

Shale gas has lost lustre

The “Golden Age” of shale gas, heralded by the IEA a year ago, may not arrive after all, at least not in Europe. The promises of plenty, soon and cheap are not materialising.

► Page 5

Agreement on equity issues essential

The equity knot remains to be cut before we can see a new global climate agreement. Climate Action Network (CAN) has just launched a proposal.

► Page 9

Shipping air pollution costs €60 billion per year

Total health-related costs in Europe caused by air pollutant emissions from international shipping are expected to increase from €58 billion to €64 billion between 2000 and 2020.

► Page 12

US: air pollution causes 210,000 deaths a year

Road transportation and power plants are the leading causes of air-pollution-related deaths in the US.

► Page 14

High potential to cut air pollution from LCPS

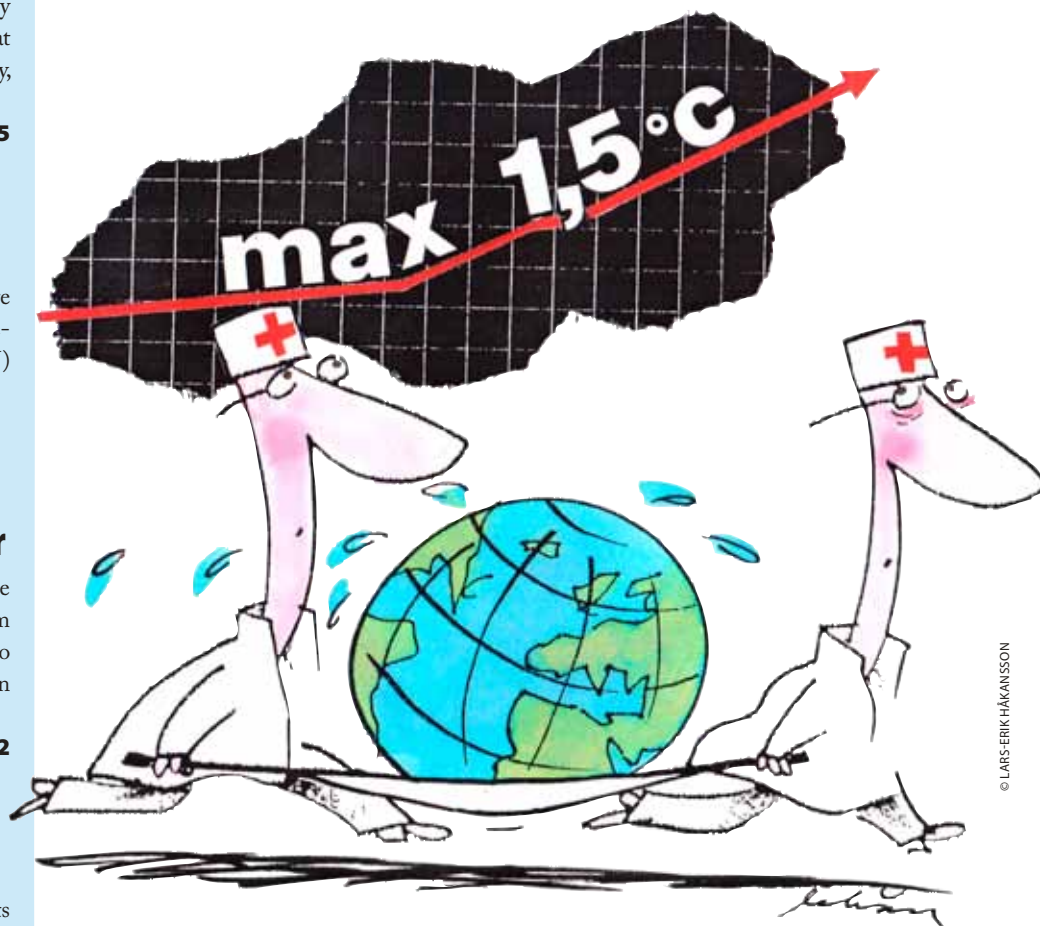
Emissions of the main air pollutants could be significantly further reduced if the emission levels associated with the best available techniques were to be achieved.

► Page 18

More food, less climate change

Improved meat production in Latin America and higher crop yields in Africa are key measures to reduce greenhouse gas emissions from land-use change, while improving food security.

► Page 24



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Warming can be limited to 1.5°C

There are reduction pathways that would make a global target of below 1.5°C possible, but they require negative CO₂ emissions in the second half of this century.

On behalf of Climate Action Network Europe and AirClim, Climate Analytics has analysed the adequacy and feasibility of limiting global warming to below 1.5°C. The report describes the effects of climate change for people and the environment at 0.8, 1.5, 2 and 4 degrees C global warming, and states that in the past century and in particular the last few decades the world

has seen signals of anthropogenic climate change emerging as diverse as rapid sea-ice thinning in the Arctic, monthly and seasonal temperature extremes, extreme droughts in the Mediterranean, decline of coral reefs and negative effects on agricultural yields.

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

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The Air Pollution and Climate Secretariat

The Secretariat has a board consisting of one representative from each of the following organisations: Friends of the Earth Sweden, Nature and Youth Sweden, the Swedish Society for Nature Conservation, and the World Wide Fund for Nature (WWF) Sweden.

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

In furtherance of these aims, the Secretariat:

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

Editorial

For the last 25 years environmental organisations around the world have been trying to warn the world about the threat of climate change and demand urgent and steep reductions in greenhouse gases. Now, leading representatives of the business world, including the International Energy Agency (IEA) and the World Bank (WB), are issuing dire warnings as well.

The IEA says that any fossil fuel infrastructure built in the next five years will cause irreversible climate change. The world is likely to build so many

fossil-fuelled power stations, energy-guzzling factories and inefficient buildings in the next five years that it will become impossible to keep global warming at safe levels, and the last chance of combating dangerous climate change will be "lost forever" the agency adds. "Anything built from now on that produces carbon will do so for decades, and this 'lock-in' effect will be the single factor most likely to produce irreversible climate change." If this is not rapidly changed within the next five years, the results are likely to be disastrous, according to Fatih Birol, chief economist at the IEA, and this would set the world on a path to 5°C of warming, which would be catastrophic.

The World Bank has warned in several reports issued in recent months that we are on track for a 4°C warmer world marked by extreme heat waves, declining global food stocks, loss of ecosystems and biodiversity, and life-threatening sea level rise. Moreover, adverse effects of a warming climate are "tilted against many of the world's poorest regions" and likely to undermine development efforts and global development goals, say the WB studies. "A 4°C warmer world can, and must be, avoided – we need to hold warming below 2°C," says World Bank Group President Jim Yong Kim. "Lack of action



AirClim

"How many more warnings do we need before governments act?"

on climate change threatens to make the world our children inherit a completely different world than we are living in today. Climate change is one of the single biggest challenges facing development, and we need to assume the moral responsibility to take action on behalf of future generations, especially the poorest." The

WB reports reveal how rising global temperatures are increasingly threatening the health and livelihoods of the world's most vulnerable populations. They describe the risks to agriculture and food security in Sub-

Saharan Africa, rise in sea level, bleaching of coral reefs and devastation of coastal areas in Southeast Asia, as well as fluctuating rain patterns and food production impacts in South Asia.

Several global ecosystems are threatened by climate change above 1.5°C, including Arctic ice ecosystems and the high-mountain ice ecosystems. A study in the science magazine *Nature* concludes that limiting global warming to 2°C is unlikely to save most coral reefs. Actually it shows that preserving coral reefs worldwide would require the limiting of warming to 1.3°C relative to pre-industrial levels. A study by the Potsdam Institute for Climate Impact Research (PIK) (see page 8) reveals that each degree of global warming leads to sea level rise of two metres, threatening many low-lying coastal ecosystems.

How many more warnings do we need before governments act and agree on a legally binding global action plan for steep greenhouse gas reductions? The study by Climate Analytics (see front page) shows that it is still possible to follow a development path that allows us to achieve a target of below 1.5°C.

Reinhold Pape

Warming can be limited to 1.5°C

Continued from front page

The report says that hypothetically, if all emissions were to be eliminated immediately, delays in the climate system and abrupt changes in atmospheric radiative forcing would let warming continue to rise to a best-guess level of 1.2°C above the preindustrial level, before embarking on a gradual decline.

It is of course not possible to stop global emissions of greenhouse gases abruptly, but Climate Analytics identifies emission reduction pathways which would at least make a global target of below 1.5°C possible. These pathways would allow for a temporary overshooting of a greenhouse gas concentration of below 400 ppm CO₂eq, which is equivalent to around 1.5°C of warming, but in the long term concentrations would drop as a result of the proposed measures.

New energy and socioeconomic models from the scientific literature achieve the required low emission levels through the following key measures:

- Early and globally concerted mitigation, emission reductions implemented from 2013 onwards and global emission peak by 2020 without use of nuclear energy.
- Rapid up-scaling and feasibility of large-scale bio-energy, and availability of forest sinks.
- High rates of energy efficiency improvements.

- Availability of carbon capture and storage technologies for bioenergy (BCCS).

According to Climate Analytics, long-term 1.5 and 2°C emission scenarios overlap until the 2030s, but a 1.5°C scenario requires deeper reductions in the rest of the 21st century with the following pathway:

“Constrained by actual emissions until 2010 and the limited energy-economic reduction potential until the 2020s, 1.5°C scenarios necessarily require net negative CO₂ emissions in the second half of the 21st century. The later the emissions peak, the more CO₂ needs to be removed from the atmosphere starting around the 2050s. Due to slowly responding carbon pools in the Earth system, a large part of emitted CO₂ stays in the atmosphere for centuries, which is why emissions need to be reduced to near zero to stabilise concentrations. However, this also means that concentrations decrease only slowly, unless CO₂ is taken out of the atmosphere by human interventions. As biomass takes up carbon from the atmosphere through photosynthesis, capturing the CO₂ from biomass energy systems and storing it

underground, it in effect produces useful forms of energy for society (electricity) while taking CO₂ out of the atmosphere – a negative emission. CO₂ removal also helps to limit acidification of the oceans.”

