrogen use efficiency¹ in the European food system would rise from today's 22 per cent to 41 per cent under the energy crop scenario and to 47 per cent under the cereal scenario.

Greenhouse gas emissions from agriculture would meanwhile drop by 42 per cent under the energy crop scenario. The biomass produced is estimated to represent 3 per cent of the EU's current energy intake and if all new biomass replaces fossil fuels it would mean even further reductions of greenhouse gases.

Under the cereal scenario, greenhouse gas emissions would fall by only 19 per cent. Nitrous oxide emissions would be reduced to a lesser extent and some grasslands would be tilled, which would reduce the carbon stock and lead to CO_2 emissions.

Increasing the volumes of cereals on the world market as well as reducing the consumption of imported soya would most likely also lead to global net emission reductions. These are however not quantified in the study.

What effects would this have on health? Halving the intake of animal foods and

Reference, 2009



Alternative diet (minus 50% meat and dairy)



Equivalents nitrogen per hectare and year

100 300 500 700 900

Annual exceedance of the critical load for N deposition in N ha^{-1} for natural ecosystems, under the reference scenario and the 50% less meat and dairy alternative diet under the high prices land-use scenario.



Halving the consumption of meat, egg and dairy products only reduces protein intake by ten per cent.

BIODIVERSITY HERITAGE LIBRARY/ FLICKR.COM/CC BY

replacing them with plant foods does not cause acute protein deficiency. It turns out that the protein intake at most is reduced by 10 per cent. In contrast the intake of saturated fats is reduced by 40 per cent, bringing average levels to slightly below the WHO recommendations of a maximum intake of 25.5 g per day. It would most certainly lead to a reduction in cardiovascular diseases and stroke, to which 40 per cent of all deaths in the region can be attributed today. In addition there are several possible indirect health benefits through improved water quality (less nitrate), reduced levels of air pollution (less formation of PM from ammonia) and lower use of antibiotics.

The model used is a biophysical one. It does not take into account possible changes in trade that might occur if consumption patterns in Europe were

to change rapidly. If European farmers maintained their production and exported the surplus to other continents, regional environmental improvements would be lost. The authors argue that this is not very likely since production costs for most livestock products are lower in many non-EU countries, such as US, Brazil, China and Thailand.

However one should not overlook the obvious fact that halving the consumption of animal products would have severe consequences for the livestock sector. This would not be compensated for by an increase in incomes from plant products for direct human consumption. One possibility is that consumers might be more willing to buy animal products with a higher added value, e.g. produced under better animal welfare conditions.

One crucial question to ask is how to implement such a massive dietary shift.

The authors don't provide a silver bullet, but identify the potential for encouraging new food habits through campaigns, active public procurement and taxation of animal products. Higher world market prices could also reduce consumption in Europe, however without decreasing production, because exports would become more lucrative.

Kajsa Lindqvist

¹ Nitrogen use efficiency equals nitrogen outputs (in this case nitrogen in the food we eat) divided by nitrogen inputs (in this case nitrogen in imported feeds and mineral fertilisers).

Source: Food choices, health and environment: Effects of cutting Europe's meat and dairy intake, published in *Global Environmental Change* (26 March 2014) can be downloaded at <http://www.sciencedirect.com/science/article/pii/S0959378014000338>

Rise in agricultural emissions

Aggregated greenhouse gas emissions from agriculture increased by 14 per cent between 2001 and 2011, according to new data from the FAO.

Compared to emissions from fossil fuels, global statistics for emissions from agriculture and forestry and other land use (AFOLU) have been poorly known and incomplete. While helping the Intergovernmental Panel on Climate Change (IPCC) with data for its fifth assessment report, The Food and Agriculture Organization of the United Nations (FAO) has for the first time created an emissions database for the sector. The database covers greenhouse gas emissions data from 1961 to 2011 for nearly 200 countries, as well as projections for 2030 and 2050 for 140 of the countries.

In total over the period 2001–2010 the AFOLU sector was responsible for 10–12 GtCO₂eq a year, which is about a quarter of global anthropogenic greenhouse gas emissions. The largest proportion is agricultural emissions (5 GtCO₂eq/year) followed by net forest conversion (almost 4 GtCO₂eq/year) and peat degradation (1 GtCO₂eq/year). This was partly offset by growing forest that also works as a sink and removed almost 2 GtCO₂eq a year.

Annual emissions from agriculture have increased by 14 per cent in the past decade, from 4.68 Gt in 2001 to 5.34 Gt in 2011. However, fossil fuel emissions have risen even more over the same period, so agriculture's share of total greenhouse gas emissions has actually decreased.

Almost all of the growth took place in non-Annex I countries, where emissions increased by 21 per cent. The increase was largest in central, eastern and southeastern Asia, and Africa. This reflects increased numbers of livestock and use of mineral fertilisers in these regions. In Europe, emissions fell by 8 per cent, which was caused by opposite trends. Livestock numbers dropped and the level of fertiliser use is a bit lower than a decade ago. In North America, emissions increased by 3 per cent. Reduced emissions from livestock were offset by emissions from the increased use of fertilisers.

In the case of global agricultural emissions, methane from enteric fermentation

is the largest source, representing 40 per cent. Cattle caused nearly three-quarters of these emissions (non-dairy 55%, dairy 18%), followed by buffaloes (11%), sheep (7%) and goats (5%).

The second largest source of emissions from the agricultural sector is methane and nitrous oxide from manure left on pastures (15%). Cattle again are responsible for the greater part (62%), followed by sheep and goats (both 12%).

Nitrous oxide emissions from synthetic fertilisers applied to soils come third, with 13 per cent of total agricultural emissions. Similar emissions from manure applied to soils contribute another 3 per cent.