Climate Analytics explains in the report that non-CO₂ measures must never be interpreted as a means for “buying time” to allow delayed reductions in CO₂. “The probability of exceeding a 2°C warming in the 21st century more than doubles from 20% to 50%, if CO₂ reductions were delayed by just 10 years, with compensation in the near term by non-CO₂ measures. Given the slow removal of CO₂ from the atmosphere, this effect is set to linger for centuries. Also, after a delay in CO₂ reductions, energy-related CO₂ reduction rates need to be almost double those in a “least-cost” low-emission pathway with early CO₂ measures. Without these higher reduction rates to “catch up”, the CO₂ concentration and warming by 2100 will be even higher. From a multi-decadal perspective, delay scenarios have been shown to be riskier, with required faster CO₂ reductions after a 10-year delay too expensive and/or technically infeasible. The IEA’s “World Energy Outlook 2011” states that: “Delaying action is a false economy: for every \$1 of investment avoided in the power sector before 2020 an additional \$4.3 would need to be spent after 2020 to compensate for the increased emissions.”

Today more than 100 countries support the 1.5°C target and in the UN Climate Convention this year a review process has been initiated to possibly adopt this target and reach a decision in 2015 about a reduction pathway for greenhouse gases that would make it possible to reach this long-term global limit.

Reinhold Pape



APC 29: Adequacy and feasibility of the 1.5°C long-term global limit by Michiel Schaeffer, Bill Hare, Marcia Rocha & Joeri Rogelj from Climate Analytics. Available at <http://www.airclim.org/publications/adequacy-and-feasibility-15c-long-term-global-limit-air-pollution>

Link to Climate Analytics and Climate Action Tracker: www.climateanalytics.org

Shale gas has lost its lustre

The “Golden Age” of shale gas, heralded by the International Energy Agency (IEA) a year ago, may not arrive after all, at least not in Europe. The promises of plenty, soon and cheap are not materialising.

When **Acid News** wrote about shale gas a year ago (AN 2/2012), there was a certain triumphalism among frackers, and their standard-bearer, the IEA. The message was that the success of unconventional gas in the United States could and should be replicated in much of the rest of the world, especially Europe.

The outcome is not so clear-cut. The war has just begun and both sides have scored some battle victories.

The frackers, i.e. the exploiters of and proponents for unconventional gas (see Box) have won some ground.

The EU Parliament voted down a moratorium on fracking in November 2012 with a very large majority.

The UK government lifted its moratorium on fracking in December 2012, and has since moved to a strong pro-shale position. In July it outlined tax breaks for fracking. The plans would make the UK the “most generous” regime for shale gas in the world, according to the government.

“Fracking has become a national debate in Britain – and it’s one that I’m determined to win,” wrote Prime Minister David Cameron in the *Telegraph* in September. The energy and climate secretary Ed Davey then claimed that fracking will not add to climate change. This was simultaneously more or less contradicted by a report from his own chief scientist, David Mackay.

The national debate has centred around an exploration project in Sussex, south England, where road blocks and other civil disobedience action, followed by police arrests, were very successful in getting attention. The explorer, Cuadrilla Resources, backed down there in August, but several other projects are progressing.

Public opinion is evenly divided; 40 per cent would support it in their local area and 40 per cent would oppose it, an ICM poll found in August. When asked if it should take place in the UK, 44 per cent of respondents said yes, with 30 per cent saying no and 26 per cent undecided.

The local Labour party has supported the Sussex protestors, whereas the central Labour party (the main opposition nationally, but not strong in southern England) has so far not taken a stand.

The political dynamics are unpredictable. Meanwhile, the British Geological Survey recently estimated there may be 1,300 trillion cubic feet of shale gas present in the north of England – double the previous estimates.

From the EU there are mixed signals. The EU commissioners say different things.

The EU Energy Commissioner, Günther Oettinger, told Germany in April that it would be unwise to say no to shale.

In May the EU Environment Commissioner, Janez Potočnik, expressed caution at a meeting in Poland. His reservation was not only on environmental grounds, but also based on energy strategy:

“Even in the most optimistic case, European shale gas development can only compensate for the decline in conventional gas production,” he said. “This would basically help maintaining the

current level of EU import dependency to 60 per cent.”

That is a far cry from the high hopes of yesteryear, that shale gas would rid Europe of dependence on Russia and OPEC.

The Polish shale energy resource has been downgraded by a factor of 10, notes Antoine Simon, campaigner for Friends of the Earth Europe (FoEE). The early estimates said the gas would supply Poland with energy for 300 years.

Now it is more like 30–35 years and that is “resources”, he says to Acid News.

The “reserves”, the technically and economically recoverable shale, are much less.

Exxon Mobile, Talisman Energy and Marathon Oil have all left Poland. One test well in northern Poland extracts some 5000 cubic metres of gas per day, which made Foreign minister Sikorski exclaim that “Polish shale gas is already out”. This is not really the case; it means less than four megawatts of gas.

The UK is the only other EU nation where fracking actually goes on, but with growing resistance from grassroots and a clear lack of enthusiasm from some large corporations.

Shell has declared that it has no plans to go into shale in the UK. BP’s chief economist, Christof Rühl, foresees “extremely limited growth” for it before 2030.

Similar disenchantment is voiced by the big consultancies. “Poland is not Texas”, said an IHS consultant to the *New York Times*.

One of the reasons why fracking will be more difficult here in Europe is the political risk. Only a few European nations have bans or moratoria, such as France, Bulgaria, and the Netherlands. But there could be more, particularly at the subnational level, as has already happened in Hessen and North Rhine-Westphalia in Germany and Cantabria in Spain.

The infrastructure and workforce that is already in place in the US will take a long time to develop here.



In april 2013 three well-known Dutch breweries announced they were against fracking, for which large amounts of water and chemicals are pumped into the ground, as it may contaminate the water, the most important ingredient of beer.

FILIPPO/CONMARK VON MINDEN ADAPTED BY FLICKR.COM/GLOTZBACH/CC BY-NC-SA

Even the US success story is not as clear-cut as it seemed. Natural gas prices fell, but have risen again over the past year, notes Antoine Simon.

He doubts that shale gas is cheap, and points to a German study that claims natural gas prices have to go up, not down to make shale gas economic.

The most important goal for Simon and FoEE is an inclusion of all fracking activities in the Environmental Impact Assessment Directive. It should supply baseline data, so a causal link can be established for pollution.

This is in fact not evident at all. Even the famous tap water on fire in a fracked area in the US movie *Gasland* has been contested on the ground that such things have happened before fracking!

A mandatory impact assessment also gives NGOs a right to participation.

Amendments to the directive in these respects will be voted upon in the EU Parliament, on October 1.

As for now, whether fracking projects need EIA is essentially up to the member states.

In Poland, which according to Simon, “wants fracking at any cost”, requirements for EIA are minimal.

While the wider public was either sympathetic or apathetic to fracking a couple of years ago, the issue is now also high-profile in the US, and resistance is growing. New York governor Andrew Cuomo has found one excuse after another not to make a decision about fracking in the state, which has a de facto moratorium. Two and a half

years have passed. Opinion polls show that more New Yorkers are against than for it. A large number of municipalities have decided on bans or moratoria. The gas industry contested their right to decide, but it has been sustained in court.

Efforts by the gas industry to portray their opponents as NIMBYists (Not In MY Back Yard) seem to have backfired. It is true that much of the anti-fracking grassroots campaign is locally based, but wider issues are certainly addressed by the NGOs. The strong commitment of a large showing of artists and celebrities has helped.

Even if some of the rhymes are open to criticism, Sean Lennon’s song “Don’t frack my mother” (with Yoko Ono joining in “Don’t frack me”) makes a pretty clear statement in that respect:

“We can’t afford for this world to get hotter

We can’t afford polynuclear aromatic hydrocarbons in our water.”

The song and video are on YouTube.

The campaigners, for example New Yorkers Against Fracking¹, focus both on local pollution and on wider issues, such as renewable energy and conservation against fossil energy and global warming.

This is an important point. It cannot be denied that less coal and more natural gas are factors behind lower energy prices, decreasing foreign dependence and tumbling CO₂ emissions in the US. But this is just part of the story. Other factors are that Americans are buying much more efficient cars, using electricity much more efficiently and that wind



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Resistance is growing in the US. Here, at a protest site in Riverdale, Utah.

power supplied 140 TWh of electricity in 2012. President Obama noted all these factors in his state-of-the-union speech:

“We have doubled the distance our cars will go on a gallon of gas... Last year, wind energy added nearly half of all new power capacity in America. So let’s generate even more. Solar energy gets cheaper by the year – let’s drive down costs even further.”

Some of the factors that are driving down CO₂ emissions in the US are at work in Europe too. Electricity consumption is falling not only because of the slump, but also because of increased efficiency. The Eco-design directive is producing tangible results: practically any new TV, fridge, lamp, razor, computer, etc., will use less electricity than the one it replaces, and you can notice that it, or the charger, does not get as warm. And while Europe used more coal and less gas in 2012 than in 2011, this does not amount to a trend. More wind, more solar and better efficiency are part of a trend, all over the world. As it costs next to nothing to use wind and solar once they are there, they are gradually ousting gas, coal and nuclear power.

This does not mean that fracking is not a threat to the climate. It clearly is. The IEA says the Golden Age case puts CO₂ emissions “on a trajectory consistent with a probable temperature rise of more than 3.5 degrees Celsius (°C) in the long term, well above the widely accepted 2°C target”.

Time, however is not on the side of the frackers. Every day of indecision, in New York state, and elsewhere, makes the Golden Age less likely.

Fredrik Lundberg

¹ Webpage: <http://nyagainstfracking.org/>

Unconventional gas and oil

Shale gas, and sometimes associated oil, is trapped in dense rock, which has to be fractured by water (with additives) under high pressure. Horizontal drilling is also needed to crack up the rock from many points.

Tight oil is essentially the same thing as shale gas, but oil is the main object. Of great importance in the US.

Coalbed methane also often needs fracturing to be released.

Underground coal gasification means partial combustion of coal seams that are not economic to mine.

Oil sand (tar sand) oil is released with steam. This is done on a large scale in West Canada. The planned Keystone XL pipeline, if permitted and built will transport this oil across the US to refineries in Texas.

Oil shale can produce oil when heated, or be combusted as it is to produce power. Large resource, but for economical and environmental reasons not much used except in Estonia.

The unconventional have one thing in common: they add to the resources, and, all other things being equal, add to the CO₂ emissions.

EU energy tax reform stalled

Poland and Romania block even small steps toward technology-neutral fuel taxes in the EU.

The much-needed revision of the EU Energy Tax Directive is in deep trouble. In April 2011 the Commission launched a proposal that is intended to adapt energy taxation in the member states to the EU's new energy and climate policies (see AN 3/2011), but the proposal has met strong resistance from several member states, Poland being the most pronounced opponent. Since changes in the directive can only be adopted by the Council and with consensus, the prospects for a meaningful revision seem dark.

The EU Energy Directive sets minimum levels for taxes on all energy carriers in the EU member states. The present directive was agreed late in 2003 by the then 15 EU members just before the "Big Bang" in January 2004 when 10 new members joined the Union.

Today the directive is clearly outdated. The minima are low, they don't reflect the environmental impact of different fuels, the loopholes are numerous and, since present levels were decided 10 years ago, inflation has reduced the real levels.

The Commission proposal was based on "technical neutrality" signifying that fuel taxes should be split into two factors – one related to the energy content, the other to the emissions of fossil CO₂ – applied in a similar way to all fuels. The most important consequence of the proposal would have been that all member states would have to tax diesel some 9–10 per cent more per litre than petrol, reflecting the fact that a litre of diesel contains more energy and more

carbon than a litre of petrol. Renewable fuels would be exempted from the CO₂ factor, but not from the energy factor. The minimum tax on coal would also go up considerably.

Apart from the UK, which applies the same tax rate per litre for diesel and petrol, all EU member states tax diesel less or much less than petrol (see table). Making the technical neutrality mandatory would reverse this situation in all countries, triggering considerably higher diesel taxes.

Three and a half years after the proposal was tabled, the negotiations now deal with an attempt to compromise, much less revolutionise, as developed under the Cypriot (autumn 2012) and Irish (spring 2013) presidencies. The suggestion to make "technical neutrality" mandatory

has been rejected, instead only the minima would be based on the two factors of energy content and CO₂ emissions. The ambition to apply the same energy content and CO₂ emission factors to all fuels has also been abandoned. Instead lower factors are suggested for natural gas, LPG and biofuels than for petrol and diesel.

These drastic dilutions have still not proven sufficient to reach consensus.

Poland and lately also Romania are stubbornly and on grounds of principle opposing the very idea of introducing a CO₂ factor in the legislation.

Some of the eastern member states also resist short-term increases in the minima, referring to both derogations in their accession agreements that meant the present minima only recently became



Unequally taxed.

Table: Non-VAT fuel taxes in EU, August 2013, €/1000 l

	Petrol Super 95	Diesel
EU minimum	359.00	330.00
Cypriot/Irish bid (from 2015)	360.10	340.70
Cypriot/Irish bid (from 2018)	360.10	390.00
Austria	493.21	409.42
Belgium	613.57	427.69
Bulgaria	363.02	329.79
Croatia	445.45	339.39
Cyprus	439.70	410.70
Czech Republic	496.66	423.52
Denmark	591.25	404.45
Estonia	422.77	392.92
Finland	623.70	462.80
France	612.50	439.40
Germany	654.50	470.40
Greece	683.88	343.45
Hungary	410.03	377.62
Ireland	607.72	499.00
Italy	728.40	617.40
Latvia	433.66	350.94
Lithuania	434.43	330.17
Luxembourg	462.09	335.00
Malta	489.38	402.40
Netherlands	754.55	448.28
Poland	392.48	342.55
Portugal	585.27	367.53
Romania	364.53	334.93
Slovakia	570.17	406.05
Slovenia	559.89	443.53
Spain	464.75	370.12
Sweden	646.24	557.28
United Kingdom	679.45	679.45

Source: EC Oil Bulletin 19/08/2013

mandatory for them, but also to the fact that if their numerically low tax rates are related to the GDP per head, the rates are actually higher than in most western member states.

The Lithuanian presidency has announced it does not intend to solve those conflicts, but instead concentrate efforts on less controversial, technical details.

Magnus Nilsson
Transport & Environment



There are significant links between exposure to PM_{2.5} and respiratory infections and asthma in young children.

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Need for stronger EU action on air pollution

World Health Organization calls for tightening of European Union air quality standards.

A new scientific review on air pollution conducted by the World Health Organization (WHO) shows that the EU needs to step up efforts to improve air quality, according to the Health and Environment Alliance (HEAL).

WHO's "Review of evidence on health aspects of air pollution" (REVIHAAP) project provides new and more extensive evidence of harm to health in adults and children, including effects on prenatal development. The scientists also say that the effects of very hot periods during the summer – associated with climate change in Europe – will make the impact of air pollution worse.

The findings prompted the scientists to recommend a review of existing WHO

guidelines. They also say that the "new-found health effects call for stronger EU air policies", and that the EU air quality standards should be revised.

"Today's results are a wake-up call for decision-makers in Europe to take the air pollution problem more seriously," says Anne Stauffer, HEAL Deputy Director. "The new findings show effects at lower concentration levels and associations with new conditions, such as diabetes, adverse birth outcomes and cognitive development. They provide evidence-based science that EU policies are inadequate."

The assessment, carried out by 60 leading international scientists in the field, forms part of the discussions on

future EU measures in the EU Year of Air 2013. This autumn will see the launch of proposals on how to improve air quality all over Europe. HEAL calls on the EU Commission, but especially EU member states to increase their political commitment to tackling air pollution, which causes more premature deaths in Europe than road accidents.

Source: HEAL press release, 3 July 2013

The REVIHAAP Technical report "Review of evidence on health aspects of air pollution": <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/publications/2013/review-of-evidence-on-health-aspects-of-air-pollution-revihaap-project-final-technical-report>



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Under a business-as-usual scenario, temperatures are expected to rise by four degrees compared to pre-industrial times by the end of the century.

Sea levels might rise 2 metres for each degree of warming

Prehistoric data has been used to simulate possible sea levels over the next two millennia.

In the long term, we can expect more than two metres of sea-level rise per degree of global warming, a study published in the Proceedings of the National Academy of Sciences shows. Thermal expansion of sea-water is the main reason for the 0.2 metres the oceans have risen so far. The melting of the large ice sheets in Greenland and Antarctica has only contributed to around 10 per cent of the global sea-level rise, since these systems respond significantly slower to higher temperatures. “The problem is: once heated out of balance, they simply don’t stop,” says Anders Levermann, lead author of the study.

The research team managed to simulate what will happen to sea levels over the next two millennia, by combining data

on prehistoric sea levels with a physical model. “The Antarctic computer simulations were able to simulate the past five million years of ice history, and the other two ice models were directly calibrated against observational data – which in combination makes the scientists confident that these models are correctly estimating the future evolution of long-term sea-level rise,” says Peter Clark, co-author of the study.

Under a business-as-usual scenario, temperatures are expected to rise by four degrees compared to pre-industrial times by the end of the century. “Continuous sea-level rise is something we cannot avoid unless global temperatures go down again,” concludes Levermann. “Thus we can be absolutely certain that we need to adapt.

Sea-level rise might be slow on time scales on which we elect governments, but it is inevitable and therefore highly relevant for almost everything we build along our coastlines, for many generations to come.”

Sources: Potsdam Institute for Climate Impact Research, Press release 15 July 2013 <http://www.pik-potsdam.de/news/press-releases/jedes-grad-erderwaermung-koennte-den-meeresspiegel-auf-lange-sicht-um-mehr-als-2-meter-erhoehen>

The multimillennial sea-level commitment of global warming. By Anders Levermann et al. Published in Proceedings of the National Academy of Sciences (online edition), vol. 110 no. 34 <http://www.pnas.org/content/110/34/13745.full?sid=c8fa3f55-3079-434d-987e-7df0775efa2f>

Agreement on equity issues essential

The equity knot remains to be cut before we can see a new global climate agreement. Climate Action Network (CAN) has just launched a proposal.

Equity issues play an important role when governments now discuss the details for a new global agreement on very steep greenhouse gas reductions, and there is hope that an equity framework can be developed for this process by 2014 at the latest. This is needed to pave the way for governments to be able to decide on a global legally binding treaty in 2015.

In September 2013, Climate Action Network (CAN) issued its proposals¹ for the equity decision in the UN Climate Convention (UNFCCC). The CAN proposal says that: “extremely ambitious action will only occur within a regime that meets the legitimate development needs of the world’s poor. Equity, and a process for equity, must be forged into instruments of cooperation and breakthrough. The ultimate need, here, is the formal agreement of an Equity Reference Framework under the UNFCCC. The immediate need is a focused effort to agree on a small list of well-designed equity indicators that, taken together, allow us to adequately model the Convention’s core equity principles.”