Rice cultivation, which produces methane in the anaerobic conditions caused by the decomposition of organic material in the paddy fields, represents 10 per cent of the emissions.

Manure management, burning of savanna, cultivation of organic soils and crop

residues were other sources of agricultural greenhouse gas emissions.

Deforestation is the other important contributor to emissions in the AFOLU sector. In the period 2001 to 2011, emissions from net deforestation decreased by 3 per cent, a decrease that took place in both Annex I and non-Annex I countries. To further reduce deforestation, improved forest management and increased afforestation would be the cheapest way to reduce emissions from the AFOLU sector, according to the IPCC fifth assessment report.

For agriculture, effective mitigation options pointed out are cropland management, grazing land management, and restoration of organic soils. This would result in improved carbon storage in soils and vegetation. The IPCC also mentions the potential of demand-side measures, such as changes in diet and reductions of losses in the food supply chain.

The FAO has also quantified emissions from energy use in the agricultural sector. In 2010 these emissions were 0.79 Mt CO₂ eq, which was an increase of 20 per cent since 2000. Nearly half originated from combustion of diesel and more than a third from production of electricity used within the sector. Energy for irrigation is estimated to have increased by 40 per cent over the period 2000–2010, accounting for about a quarter of the total emissions in 2010.

Kajsa Lindqvist

The database can be accessed at: <http://faostat3.fao.org>

FAO has done an analysis of some of the data in "Agriculture, forestry and other land use emissions by sources and removals by sinks" (March 2014), which can be downloaded at: <http://www.fao.org/docrep/019/i3671e/i3671e.pdf>

The IPCC Working Group III contribution to the fifth assessment report "Climate Change 2014: Mitigation of Climate Change" can be downloaded at: <http://mitigation2014.org/>



Cattle produce nearly three quarters of methane emissions.

CIMON/Flickr.com/CC BY-NC



STERLING COLLEGE/FLICKR.COM/CC BY

Ecological recovery in acidified lakes is slow

Acidification of lakes has large impacts on aquatic ecosystems, and even after chemical conditions improve, biological recovery may lag behind. A study of Swedish lakes shows that, although their chemical quality has improved as a result of international reductions in acidifying emissions since 1980, biological recovery has been much slower.

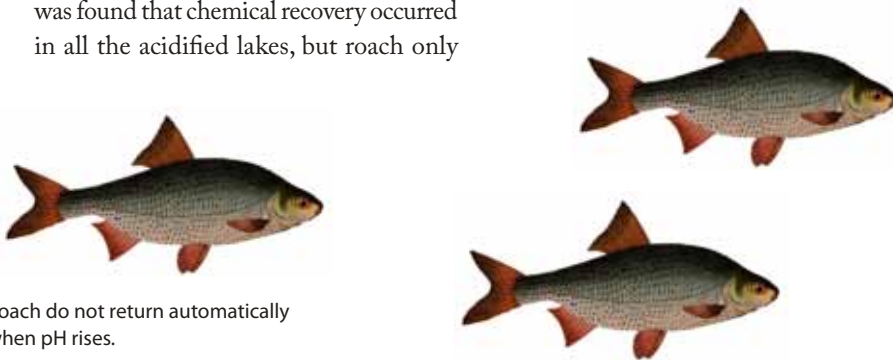
The researchers have specifically looked at the roach (*Rutilus rutilus*), a species of fish that is very sensitive to acidification and cannot reproduce at pH levels below 5.5. Historical records of roach in 85 Swedish lakes were used and compared with the chemical model MAGIC, and it was found that chemical recovery occurred in all the acidified lakes, but roach only

return to some lakes, and then mostly after manual restocking.

"This shows both that chemical recovery is a prerequisite for biological recovery and that a greater emission reduction in turn leads to greater chances of biological recovery. Unfortunately it also shows that a chemical recovery does not guarantee that the fish automatically will return once the water reaches a decent level," said Filip Moldan, researcher at IVL Swedish Environmental Research Institute.

Source: IVL news, 3 April 2014

Article in Global Change Biology: <http://onlinelibrary.wiley.com/doi/10.1111/gcb.12527/abstract>



Roach do not return automatically when pH rises.

EU citizens support climate action

Nine out of ten EU citizens consider climate change a serious problem, and four out of five recognise that fighting climate change and using energy more efficiently can boost the economy and employment, according to a special Eurobarometer opinion poll on climate change.

The vast majority support national action on energy efficiency and renewable energy, with 92 per cent of respondents thinking it is important for their governments to provide support for improving energy efficiency by 2030. For renewable energy, 90 per cent find it important for their government to set targets to increase use of renewables by 2030. The survey also found that seven in ten citizens agree that reducing fossil fuel imports from outside the EU could bring economic benefits.

Source: European Commission press release 3 March 2014.

Link: http://europa.eu/rapid/press-release_IP-14-201_en.htm

Stricter vehicle and fuel standards in the US

On 3 March the US Environmental Protection Agency (EPA) finalised new Tier 3 emission standards for cars and petrol, that once fully in place will help avoid up to 2,000 premature deaths per year and 50,000 cases of respiratory ailments in children.

The Tier 3 vehicle emission standards are to be phased in gradually from 2017 to 2025, and combined with the stricter petrol sulphur limit (10 ppm from 2017), they will reduce motor vehicle emissions of nitrogen oxides (NO_x), volatile organic compounds (VOCs), particulate matter (PM_{2.5}), carbon monoxide (CO) and air toxics, such as benzene and 1,3-butadiene.