CAN has identified the following as the core equity principles of the Convention and some examples for indicators are also presented here:

1. “A precautionary approach to adequacy, referring to the collective obligations of countries to undertake and support urgent and adequate global action to prevent dangerous impacts of climate change and provide effective adaptation to unavoidable impacts, without which there can be no justice.” (Climate Convention Article 3.3: “The Parties should take precautionary measures to anticipate, prevent and minimize the causes of climate change and mitigate its adverse effects.”)
“The most relevant indicators here, clearly, are those related to the 1.5°C and 2°C temperature targets. These should be defined, in the first instance, by GHG emission budgets, and secondarily by



The immediate need is a focused effort to agree on a small list of well-designed equity indicators.

indicative global emissions pathways (including peak years) that conform to those budgets.”

2. “Common but differentiated responsibility and respective capability (CBDR+RC), in which obligations to take action and provide support, and rights to receive such support, are accepted as functions of both historical and current emissions, and of capability to act.” (Climate Convention Article 3.1: “The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.”)
“One obvious indicator point here is that responsibility and capability are frequently correlated. This is not surprising since development and wealth creation have historically been strongly correlated with the consumption of fossil fuels. This frequent correlation between emissions and wealth is implicitly recognized in the second sentence of Article 3.1, obliging developed countries to ‘take the lead in combating climate change and the adverse effects thereof’. The need to take both responsibility and capability into proper account has implications. In particular, it means that the problem here is properly one of equitable effort sharing. In effort-sharing systems, mitigation efforts and contributions must ultimately be expressed relative to national baseline pathways.”

3. “The right to sustainable development, which we understand as the right of all countries to not just lift their people out of poverty, but also to provide their citizens with sustainable and universalizable living standards. By sustainable we mean ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs.’ By universalizable, we mean living standards that could be made available to the citizens of all countries.” (Climate Convention Article 3.4: “The Parties have a right to, and should, promote sustainable development.”)

Discussions on equity issues in the UNFCCC during 2012 and 2013 still showed a large difference between developed and developing countries. The governments of developing countries and institutions like the South Center/Third World Network argue that the Climate Convention recognises the equity principle: that developed countries must take the lead in emission reduction, and that developing countries have development imperatives, and their ability to undertake climate actions depend on the extent of support they receive from the developed countries².

Within the EU, on the initiative of the governments of Belgium and Sweden, an initial workshop was held in the end of 2012 to discuss equity in the context of the UN climate change negotiations.³ The meeting started a process which has improved awareness and knowledge about equity issues in the EU.

Reinhold Pape

¹ Link to the CAN position paper: http://www.climateactionnetwork.org/sites/default/files/can_convention-based_indicators_sept2013.pdf

² Link to position from South Center: http://unfccc.int/files/bodies/awg-lca/application/pdf/20120516_south_centre_paper_1701.pdf

³ Link to the Belgium-Swedish workshop: <http://www.climatechange.be/spip.php?article837>

Ship emissions down in the Baltic and North Sea

Switching to low-sulphur marine gas oil and lowering cruising speeds can reduce shipping emissions of air pollutants and greenhouse gases.

Implementing the stricter ship fuel sulphur standards in the northern European sulphur emission control area will cut emissions of sulphur dioxide (SO₂) and particulate matter (PM_{2.5}) by 85 and 50 per cent, respectively, between 2011 and 2015.

The corresponding increase in fuel costs is estimated to be between 10 and 63 per cent depending on the development of the fuel oil prices and the use of the sulphur scrubbers.

Between 2009 and 2011, emissions of SO₂ from shipping in the northern European sulphur emission control area (SECA) came down from 350,000 to 238,000 tons (-32%), and those of PM_{2.5} were lowered from 80,700 to 66,900 tons (-17%).

On the other hand, emissions of nitrogen oxides (NO_x) increased by five per cent, from 1,032,900 to 1,085,100 tons, and those of carbon dioxide (CO₂) went up by nine per cent, from 49.4 to 54 million tons.

The figures come from a recent Finnish inventory of marine exhaust emissions car-

ried out by the Finnish Meteorological Institute, using data for 2009 and 2011 on real ship movements taken from the global automatic identification system (AIS) and processing this data in the ship traffic emission assessment model (STEAM).

According to the authors, the strengthening of the sulphur standards has obviously had a significant impact on reducing the emissions of both SO₂ and PM_{2.5}. As from 1 July 2010 the sulphur limit for ships in SECAs was lowered from 1.5 to 1.0 per cent, and from 1 January 2010 the EU sulphur limit of 0.1 per cent for ships at berth came into effect.

It was noted that the highest emissions were located in the vicinity of the coast of the Netherlands, in the English Channel, near the south-east UK and along the busiest shipping lines in the Danish Straits and the Baltic Sea. Near several major ports (e.g., Antwerp, Rotterdam, Amsterdam, Hamburg, Riga, Tallinn, Helsinki and

St. Petersburg), the emissions of PM_{2.5} per square kilometre were especially high.

In order to evaluate the overall impact of stricter sulphur standards so far, a model simulation was performed applying the 2005 sulphur standards to the ship activity levels of 2011.

The simulation showed that the SO₂ emissions in the Baltic Sea and the North Sea would have

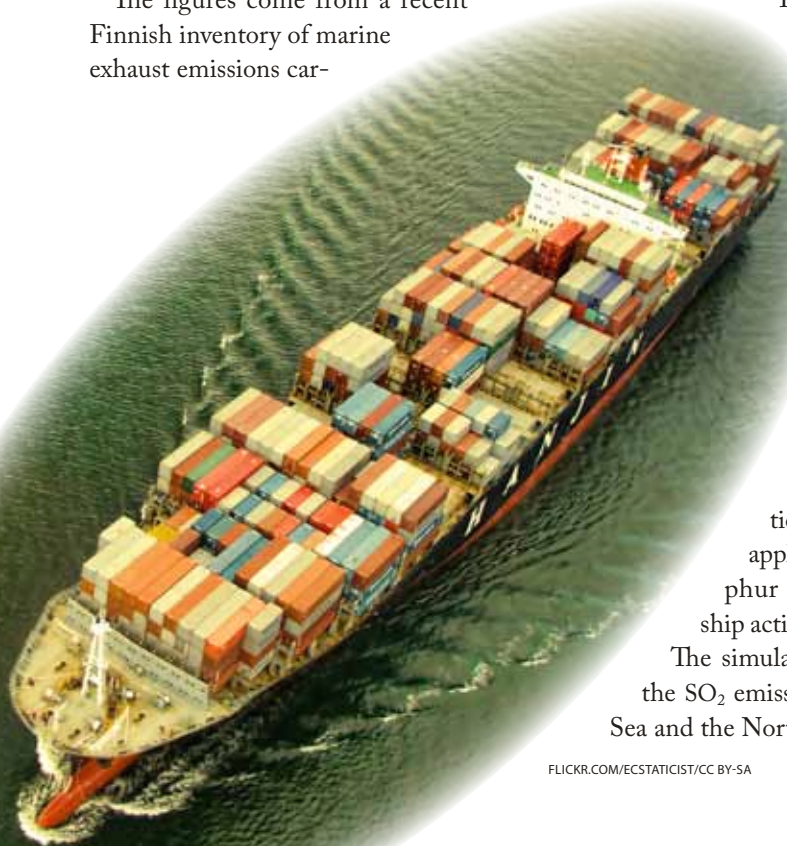
been 131 per cent higher (i.e., more than twice as high), compared to the current emissions in 2011. The corresponding PM_{2.5} emissions would have been 67 per cent higher. It was also estimated that if the 2005 sulphur standards still applied, the direct fuel costs would have been 12 per cent lower.

In 2008 the International Maritime Organization (IMO) unanimously agreed new ship emission standards, including a further strengthening of the SECA sulphur standard down to 0.1 per cent as from 1 January 2015. The IMO's sulphur standards were introduced in EU legislation last year.

Based on ship movements in 2011, the expected impacts of the 0.1 per cent limit on SECA ship emissions was simulated in the model. It was estimated that the SECA limit would reduce the emissions of SO₂ by 85 per cent and those of PM_{2.5} by 50 per cent, compared to the 2011 level of emissions.

Assuming that the fuel price differential would be the same as in January 2013, the introduction of the 0.1 per cent sulphur standard was estimated to increase the direct fuel costs by 19 per cent. In January 2013, the price of 0.1 per cent marine gas oil (MGO) was USD960 per ton and the cost of 1 per cent sulphur heavy fuel oil (HFO) was USD668 per ton, i.e. a price differential of USD292 per ton, or 44 per cent. The percentage increase in direct fuel costs is lower than the price differential because some ships already use low-sulphur MGO as their main fuel and/or to fuel their auxiliary engines, and ships are also obliged to use low-sulphur MGO when at berth.

However, it is noted by the authors that fuel price development over time has been volatile and the price differential between HFO and MGO has varied significantly.