Compared to current standards, the new tailpipe standards for light-duty vehicles represent an 80-per-cent reduc-

tion in VOCs and NO_x from today's fleet average and a 70-per-cent reduction in per-vehicle PM standards. Fuel vapour emissions are to be virtually eliminated. For heavy-duty vehicles, the new standards mean a 60-per-cent reduction in fleet average VOCs and NO_x emissions, and per-vehicle PM standards.

The vehicle emissions standards are fuel-neutral, i.e. they are applicable regardless of the type of fuel that the vehicle is designed to use. The period the standards apply is extended from 120,000 miles to 150,000 miles.

The EPA estimates that by 2030 the total health-related benefits will be between US\$6.7 and 19 billion annually, providing up to 13 dollars in health benefits for every dollar spent to meet the standards.

The vehicle standards are calculated to have an average cost of about US\$72 per vehicle in 2025.

The Tier 3 standards are to be implemented over the same timeframe as the national programme to reduce greenhouse gas emissions from cars and light trucks. Actions to improve fuel economy and reduce greenhouse gases from these vehicles will, according to the EPA, result in average fuel savings of more than US\$8,000 by 2025 over a vehicle's lifetime, and between 2012 and 2025 they are projected to save American families more than US\$1.7 trillion in fuel costs.

Source: US EPA press release, 3 March 2014

More information: <http://www.epa.gov/otaq/tier3.htm>

Ship emissions impact on coastal air quality

Around 15 per cent of global anthropogenic NO_x and 5–8 per cent of global SO₂ emissions are attributable to ocean-going ships. Because 70 per cent of ship emissions are estimated to occur within 400 km of land, ships have the potential to contribute significantly to air quality degradation in coastal areas. Despite this, international ship emissions are not well quantified and are one of the least regulated sources of air pollution.

A recent in-depth literature review with the aim of quantifying the impacts of shipping emissions on urban air quality in coastal areas in Europe, concluded among other things that in European coastal areas, shipping emissions contribute 1–7 per cent of PM₁₀ levels, 1–14 per cent of PM_{2.5}, and at least 11 per cent of PM₁ in ambient air. Contributions from shipping to ambient NO₂ levels range between 7 and 24 per cent, with the highest values being recorded in the Netherlands and Denmark.

Impact of maritime transport emissions on coastal air quality in Europe (March 2014). By Mar Viana et. al. Published in *Atmospheric Environment*. Link: <http://www.sciencedirect.com/science/article/pii/S1352231014002313>

UK: 29,000 deaths per year due to PM

Public Health England (PHE) has published estimates of mortality burden based on modelled annual average concentrations of anthropogenic fine particulate matter (PM_{2.5}) in each local authority area.

It was found that the burden of air-pollution-related mortality varies between regions. In rural areas of Scotland and Northern Ireland the figure is put at 2.5 per cent, but in some London boroughs it exceeds 8 per cent. Overall, elevated levels of PM_{2.5} are estimated to cause 29,000 deaths per year in the UK, with 3389 deaths in London, 520 in Birmingham, 306 in Glasgow and 1320 in Wales.

Source: GOV.UK press release 10 April 2014.
Link: www.gov.uk/government/news/estimates-of-mortality-in-local-authority-areas-associated-with-air-pollution

SCR can cut ship NO_x emissions

The technology to drastically cut ship NO_x emissions is widely available, performs well, and may even slightly reduce ship fuel consumption. The costs of installation and operation are modest and expected to fall over time.

International shipping is a major source of emissions of nitrogen oxides (NO_x). Globally, ocean-going vessels emitted about 25 million tons of NO_x in 2007, representing about 15 per cent of total anthropogenic emissions. While NO_x emissions from land-based sources in industrialised countries are gradually coming down, those from shipping show a continuous increase.

Ship NO_x emissions can be mitigated by several means, including engine controls such as exhaust gas recirculation (EGR), exhaust gas after-treatment such as Selective Catalytic Reduction (SCR), or the use of alternative fuels such as gas or methanol.

In a new report, the International Council on Clean Transportation (ICCT) has investigated the viability of SCR technology to achieve compliance with the international Tier III NO_x standards that will apply to new ships in designated NO_x Emission Control Areas (NECAs) as from 2016. The Tier III standards require approximately 75 per cent lower emissions as compared to the Tier II standards that apply globally for new ship engines built after 1 January 2011.

ICCT notes that SCR technology is already used in millions of vehicles and power plants with a cumulative capacity of half a million megawatts worldwide, and that it is the only technology currently available to achieve compliance with the Tier III NO_x standards for all applicable ship engines. (Other technologies can either achieve Tier II standard or achieve Tier III standard for only a subset of applicable ship engines.) State-of-the-art SCR systems can reduce NO_x emissions by more than 90 per cent.

The maritime sector has had more than two decades of experience with SCR, and

the report found that overall, approximately 1250 SCR systems have been installed on marine vessels in the past decade. Those vessels with the longest track records have accumulated up to 80,000 hours of operation over the past two decades.

SCR has been used on a variety of vessel and engine types using various fuels, including low-sulphur distillate fuel and high-sulphur residual fuel. Many current SCR applications are retrofits, where the after-treatment system has been retroactively applied to existing engines.

Engines certified to NO_x emission standards are typically tuned to reduce emissions by operating at off-optimal combustion conditions, with negative impacts on fuel efficiency. When applying SCR, however, such engines can instead be tuned for maximum fuel efficiency. For example, SCR was estimated to provide a fuel economy benefit of 3–5 per cent under the EU's Euro V standards for heavy-duty vehicles, with fuel cost savings partially offset by the additional cost of the urea used for SCR.

According to the ICCT, for ships, slightly lower fuel efficiency gains, on the order of 2–4 per cent, are expected under Tier III given that engine combustion conditions are currently less constrained under Tier II than equivalent standards for other modes. Thus, it may be possible to simultaneously reduce both CO₂ and NO_x emissions when moving from Tier II to Tier III compliance.