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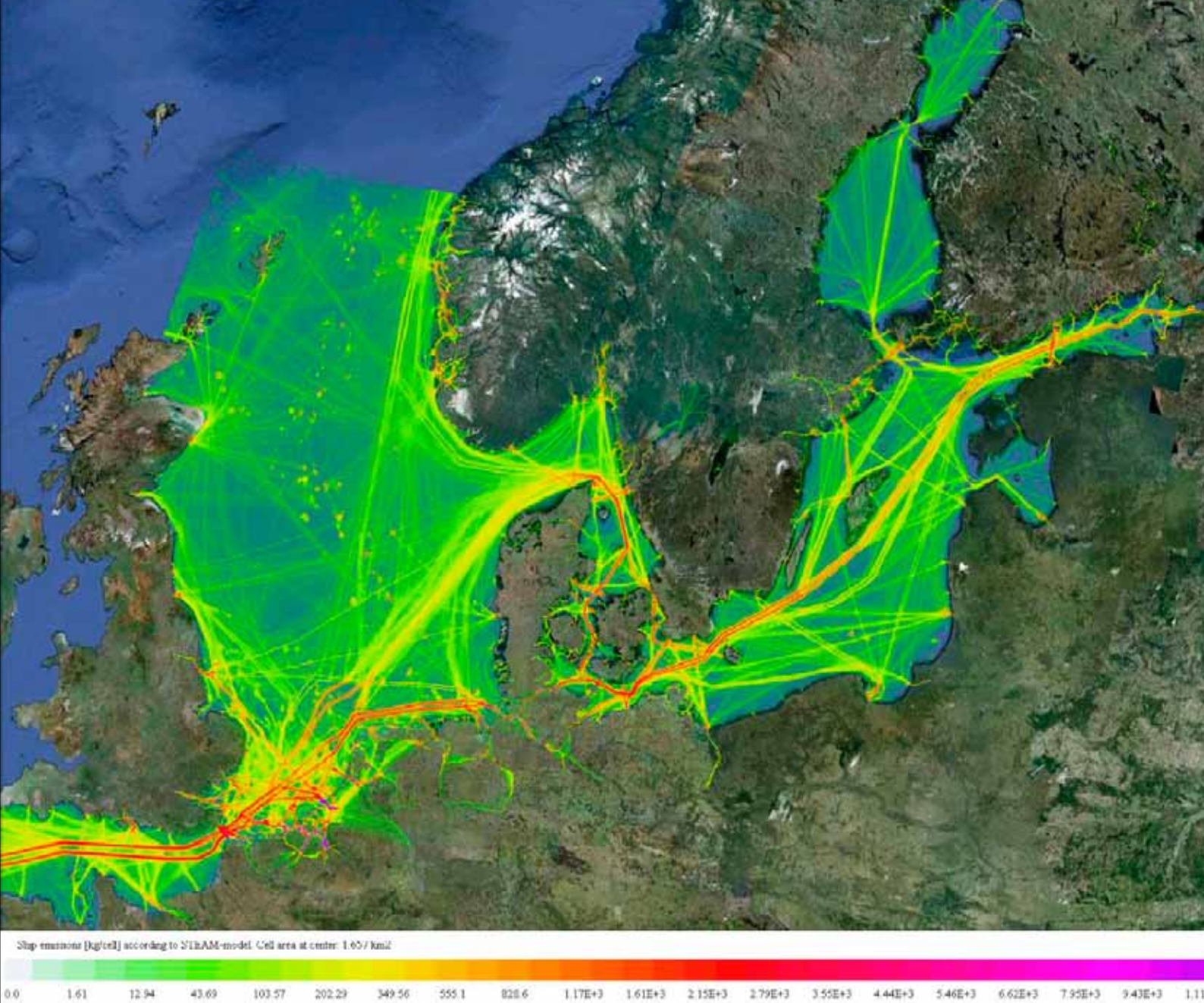


Figure: Intensity and geographic distribution of shipping emissions of PM_{2.5} in 2011.

They therefore looked at three different levels of price differentials: 50, 75 and 100 per cent price premium for MGO over HFO. If assuming the worst-case scenario – a price premium of 100 per cent – the direct fuel costs would increase by 64 per cent.

As an alternative to switching to 0.1 per cent sulphur MGO, ships can use exhaust gas cleaning systems, also known as scrubbers, to reduce their SO₂ emissions. Based on the estimated fuel consumption and current fuel prices, it was estimated that more than 630 IMO-registered ships might benefit from retrofitting scrubbers. These ships were responsible for more than one fifth of the total fuel consumption in the ECA in 2011.

Assuming that these ships would use scrubbers instead of switching to 0.1 per cent sulphur MGO, the estimated fuel cost increase in 2015 would be only 10 per cent (using the contemporary bunker prices) or at most 46 per cent (assuming 100 per cent price premium between HFO and MGO).

Achieving emission reductions by decreasing vessel cruising speeds was investigated by simulating speed reductions of 10 and 30 per cent to speeds exceeding 10 knots. It was concluded that the effectiveness of speed reduction as a way to curb emissions varies substantially between ship types. Especially RoPax, RoRo and vehicle carrier ships could achieve substantial fuel cost savings, without large increases in operational time.

The resulting fuel savings were significant even with a speed reduction as low as 10 per cent, and the relative reduction in SO₂, NO_x and PM_{2.5} emissions was estimated to be higher than the reduction in total fuel consumption.

Christer Ågren

The evolution of shipping emissions and the costs of recent and forthcoming emission regulations in the northern European emission control area. By L. Johansson et al. Published in Atmospheric Chemistry and Physics Discussion, 13 June 2013. Available at: <http://www.atmos-chem-phys-discuss.net/13/16113/2013/acpd-13-16113-2013.html>



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Shipping air pollution costs €60 billion per year

Total health-related costs in Europe caused by air pollutant emissions from international shipping are expected to increase from €58 billion to €64 billion between 2000 and 2020.

The total health-related costs of air pollution in Europe are calculated to have been more than €800 billion per year at the pollution levels of year 2000. This figure is estimated to decrease to €537 billion in 2020, provided that EU countries reduce their emissions from land-based sources in line with what is needed to achieve the environmental targets of the EU's 2005 Thematic Strategy on Air Pollution, and provided that the sulphur emission standards for international shipping are complied with.

Air pollution is estimated to have been responsible for around 680,000 premature deaths in the whole of Europe in the year 2000, a figure that is expected to come down to approximately 450,000 in 2020.

Comparing the health impacts from shipping with those from land-based

Table: Estimated total number of annual premature deaths in Europe caused by different emission sources.

	2000	2007	2011	2020
All sources	681,100	575,500	572,600	450,000
International shipping	49,500	48,300	46,000	53,400
Int. shipping in the North Sea and Baltic Sea	20,400	16,200	14,100	13,200

sources shows that in the year 2000 emissions from international shipping were responsible for an estimated seven per cent of the total health damage from air pollution in Europe, and that its share will increase to twelve per cent by 2020.

The number of annual premature deaths in Europe linked to air pollution from international shipping is estimated to increase from 49,500 to 53,400 between 2000 and 2020.

These figures come from a Danish study¹ using the EVA (Economic Value of Air

pollution) computer model. The research project aims to map the true costs of damage caused by air pollutant emissions from various sectors. Different scenarios assessing the human health impacts and associated external costs from different emission sectors have been investigated for the years 2000, 2007, 2011 and 2020 (see Table).

Air pollutant emissions from ships operating in the North Sea and the Baltic Sea were responsible for annual health damage in Europe valued at €22 billion at

International ship emission regulations

The International Maritime Organization (IMO), under ANNEX VI of MARPOL 73/78 (the International Convention for the Prevention of Pollution from Ships), has adopted controls on sulphur in marine fuels.

The global fuel sulphur limit is currently 3.50% and will be lowered to 0.50% by 2020 (or possibly 2025, subject to a review in 2018). In specially designated sulphur emission control areas (SECAs), the current limit is set at 1.00% sulphur. It will be tightened to 0.10% by 2015.

Through the revision of the EU's sulphur-in-fuels directive (2012/33/EU), which was finalised last year, these

sulphur standards are part of binding EU legislation.

In Europe there are currently only two existing SECAs: the Baltic Sea and the North Sea (including the English Channel). Most of the coastal waters – within 200 nautical miles of the coast – of the USA and Canada have been designated as “combined” ECAs for both SO₂ and NO_x.

It should be noted that exhaust gas cleaning systems (e.g. scrubbers) that achieve equivalent sulphur emission reductions may be used as an alternative to low-sulphur fuels to fulfil the sulphur requirements.

ECA plans for Marmara Sea and Turkish Straits

Earlier this year Turkey ratified the global shipping emission regulation MARPOL Annex VI and the country is now planning to put an emission control area (ECA) proposal to the International Maritime Organization (IMO).

Targeting ship emissions has become an important part of Turkey's efforts to reduce air pollution, especially in Istanbul, which has a population of around 14 million people who would benefit from cleaner air through reducing ship emissions. The detrimental effect of air pollution on Istanbul's historic buildings is also a factor in support of an ECA. The aim is to put a formal Turkish Straits and Marmara Sea ECA proposal to the IMO in 2015.

Source: Sustainable Shipping News, 6 June 2013

Monitoring of shipping's CO₂ emissions proposed

In late June, the European Commission published a proposal to monitor, report and verify (MRV) emissions to air from international shipping. The measure will apply to all large ships calling at EU ports and could be used to set the baseline for measures to actually require emission reductions.

Shipping is responsible for three per cent of global greenhouse gas emissions (4 per cent in Europe) – emissions that are expected to continue to increase if no action is taken to curb them. According to the Commission, its proposed European monitoring system would reduce shipping CO₂ emissions by up to two per cent, but environmental group T&E said they found no scientific evidence to back this claim.

T&E shipping officer Antoine Kedzierski said: “The proposal doesn't do anything to incentivise those monitoring and verification systems that are better, so owners will in all likelihood use the cheapest, most basic way, which in reality is business as usual.”

Environmental NGOs are also critical of the proposal's failure to include other harmful emissions from shipping, notably nitrogen oxides (NO_x) and sulphur dioxide (SO₂).

Source: T&E, 28 June and 16 July 2013. Link: www.transportenvironment.org

the emission levels of year 2000. By 2020, this figure is expected to come down to €14.1 billion, as a result of implementation of the stricter ship fuel sulphur standards agreed by the International Maritime Organization (IMO) in 2008 (see Box).

However, since these stricter fuel standards apply only in designated Sulphur Emission Control Areas (SECA), and the Baltic Sea and the North Sea so far are the only such areas in Europe, and ship traffic overall is expected to continue to increase, the total health-related costs in Europe of international ship traffic are expected to increase from €58.4 billion in the year 2000 to €64.1 billion in 2020.

In the intermediate years (2007 and 2011), smaller decreases in the health damage from ship pollution occurred as a result of stricter sulphur standards in the SECA area. The subsequent increase up to 2020 results from an overall projected increase in ship traffic worldwide.

It is noted by the authors that a similar study performed by the US Environmental Protection Agency estimated that by 2020 air pollution from shipping would still cause 21,000 annual premature deaths within the USA, with related health costs amounting to USD47–110 billion.

Specifically for Denmark, it is estimated that the total annual health-related air pollution damage amounted to €4.5 billion in year 2000. By 2020, this figure is expected to come down to €2.5 billion.

Air pollutant emissions from international shipping in the Baltic Sea and the North Sea are responsible for health damage in Denmark valued at more than €620 million per year (year 2000), decreasing to €360 million in 2020. The authors conclude that the SECA regulation that limits the sulphur content in ship fuel to a maximum of 0.1 per cent as from 2015, is expected to significantly reduce the external costs, and that “a similar regulation of international ship traffic in the whole world would have a significant positive effect on human health.”

It is however noted that the health impacts from ship emissions in the SECAs will remain significant after 2015. The reason being that the emissions of nitrogen oxides (NO_x) from ship traffic are not regulated by the SECA standard, and in the scenario used, NO_x emissions from international shipping are therefore expected to continue to increase more or less in line with the projected increase in shipping activities.

Christer Ågren

¹Assessment of past, present and future health-cost externalities of air pollution in Europe and the contribution from international ship traffic using the EVA model system (March 2013). By J. Brandt et al. Published in Atmospheric Chemistry and Physics Discussion 13, 6 March 2013. Available at: <http://www.atmos-chem-phys.net/13/7747/2013/acp-13-7747-2013.html>



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Air pollution causes 210,000 deaths each year

Road transportation and power plants are the leading causes of air-pollution-related deaths in the US, contributing to 53,000 and 52,000 early deaths respectively each year.

Researchers from Massachusetts Institute of Technology (MIT) estimate that total combustion emissions in the United States account for about 200,000 premature deaths per year in the country due to changes in particulate matter (PM_{2.5}) concentrations, and about 10,000 deaths due to changes in ozone concentrations.

The group tracked emissions from sources such as industrial smokestacks, vehicle tailpipes, marine and rail operations, and commercial and residential heating throughout the country.

In a state-by-state analysis, it was found that California suffers the worst health impacts from air pollution, with about 21,000 early deaths annually, mostly attributed to road transportation and to commercial and residential emissions from heating and cooking.

When mapping local emissions in 5,695 cities, the highest emissions-related mortality rate was found in Baltimore, where 130 out of every 100,000 residents likely die in a given year due to long-term exposure to air pollution.

“In the past five to ten years, the evidence linking air-pollution exposure to risk of early death has really solidified and gained scientific and political traction,”

said Steven Barrett at MIT. “There’s a realization that air pollution is a major problem in any city, and there’s a desire to do something about it.”

According to Barrett, a person who dies from air-pollution causes typically dies about a decade earlier than he or she might have otherwise.

The greatest number of emissions-related premature deaths came from road transportation, with 53,000 early deaths per year attributed to exhaust from cars and trucks.

Pollution from electricity generating power plants accounted for 52,000 premature deaths annually. The largest impact was seen in the east-central United States and in the Midwest.

To explain why road transport contributes more than power plants to the health damage, the researchers reasoned that “vehicles tend to travel in populated areas, increasing large populations’ pollution exposure, whereas power plants are generally located far from most populations and their emissions are deposited at a higher altitude.”

Most premature deaths due to commercial and residential pollution sources,

such as heating and cooking emissions, occurred in densely populated regions along the east and west coasts.

Pollution from industrial activities was highest in the midwest, roughly between Chicago and Detroit, as well as around Philadelphia, Atlanta and Los Angeles. Industrial emissions also peaked along the Gulf Coast region, possibly due to the proximity of the largest oil refineries.

Southern California saw the largest health impact from marine-derived pollution, such as from shipping and port activities, with 3,500 related early deaths.

While the study is based on emission data from 2005, Barrett says the results are likely representative of today’s pollution-related health risks.

Christer Ågren

The results of the study “**Air pollution and early deaths in the United States. Part I: Quantifying the impact of major sectors in 2005**” are published in the journal *Atmospheric Environment*. Link: <http://www.sciencedirect.com/science/article/pii/S1352231013004548>

Source: MIT News, 29 August 2013

Ship NOx restrictions on track for 2016 in the US

The US Environmental Protection Agency (EPA) looks set to impose tighter limits on nitrogen oxides (NOx) emissions from ships operating in emission control areas (ECA) on schedule.

“EPA remains strongly committed to ensuring the important health and environmental benefits for the United States will be achieved through the Tier III NOx standards in the North American ECA,” said an agency spokeswoman.

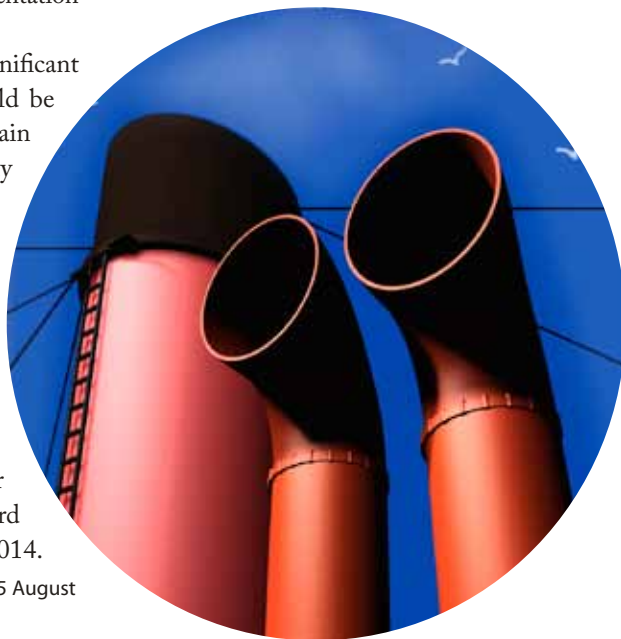
Marine engines that comply with the International Maritime Organization’s (IMO) Tier III standards emit 80 per cent less NOx. The IMO was on track to stick with plans to apply Tier III regulations for new ships’ NOx emissions under MARPOL Annex VI regulations from 2016. But in a surprise move at an IMO committee meeting in May, there was a

recommendation to delay implementation for five years.

Any delay would mean that significant NOx emission reductions would be lost. Moreover, failure to maintain the original deadline will unfairly punish shipping companies that invested in Tier III technology.

Although so far only the North American ECA includes the Tier III NOx standard, opposition came from countries, including Russia, worried that Europe’s ECAs would eventually follow suit. A final decision on whether or not to delay the Tier III standard will be taken by IMO in spring 2014.

Source: Sustainable Shipping News, 15 August 2013



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Potential for increased efficiency

Shipping is generally regarded as a fuel-efficient mode of transport, but its sheer volume and rapid growth make it a major consumer of energy and source of carbon dioxide emissions.

A new study by the International Council on Clean Transportation (ICCT) has assessed the long-term prospects for increasing shipping efficiency. The findings indicate that industry-leading ships are about twice as efficient as industry laggards across major ship types. For example, the top five per cent of container ships have a carbon dioxide (CO₂) emission intensity (i.e. emission rate per unit of cargo carried) that is 38 per cent lower than industry-average container ships.

Moreover, the bottom five per cent of industry laggards emit 48 per cent more CO₂ than average to move one unit of cargo over a given distance. This means that a shipper putting its goods on a laggard ship would have a carbon intensity (and therefore an associated fuel use per cargo unit) 2.4 times higher than the industry-leading group. Even broader efficiency variation is seen between shipping industry leaders and laggards across other major ship types.

The analysis indicates that there is the potential to reduce CO₂ emissions in ab-



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Industry-leading ships are about twice as efficient as industry laggards across major ship types

solute terms even while freight movement doubles, as it is expected to do by 2040. Moving to industry-leading ship efficiency practices could reduce emissions of CO₂ by 300 million metric tons per year and oil consumption by two million barrels

per day by 2030, compared to business-as-usual efficiency practices.

Source: “Long-term potential for increased shipping efficiency through the adoption of industry-leading practices” (July 2013). By H. Wang and N. Lutsey. ICCT. Link: www.theicct.org

Fewer congestion charge exemptions

From 1 July, new cars in London will no longer be able to be registered for the Greener Vehicle Discount which gave cars with emissions under 100 grams of CO₂ per kilometre the right to pass through the city without paying the London congestion charge.

Instead, new car buyers will be able to register their cars under the new Ultra Low Emission Discount (ULED), provided that the cars meet Euro 5 emission regulations and meet a stricter CO₂ limit of 75g/km.

Currently no combustion-only cars actually meet this criteria, so only buyers of plug-in hybrids or fully electric cars will be able to register for exemption.

The changes to the congestion charge were proposed last year as part of plans to reduce diesel car emissions in the city. The rising popularity of diesel cars – which emit much more of another air pollutant, nitrogen oxides, per kilometre driven compared to petrol cars – has been blamed for contributing to London failing to meet the legally binding air quality standards for nitrogen dioxide (NO₂). With plenty of diesel cars emitting just below the 100 g/km CO₂ limit and thus qualifying for charge exemption, the Mayor's office wanted to tighten the rules to tackle the problem.

Matthew Pencharz, the Mayor of London's advisor on the Environment, said: "These changes are in line with the Mayor's aim to improve air quality in London by reducing emissions from private vehicles and promoting the further development of low-emission vehicles. We want to encourage the continued development of these technologies, while also protecting the benefits to traffic flow in the centre of London that the charge provides."

Source: TheGreenCarWebsite.co.uk, 1 July 2013



C as in cutting emissions from cars.

Germany blocks CO₂ deal for cars

The agreed CO₂ rules for cars are threatened by demands from Germany to re-open the negotiations.

At the end of June it seemed as if a deal had been struck on CO₂ rules, which would help to implement the 95g of CO₂ per kilometre average emission limit for new cars by 2020. But at a formal meeting a few days later Germany refused to approve the agreement and insisted that it should be renegotiated, following a major lobbying push from the national automobile industry.