The International Association for Catalytic Control of Ship Emissions to Air (IACCSEA) has developed a cost estimation model for SCR installation and operation. Using this model, the ICCT calculated the total (undiscounted) operating cost of SCR for a 10 MW engine powering a



Ocean-going vessels emit about 15 per cent of total anthropogenic NOx emissions. PAUL HART/Flickr.com/CC BY

vessel of 20,000 DWT using heavy fuel oil (HFO) and that spends 1500 hours annually in a NOx Emission Control Area to between US\$104,000 and 224,000 per year, or approximately UD\$900 to 2000 per tonne of NOx reduced.

ICCT concludes that SCR is a well-proven technology, and that a large number of companies based in Europe, the US, and Asia are currently delivering marine SCR systems to meet current and future NOx reduction requirements. The costs of installing and operating SCR are modest and are expected to fall over time as application of the Tier III standards generates greater innovation and competition among manufacturers and suppliers.

Based on this evaluation of technological capabilities and a history of successful application of SCR technology to maritime vessels, the ICCT sees no substantial equipment, supply chain, or cost barriers that would significantly inhibit the implementation of the NOx Tier III standards for applicable vessels in 2016 as established by the International Maritime Organization in 2008.

Christer Ågren

Feasibility of IMO Annex VI Tier III implementation using Selective Catalytic Reduction (March 2014). ICCT working paper 2014-4. By A. Azzara, D. Rutherford & H. Wang. Can be downloaded at: <http://www.theicct.org/feasibility-imo-tier-iii-implementation-using-scr>

Sulphur compliance alliance announced

The Trident Alliance is a new shipping industry initiative for robust enforcement of maritime sulphur regulations, set in motion by Wallenius Wilhelmsen Logistics (WWL), with the aim to form a coalition of owners and operators willing to collaborate to bring this about. A first meeting was held in Copenhagen on 28 May.

“If the regulations are robustly implemented then compliance is the norm and competition is not distorted. However, when enforcement is weak a temptation is created to cut corners on compliance. The result is that regulations will not have the intended effect of protecting the environment and human health. Also, responsible shipping companies are put at a disadvantage relative to those who are intentionally non-compliant,” said WWL.

There have been calls from shipping companies, in particular in Scandinavia, to step up enforcement of sulphur regulations in 2015 to deter cheats. According to WWL, European compliance testing for ship fuel sulphur content is currently in the range of 1 out of 250 to 1 out of 1000 vessels, or around 0.2 per cent, and of those tested, about half are found to be in violation.

WWL and Maersk are so far the only names, part of the environmental alliance, that have been made public, however, carriers from Sweden, Germany, Japan, and South Korea are said to be participating.

Kirsten Brosbol, Danish Minister for the Environment, said she believes the alliance could make a difference: “I absolutely believe that this will make a difference, when several major carriers join forces to call for increased control of shipping in national and international waters. Denmark is already working toward making all countries perform controls to ensure that shipping complies with the new sulphur regulation, so this is certainly going to benefit us.”

Sources: Sustainable Shipping News 14 May and 30 May and WWL news release 9 May 2014.

Link: www.2wgglobal.com



Schoolgirl in Bangladesh with an air pollution mask.

ADAM JONES/FICKR.COM/CC BY-SA

Air pollution the world's largest environmental health risk

New figures from the WHO link indoor and outdoor air pollution to around 7 million premature deaths a year – more than double previous estimates.

Air pollution is now the world's largest single environmental health risk, linked to around 7 million deaths in 2012, according to new estimates by the World Health Organization (WHO).

Regionally, South-East Asia has the largest air pollution-related health impacts, with a total of 3.3 million deaths linked to indoor air pollution and 2.6 million deaths related to outdoor air pollution.

After analysing the risk factors and taking into account revisions in methodology, WHO estimates that indoor air pollution was linked to 4.3 million deaths in households cooking over coal, wood and biomass stoves. The new estimate is explained by better information about pollution exposures among the approximately 2.9 billion people that live in homes using wood, coal or dung as their primary cooking fuel, as well

as evidence about air pollution's role in the development of cardiovascular and respiratory diseases, and cancers.

Outdoor air pollution was estimated to cause 3.7 million deaths. Because many people are exposed to both indoor and outdoor air pollution there is an overlap, and mortality attributed to the two sources cannot simply be added together, hence the total estimate of around 7 million deaths.

A breakdown of deaths attributed to specific diseases underlines that the vast majority of air pollution deaths are due to cardiovascular diseases. For outdoor air pollution, the cause of deaths was attributed to: ischaemic heart disease (40%); stroke (40%); chronic obstructive pulmonary disease (COPD) (11%); lung cancer (6%); and acute lower respiratory infections in children (3%).

For indoor air pollution, the causes of deaths were: stroke (34%); ischaemic heart disease (26%); COPD (22%); acute lower respiratory infections in children (12%); and lung cancer (6%).

"The risks from air pollution are now far greater than previously thought or understood, particularly for heart disease and strokes," said Dr Maria Neira, Director of WHO's Department for Public Health, Environmental and Social Determinants of Health. "Few risks have a greater impact on global health today than air pollution; the evidence signals the need for concerted action to clean up the air we all breathe."

Christer Ågren

Source: WHO press release, 25 March 2014.
Link: <http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/>

Urban air quality getting worse

About half of the urban population being monitored worldwide is exposed to air pollution that is at least 2.5 times higher than the levels recommended by the WHO.

The urban air quality database of the World Health Organization (WHO) now covers 1600 cities across 91 countries – 500 more cities than the previous database issued in 2011. This shows that more and more cities worldwide are monitoring outdoor air quality, reflecting a growing recognition of air pollution's health risks.