The nub of the argument is the so-called super credits for low-emission cars. It was agreed in the trialogue deal that cars that emit less than 50 grams of CO₂ per kilometre will be counted as two, but Germany wants them to be counted as three. This factor will be scaled down to 1.33 by 2023 in the original deal, but the German bid is instead 1.5. They also want to abolish the annual cap for this accounting measure and advocate instead for it to be calculated on a four-year average.

Sales of this low-emission segment represent less than 0.6 per cent of all new cars sold in 2012, but are expected to increase rapidly in the years to come. Generous super credits may then undermine the original target by several grams.

Germany has however not acted in isolation. Several member states in eastern and central Europe, whose car industries are tightly interlinked with the German industry, have shown support, as well as the Netherlands and the United Kingdom.

Strongly in opposition of re-opening the deal are France and Italy. These two countries have a car industry that is already more focused on light and energy-efficient vehicles. Several environmental organisations also raise severe criticism.

Greg Archer of Transport & Environment (T&E) said: "It's unprecedented in EU environmental policymaking that the pressure of one country delays a vote in an attempt to overturn a fairly-negotiated

agreement between the European Parliament, the Commission and the Council itself."

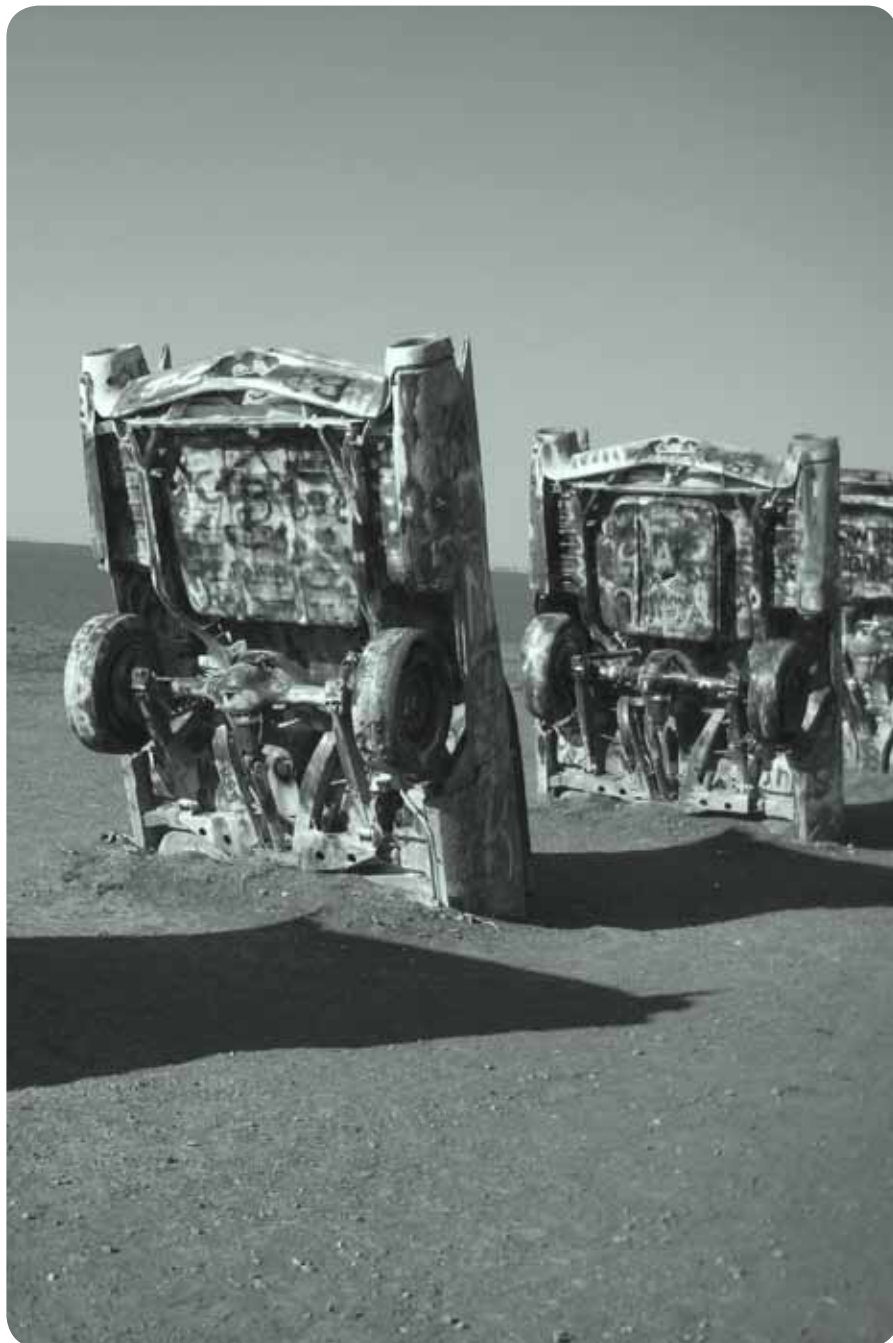
There have been no formal negotiations during the summer. The Lithuanian presidency has instead talked informally with different member states to find a way forward. To re-open the deal for new trialogue negotiations would mean a delay of several months, because the issue must once more come up for a vote in parliament. Mathias Groote, German social democrat and chair of the European Parliament Environment Committee told Süddeutsche.de, a German news site, about his disaffection: "We had a deal, and a deal is a deal."

Also at the end of June the European Parliament, the European Council and the European Commission also reached an agreement on corresponding rules for vans. The targets for vans have been criticised for being less ambitious than those for cars. According to data from the European Environment Agency, new vans already average 180.3 grams per kilometre, close to the interim target of 175 grammes of CO₂ per kilometre for 2017.

This would have been the right time to raise the level of ambition, if the parties had been interested in doing so. Instead the trialogue committed to reduce emissions from the new van fleet in line with the previous target of 147 grams of carbon dioxide per kilometre by 2020.

Reacting to the outcome, William Todts of T&E said: "It is disappointing that decision-makers have agreed on a vans target that is business as usual until 2020, allowing van-makers to achieve the limit at a snail's pace."

The more relaxed targets may have contributed to the fact that super credits were not as hot a topic in the van negotiations



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Instead of facing stricter standards, German car industry sticks its nose in the sand.

and the accounting measure was rejected in the final deal.

Contrary to the proposal from the parliament environment committee, the outcome did not include any post-2020 targets for vans. Instead there was a commitment in a supporting declaration to reduce emissions for vans by 3–4 per cent between 2020 and 2025 compared to 2012 levels.

The final deal also scrapped speed limiters for vans, a measure proposed by the European Parliament, which would have cut emissions by 6 per cent according to T&E.

Kajsa Lindqvist

Sources:

European Environment Agency press release 18 June 2013 <http://www.eea.europa.eu/highlights/van-manufacturers-must-make-new>

Transport & Environment press release 26 June 2013 <http://www.transportenvironment.org/press/vans-become-more-fuel-efficient-not-till-after-2020>

Transport & Environment press release 27 June 2013 <http://www.transportenvironment.org/press/german-political-muscle-used-delay-vote-2020-car-emissions-limits>

How clean are Europe's cars 2013, Transport & Environment, 2013 <http://www.transportenvironment.org/publications/how-clean-are-europes-cars-2013>

China acts firmly against environmental crimes

In June, China's supreme court and procuratorate jointly issued a new judicial explanation that imposes harsher punishments on polluters. In the most serious cases the death penalty could be handed down.

With more precise criteria for convictions and sentencing, the judicial explanation provides "a powerful legal weapon" for law enforcement, which is expected to facilitate the work of judges and tighten punishments for polluters, the statement said.

Monitoring measures will also be strengthened, especially for enterprises that previously used toxic substances and discharged dangerous waste, or are located in environmentally-sensitive areas where major environmental pollution accidents have happened over the past one or two years.

Source: www.china.org.cn, 20 June 2013

Air pollution from barges to be cut

The European Commission in September announced actions to cut air pollution from barges as part of a plan to get more freight onto rivers and canals. Inland shipping is energy efficient and quiet, but it is also the mode of transport with the highest air pollution impact per tonne-kilometre. Around six per cent of European cargo is transported on barges.

Emission limits for new engines from 2014 and possible further limits for existing engines in 2015 and 2016 will be proposed under the Commission's Naiades II package "Towards quality inland waterway transport".

According to the Commission, the problem of sulphur dioxide emissions from barges has largely been solved under EU legislation that came into force in 2011, but particulate matter and levels of nitrogen oxides remain to be tackled.

Source: ENDS Europe Daily, 10 September 2013

Link to Naiades II page: http://ec.europa.eu/transport/modes/inland/promotion/naiades2_en.htm

High potential to further cut pollution from power plants

Emissions of the main air pollutants – sulphur dioxide, nitrogen oxides and dust – could be significantly further reduced if the emission levels associated with the best available techniques were to be achieved.

Emissions of sulphur dioxide from large combustion plants (LCP) could have been up to 94 per cent lower in 2009, those of nitrogen oxides 69 per cent lower, and those of dust 79 per cent lower, if the best available emission abatement techniques had been applied to all plants, according to a recent report by the European Environment Agency (EEA).

Interestingly, the report also estimates that emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x) and dust could have been 47, 5 and 29 per cent lower respectively, if the facilities had met the emission limits set in the 2001 LCP Directive.

The new EEA study presents an updated assessment of the hypothetical emission reduction potential for LCPs for the year 2009. It uses the latest available emission and fuel-use data for 2009 reported by member states under the LCP Directive. The study may be viewed as a “what-if” study that aims to quantify the potential emission reductions that are achievable by implementing the techniques identified as best available techniques for the sector.