Only 12 per cent of the people living in cities reporting on air quality reside in cities where the pollution levels comply with the WHO's air quality guideline levels. About half of the urban population being monitored is exposed to air pollution levels that are at least 2.5 times higher than the guidelines recommended by the WHO – putting those people at additional risk of serious, long-term health problems.

In most of these cities air pollution is getting worse, often due to reliance on fossil fuels such as coal-fired power plants for electricity generation, dependence on private transport motor vehicles, inefficient use of energy in buildings, and the use of biomass for cooking and heating.

Some of the most polluted cities are: Dakar (Senegal); Mexico City, Karachi

(Pakistan); Ulaanbaatar (Mongolia) and Seoul (South Korea). However, thirteen of the dirtiest twenty cities are Indian, with New Delhi, Patna, Gwalior and Raipur in the top four spots.

“We can win the fight against air pollution and reduce the number of people suffering from respiratory and heart disease, as well as lung cancer,” said Dr Maria Neira, WHO Director for Public Health, Environmental and Social Determinants of Health. “Effective policies and strategies are well understood, but they need to be implemented at sufficient scale. Cities such as Copenhagen and Bogotá, for example, have improved air quality by promoting ‘active transport’ and prioritising dedicated networks of urban public transport, walking and cycling.”

Christer Ågren

Source: WHO press release 7 May 2014. Link: <http://www.who.int/mediacentre/news/releases/2014/air-quality/en/>

The ambient air pollution in cities database 2014: http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/

Lorry fuel-efficiency standard needed

On 21 May, the European Commission published a CO₂ strategy for heavy-duty vehicles (trucks, buses and coaches). Between 1990 and 2010, emissions of CO₂ from these vehicles grew by 36 per cent and now represent 6 per cent of total EU emissions. To deal with these rising emissions, the Commission has proposed, as a first step, a tool to measure, certify and report CO₂ emissions, hoping that increased transparency may accelerate improvements.

Transport & Environment (T&E) welcomes the strategy, but urges swift, concrete action, including the rapid introduction of fuel economy standards. William Todts, senior policy officer at T&E, said: “Lorry fuel efficiency has remained stagnant for 30 years, but while the US has quickly set standards for American trucks to improve their fuel economy, Europe is just treading water. Fuel economy standards will slash fuel bills, reduce oil and diesel imports and cut climate-changing emissions.”

Source: European Commission and T&E press releases 21 May 2014.

Links: T&E: www.transportenvironment.org/

Commission Strategy: http://europa.eu/rapid/press-release_IP-14-576_en.htm?locale=en

Bogotá has improved air quality by prioritising urban public transport, walking and cycling.

ADAM JONES/FLICKR.COM/CC BY-SA



Use the law, beat pollution

Clean air is essential to good health and is a basic human need. EU law has recognised the need for healthy air and given legal protection to it through directives and court judgments.

To help people use the law to campaign for healthy air, Client Earth has released a handbook – “The Clean Air Handbook: A practical guide to EU air quality law” – that provides a straightforward, easy-to-use guide to EU air quality law.

Whether you are a concerned citizen trying to find out what levels of pollution

are like in your neighbourhood, an experienced non-governmental organisation (NGO) campaigner trying to influence an air quality plan for a heavily polluted city, or a lawyer trying to bring a case concerning air quality, this guide will give you an overview of the relevant aspects of EU law, together with some practical tips on how they can be used effectively.

Source: Client Earth 28 May 2014

Link: www.clientearth.org/201405282553/news/latest-news/use-the-law-beat-pollution-2553

Harmful ozone levels over Europe

Ozone pollution significantly exceeded EU standards to protect health during the summer of 2013, especially in the Mediterranean and Alpine regions.

Ground-level ozone exceeded legal limits in every EU member state during summer 2013, according to a new report by the European Environment Agency (EEA). Although the number of exceedances is high, they have decreased over recent decades.

EU standards to protect health were significantly exceeded, particularly during July and early August, and the most problematic areas were the Mediterranean and Alpine regions. In some countries up to two-fifths of the population was exposed to levels exceeding limits.

Recent scientific studies have shown that ground-level ozone pollution is also

harmful to health at very low levels, well below the limits set in EU air quality standards. Even though the EU limits were exceeded on fewer occasions in 2013 than in many previous years, this does not necessarily mean that public exposure to harmful ozone levels is falling by a corresponding amount. A separate study found that in 2012 almost all inhabitants of cities in the EU were exposed to ozone levels above the World Health Organization (WHO) guideline of $100 \mu\text{g}/\text{m}^3$ as a daily eight-hour mean value, which is stricter than the EU limits.

The EU's air quality directive includes a long-term objective (LTO) for the

protection of human health, which is set at a maximum daily eight-hour mean concentration of $120 \mu\text{g}/\text{m}^3$. This was exceeded at least once in all member states during summer 2013.

The EU target value (TV) for the protection of human health is exceeded when the LTO of $120 \mu\text{g}/\text{m}^3$ has been exceeded at a particular station more than 25 times per calendar year, averaged over three years. More than 25 LTO exceedances occurred at stations in 19 EU member states (Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, France, Germany, Greece, Hungary, Italy, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia and Spain) and in five other reporting countries or territories (Macedonia, Kosovo, Montenegro, Serbia and Switzerland).

Ground-level ozone is a 'secondary pollutant', which means it is formed in chemical reactions between other pollutants in the air, primarily nitrogen oxides (NO_x) and volatile organic compounds (VOCs). Ozone levels become particularly high in regions where considerable ozone precursor emissions combine with warm and sunny weather during the summer.

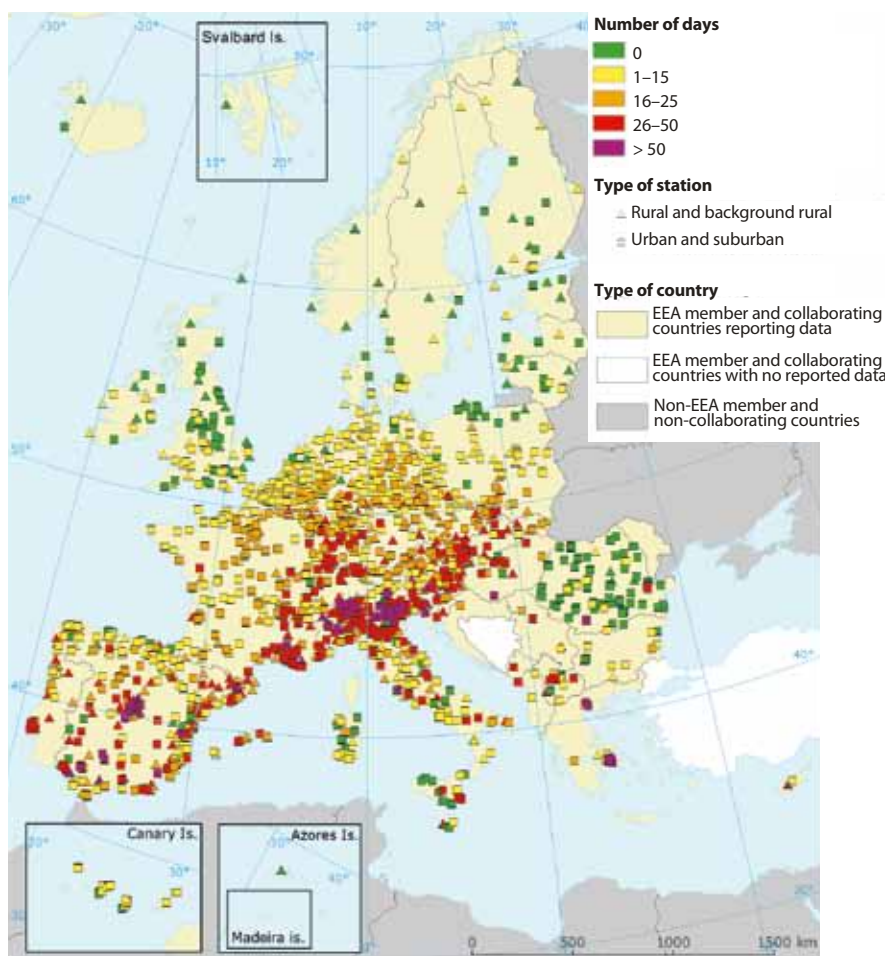
Elevated ozone concentrations can cause serious health problems, especially respiratory illnesses and cardiovascular problems, which may lead to premature death. Ozone also damages materials and vegetation, including forest trees and agricultural crops.

Christer Ågren

Source: EEA, 13 March 2014

Link: <http://www.eea.europa.eu/highlights/summer-ozone-at-harmful-levels>

The report: <http://www.eea.europa.eu/publications/air-pollution-by-ozone-across-1>



Number of days on which ozone concentrations exceeded the LTO for the protection of human health during summer 2013.



Diesel cars from 2010 and later only emit 1.5 per cent less CO₂ than petrol cars from the same year.

© DONFIORE - FOTOLIA.COM

Diesel cars not as green as perceived

In Europe, diesel cars have been promoted based on the assumption that they emit less greenhouse gases (GHG) than petrol-fuelled cars and many EU member states have reduced taxes on diesel fuel and diesel car sales. This led to a boom in the diesel car market between 1995 and 2009, resulting in an additional 47 million more diesel vehicles on the road since the mid-1990s. These cars have the potential to have long-term impacts on emissions, as each car is likely to last approximately 16 years.

A recent study has reviewed the evidence for the claim that diesel cars are better for the environment than petrol cars.

Laboratory studies suggest that diesel cars are 35 per cent more efficient than petrol cars. However, diesel fuel contains about 14 per cent more carbon per litre. When improvements are measured in grams of CO₂ emitted per kilometre (gCO₂/km), i.e. considering the emission intensity, diesel is only 15 per cent more CO₂ efficient.

Furthermore, when the actual car fleet is examined, the advantages of diesel cars reduce even more. Until 2005, diesel cars emitted 5–10 per cent less CO₂ than petrol cars. However, designs of petrol cars

have improved and by 2010 diesel cars emitted only 1.5 per cent less CO₂. The researchers note that a trend for greater size and power of diesel cars may be partly responsible for the comparative reduced efficiency of the diesel fleet. However, they argue that this increase in size and power is itself partly due to excessive diesel fuel subsidies.

In Europe, CO₂ emissions from newly registered cars dropped from over 180 gCO₂/km in 1995 to 140–150 gCO₂/km in 2009. In contrast, emissions from the Japanese car fleet reduced from very similar levels in 1995 to 120–130 gCO₂/km in 2009. In Japan, diesel cars have been phased out and efforts have been made to promote hybrid petrol-electric cars.

The researchers also point to the fact that diesel cars emit more black carbon, which also contributes to global warming, and estimate that for diesel cars produced between 1995 and 2003, the negative effects on the climate of black carbon outweigh CO₂ savings. That said, post-2003 cars are often fitted with particle filters and, for these vehicles, the diesel car retains a slight advantage of 4 gCO₂/km, based on laboratory tests.

In addition to climate change effects, diesel cars emit high levels of nitrogen oxides (NO_x), causing damage to human health and contributing to ecosystem damage through eutrophication, acidification and ground-level ozone. It is concluded that NO_x emissions from current on-road diesel cars are 10 to 100 times higher than those from petrol cars, if petrol-fuelled hybrid cars are considered. This fact was ignored when setting up economic policy on diesel fuel and diesel car sales.

The researchers conclude that, while the move away from petrol cars is essential to tackle global warming, replacing them with diesel-fuelled cars is not the solution. They suggest that the Japanese approach of producing relatively affordable hybrids has been much more successful in reducing GHG emissions from the transport sector.

Source: Science for Environment Policy, 5 December 2013

Study: Critical evaluation of the European diesel car boom – global comparison, environmental effects and various national strategies (2013). By M. Cames & E. Helmers. Published in Environmental Sciences Europe. www.enveurope.com/content/25/1/15



Hungary must act on PM pollution

The European Commission has noted with concern that Hungary has recorded PM₁₀ concentrations above the legal limit every year since 2005 in areas around the cities of Miskolc, Nyíregyháza and Szeged, and in the Budapest region. The Pécs region, which was exempt from the rules until 2011, has also been affected.

According to the Commission, Hungary has not taken measures that should have been in place since 2005 to protect citizens' health, and is asking the country to take forward-looking, speedy and effective action to keep the period of non-compliance as short as possible. If Hungary fails to act, the Commission may take the matter to the EU Court of Justice.

Source: European Commission press release 28 March 2014.

Link: http://europa.eu/rapid/press-release_MEMO-14-241_en.htm

RAMOS ALEANDRO/FLICR.COM/CC BY



Stricter PM limits proposed in Norway

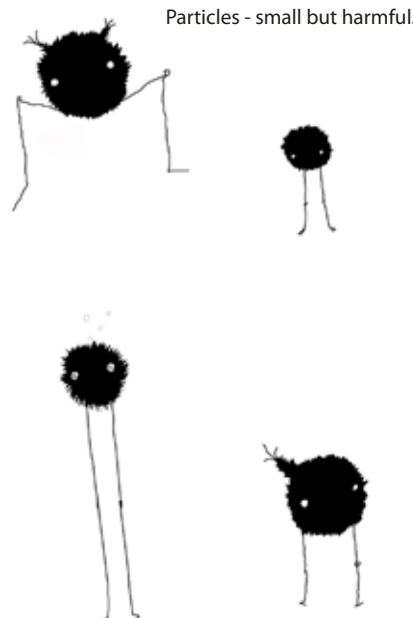
Norway's Environment Agency published on 28 February a recommendation to tighten the country's limits on particulate matter (PM) concentrations in the air. Norway's existing air quality standards are similar to the EU's, but the European Commission decided in its Clean Air package of December 2013 not to update the limits set in the EU Air Quality Directive from 2008.

Proposed new limits for PM₁₀ are an annual mean of 25 µg/m³ in 2015 and 22

µg/m³ in 2020. The number of maximum allowed exceedances of the daily PM₁₀ limit (of 50 µg/m³) is proposed to come down to 30 in 2015 and to 15 in 2020. Proposed new limits for PM_{2.5} are an annual mean of 15 µg/m³ in 2015 and 12 µg/m³ in 2020.

Source: Norwegian Environment Agency press release 28 February 2014.

Link: <http://www.miljodirektoratet.no/no/Nyheter/Nyheter/2014/Februar-2014/Vil-ha-strengere-grenser-for-svevestov/>



Switzerland considers PM_{2.5} limit value

The Swiss Federal Commission for Air Hygiene recommends the introduction of an ambient air quality standard for PM_{2.5} in addition to the already existing standards for PM₁₀. It is calling for an annual mean limit of 10 µg/m³, as recommended by the World Health Organization (WHO), to be incorporated into the Swiss Federal Ordinance on Air Pollution Control (OAPC). It also recommends the specification of a binding target for a reduction of carcinogenic soot by 80 per cent in the next 10 years.

Source: Swiss Federal Department of the Environment, Transport, Energy and Communications 19 March 2014. Link: www.uvek.admin.ch/dokumentation/00474/00492/index.html?lang=en&msgid=52333

Climate change will worsen ozone pollution

Warmer temperatures and higher atmospheric levels of methane could increase summertime ozone levels in the United States by 70 per cent in 2050, according to a new study. Ground-level ozone can trigger health problems such as asthma, bronchitis, and emphysema. Even short periods of unhealthy ozone levels can cause local death rates to rise. Ozone pollution also damages crops and other plants.

"It doesn't matter where you are in the United States – climate change has the potential to make your air worse," said

Gabriele Pfister, lead author of the study. "A warming planet doesn't just mean rising temperatures, it also means risking more summertime pollution and the health impacts that come with it."

On the other hand, it was also found that sharp reductions in emissions of the ozone precursor pollutants, nitrogen oxides and volatile organic compounds, could reduce ozone levels even as the climate warms.

Two scenarios were examined. In one, emissions of nitrogen oxides and volatile

organic compounds from human activities would continue at current levels through 2050. In the other, emissions would be cut by 60–70 per cent. Both scenarios assumed continued greenhouse gas emissions with significant warming.

Source: UCAR new release, 5 May 2014.

The study Projections of future summertime ozone over the U.S. is published online in the Journal of Geophysical Research-Atmospheres.

Link: <http://onlinelibrary.wiley.com/doi/10.1002/2013JD020932/abstract>

Europe's biggest polluters

Twelve of Europe's most polluting point sources in 2012 were found in two countries: Germany and the UK.

The European Pollutant Release and Transfer Register (E-PRTR) was recently updated with figures for emissions from industrial installations in 2012.

The state-owned Bełchatów lignite plant in Poland remained Europe's biggest carbon dioxide (CO₂) polluter. It was followed by three German lignite plants. Neurath increased CO₂ emissions by more than 50 per cent, since two new blocks that were put into full service in July 2012 increased capacity by 2100 MW. Drax in the United Kingdom, which occupies fifth place, is unlike the others mainly powered by hard coal. The CO₂ emissions from these five plants have all increased in recent years. Fuel-switching from gas to coal is probably a more likely explanation for this than economic recovery after the crisis.

At the top of the list of the worst nitrogen oxides (NO_x) polluters, we find once again Drax and Bełchatów. While Bełchatów has been the worst NO_x polluter for several years, this year it was beaten by Drax, because of increasing emissions from the British plant.

Adaption to the Industrial Emissions Directive (IED) and the spread of desulphurisation techniques in the eastern parts of the European Union are reflected to some extent in the list of sulphur (SO₂) polluters. At Maritsa 2 in Bulgaria, emissions were reduced by 40 per cent. Four



Cooling towers of Drax power station, Europe's biggest point source of nitrogen oxides.

Serbian lignite plants, not covered by the IED, are also found on the list. The fact that several plants in Eastern Europe have managed to reduce their sulphur emissions might be the reason why British power plants are present on the list again. However one of them, Didcot A, will not appear in future lists, since it was shut down in 2013.

The E-PRTR is a service managed by the European Commission and the European Environment Agency (EEA). The online register contains information on emissions

of pollutants released into the atmosphere, hydrosphere and into the soil by industrial facilities throughout Europe (32 countries: EU27, Iceland, Liechtenstein, Norway, Switzerland and Serbia) and includes annual data for 91 substances released from nearly 30,000 facilities. The first data set is from 2007 and it has now been updated for the fifth time.

Kajsa Lindqvist

The European Pollutant Release and Transfer Register can be found at: <http://prtr.ec.europa.eu> (For lists from 2009–2011 see AN2/11, AN2/12, AN2/13.)

CO ₂		
	Plant	Thousand tonnes
1 (1)	Bełchatów	35,200
2 (5)	Neurath	31,200
3 (2)	Niederaußem	27,900
4 (3)	Jänschwalde	24,800
5 (4)	Drax	23,900
6 (6)	Eschweiler	20,200
7 (7)	Boxberg	15,900
8 (9)	Agios Dimitrios	14,700
9 (11)	Schwarze Pumpe	12,600
10 (12)	Brindisi South	12,200
11 (12)	Dunkerque	11,400
12 (13)	Martisa 2	11,100

NO _x		
	Plant	Tonnes
1 (2)	Drax	42,100
2 (1)	Bełchatów	40,300
3 (9)	Aberthaw	32,000
4 (28)	Neurath	20,700
5 (7)	Cottam	20,600
6 (3)	Nikola Tesla A	20,200
7 (6)	Jänschwalde	19,900
8 (8)	Niederaußem	18,200
9 (5)	Kozienice	18,200
10 (37)	West Burton	18,000
11 (4)	Agios Dimitrios	17,700
12 (-)	Longannet	16,600

SO ₂		
	Plant	Tonnes
1 (1)	Martisa 2	153,000
2 (2)	Nikola Tesla A	105,000
3 (6)	Nikola Tesla B	94,000
4 (4)	Bełchatów	77,800
5 (7)	Kostolac A	54,200
6 (3)	Kostolac B	43,100
7 (19)	Romag-Termo	40,500
8 (5)	Turceni	37,500
9 (15)	Drax	36,500
10 (54)	Didcot A	35,800
11 (8)	Bobov Dol	35,400
12 (11)	Longannet	34,800

Air Pollution & Climate Secretariat
Norra Allégatan 5
413 01 Göteborg
Sweden

Recent publications from the Secretariat

Reports can be downloaded in PDF format from www.airclim.org



Ship emissions

Shipping is a major cause of harmful air pollution in Europe and by 2020 shipping emissions of SO₂ and NO_x 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 attempt 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 were asked to describe and rank their ten best climate measures.

There is a great diversity among these measures. 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.

Subscribe to Acid News via email

Are you receiving the printed copy of *Acid News* but missing out on the online version? Sign up on our website to receive an email announcement when each issue of *Acid News* becomes available online.

This way, you'll get access to *Acid News* at least two weeks before the printed copy arrives in the mail.

airclim.org/acidnews/an_subscribe.php

Coming events

UNFCCC 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/>

EU Sustainable Energy Week (EUSEW). In Brussels and across Europe, 23 - 27 June 2014, incl. a high-level policy conference in Brussels 24 - 26 June. Information: <http://www.eusew.eu>

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

Air Pollution 2014. 22nd International Conference on Modelling, Monitoring and Management of Air Pollution. Opatija, Croatia, 7 - 9 July 2014. Information: www.wessex.ac.uk/14-conferences/air-pollution-2014.html

20th International Transport and Air Pollution Conference (TAP 2014). Graz, Austria, 18 - 19 September 2014. Information: <http://www.tapconference.org/>

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

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

EU Environment Council. 21 October 2014. Information: <http://europa.eu/newsroom/calendar/>

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

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

Fifth International Conference on Plants & Environmental Pollution (ICPEP-5). Lucknow, India, 3 - 6 December 2014. Information: <http://isebindia.com>

CLRTAP Executive Body. Geneva, Switzerland, 8 - 12 December 2014. Information: www.unece.org/env/lrtap/

EU Environment Council. 17 December 2014. Information: <http://europa.eu/newsroom/calendar/>

International Conference on Air Pollution and Control (ICAPC). Paris, France, 23-24 February 2015. Information: www.waset.org/conference/2015/02/paris/ICAPC