Best available techniques (BATs) were defined as the techniques and associated emission levels (AELs) as described in the LCP best available techniques reference document (BREF). It should be noted that this BREF document was elaborated between 2000 and 2003, i.e. more than ten years ago. It is currently being revised and a new LCP BREF is to be adopted next year.

The emissions reported by member states for nearly 1600 selected electricity- or heat-generating LCPs across the EU27 were compared to calculated emissions derived from the theoretical application of:

- the lower end (most stringent) of the BAT-associated emission levels from the LCP BREF;
- the emission limit values in the 2010 Industrial Emissions Directive; and,
- the emission limit values in the 2001 LCP Directive.

A small number of large-scale coal plants and plants co-combusting coal with other fuels dominate the reported emissions for all three pollutants. Just 50 plants (i.e. 3 per cent of the 1595 plants addressed in


the report) contribute half of the NO_x emissions, with 454 plants (28 per cent) responsible for 90 per cent of the NO_x emissions.

The situation is even more striking for SO₂ with only twenty plants (1 per cent) responsible for half of the total emissions, and 165 plants (10 per cent) contributing 90 per cent of the SO₂ emissions.

For dust, just 21 plants (1 per cent) are responsible for half and 175 plants (11 per cent) for 90 per cent of the total reported dust emissions.

At the member state level, Germany, Poland and the United Kingdom report the highest NO_x emissions from LCPs. However, emissions from Germany are already largely consistent with the IED emission limit values (ELVs), while some scope exists to reduce emissions further to the levels of the lower BAT-AELs values. Greece, Poland, Spain and the United Kingdom have the largest absolute differences in terms of tonnes of NO_x from 2009 emissions to the IED ELVs.

Regarding SO₂, Bulgaria, Greece, Poland



Bulgaria and Romania together, contribute almost 40 per cent to the total SO₂ emissions for the EU27. Here, a chimney at the Insalnita lignite plant in Romania.

Table: Estimated emission reductions potential in 2009 from the selected 1595 large combustion plants in EU27 under three various assumptions (tonnes).

	Sulphur dioxide	Nitrogen oxides	Dust
2009 reported emissions	1,662,000	1,138,000	77.6
LCPD ELVs	786,000 (-47%)	62,000 (-5%)	22 (-29%)
IED ELVs	1,089,000 (-66%)	411,000 (-36%)	49 (-64%)
Lower BAT-AELs	1,564,000 (-94%)	780,000 (-69%)	61 (-79%)

Abbreviations: LCP = Large Combustion Plants (bigger than 50 MW thermal input capacity). ELV = Emission Limit Value. BAT = Best Available Techniques. BREF = BAT reference documents. AELs = Associated Emission Levels.

and Romania have the highest reported emissions from LCPs, and together account for the largest difference between 2009 emission levels and the IED emission limit values. In particular, Bulgaria and Romania together, contribute almost 40 per cent to the total SO₂ emissions for the EU27.

The same four member states (i.e. Bulgaria, Greece, Poland and Romania) also reported the highest dust emissions from LCPs, significantly above emission levels that would be consistent with the IED ELVs.

The results clearly indicate that EU27 emissions of the air pollutants NO_x, SO₂ and dust from the LCPs included in the scope of the study could be significantly lower if all plants operating in 2009 were to meet the emission limit values set out in the Industrial Emissions Directive

(IED). If emission levels associated with the best available techniques described in the large combustion plants BREF were to be achieved, emissions would come down even more (see Table).

Such reductions in emissions would obviously deliver substantial benefits in terms of improvements to human health and the environment. A recent assessment from the EEA showed that the estimated damage costs to health and the environment caused by air pollution (excluding carbon dioxide) from the energy-generating sector in 2009 amounted to €26–71 billion per year.

Christer Ågren

Source: Reducing air pollution from electricity-generating large combustion plants in the European Union – An assessment of potential emission reductions of NO_x, SO₂ and dust. EEA Technical report No 9/2013. Available at: <http://www.eea.europa.eu/publications/reducing-air-pollution-from-electricity>

EU legislation for existing LCPs

Large combustion plants (LCPs) are defined in the 2001 LCP directive as those plants having a rated thermal input of 50MW or greater. Emissions of SO₂, NO_x and dust are regulated by the directive.

LCPs are also regulated under the 1996 Integrated Pollution Prevention and Control (IPPC) directive, which may lead to stricter and/or additional obligations on the plants. In particular, the IPPC directive requires installations to apply the best available techniques (BAT). In order to define BAT at the EU level, there are BAT reference documents (BREF), which serve as guidance for setting permits.

The current LCP BREF was developed between 2000 and 2003 and adopted by the European Commission in 2006. It describes the BAT as well as the

range of emission levels achievable by applying BAT – the Associated Emission Levels (AEL), with the lower end of AEL being the most stringent and the upper end the least stringent.

More recently, the IPPC and LCP directives were superseded by the 2010 Industrial Emissions Directive (IED), which regulates the emissions from LCPs by requiring the application of BAT and the BAT-AELs set out in BAT conclusions, which have a legal effect, as well as by setting mandatory minimum emission limit values (ELVs) for SO₂, NO_x and dust. These ELVs will apply for existing LCPs as from 2016, although some plants will be allowed longer transitional time, up to 2020.

The LCP BREF is currently being revised, with the aim of establishing BAT conclusions to be adopted in 2014.



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The new EAP sets out priority objectives in a range of areas.

7th Environment Action Programme agreed

In late June, representatives from the outgoing Irish presidency and the European Parliament agreed the final text of the EU's seventh environment action programme (7EAP) for the period to 2020.

The new EAP sets out priority objectives for EU environment policy in a range of areas. It foresees the adoption of new targets for climate and energy as well as a wide range of new measures to make products more efficient, longer lasting and easier to repair and recycle.

Regarding air pollution, it is stated that the programme shall ensure that by 2020 air pollution and its impacts on ecosystems and biodiversity are further reduced with the long-term aim of not exceeding critical loads and levels. This is said to require, among other things strengthened efforts to reach full compliance with EU air quality legislation and the defining of strategic targets and actions beyond 2020.

To safeguard EU citizens from air pollution risks to health and wellbeing, the programme shall ensure that by 2020 outdoor air quality in the EU has significantly improved, moving closer to WHO recommended levels. This is said to require implementation of an updated EU policy on air quality, aligned with the latest scientific knowledge, and the development and implementation of measures to combat air pollution at source.

The programme must be formally endorsed by member states and the full parliament before becoming an EU decision, which will give it more legal weight.

Source: ENDS Europe Daily, 21 June 2013

New tool raises awareness of air pollution impact

Clean Air in London has launched a new app that warns people about the dangers of air pollution and gives advice about how they can protect themselves.

To build public understanding of the dangers of air pollution, Clean Air in London (CAL) has launched a new app. The app uses the new Clean Air in Cities Index, developed by CAL, to report the health impact of long-term exposure to airborne particles (PM_{2.5}) on the total population in a local area, region and England as a whole.

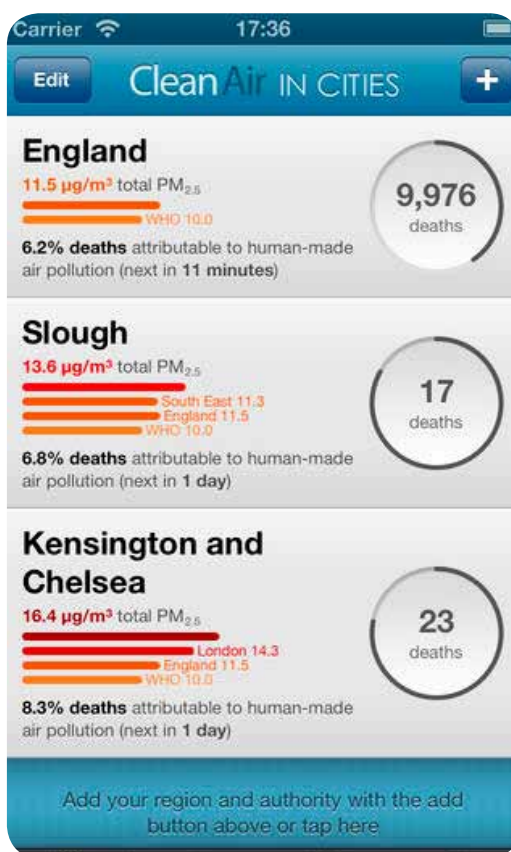
Simon Birkett, Founder and Director of Clean Air in London, said: "It is vital people are warned about the dangers of air pollution and given advice about protecting themselves and reducing pollution for themselves and others. People may be encouraged by this new index and app to consider reducing their day to day exposure to outdoor and indoor air pollution and may wish to seek health advice from medical or health professionals if they are concerned about possible health impacts."

CAL wants to extend the app to other cities, regions, countries and parts of the world. Within Europe, CAL has asked the European Environment Agency if it would be willing to provide the necessary data.

The app, initially designed for iPhones and iPads, can be downloaded from the App Store. It can be found by searching for 'Clean Air in Cities' on the App Store or downloaded here: <http://itunes.es/i6xT8pH>.

Key functionality of the app includes:

- The new Clean Air in Cities Index to report the health impact on the population of long-term exposure to PM_{2.5};
- Population-weighted annual mean concentrations of total PM_{2.5} for local areas, regions and England as whole compared to the World Health Organisation (WHO) guideline;



The app shows year-to-date number of deaths attributable to long-term exposure to human-made PM_{2.5} in each area.

- The percentage of total deaths attributable to long-term exposure to human-made PM_{2.5} in each area;
- The pro rata calendar year-to-date number of deaths attributable to long-term exposure to human-made PM_{2.5} and time to the next such attributable death for every local area and region in England;
- An 'Add' button allows users to add local areas or regions and an 'Edit' button allows users to move or delete local areas or regions. The location feature of the app allows users to choose from up to four nearby locations or select another area by typing its name;
- Users can also see the CAL website and a detailed explanation of the app

under 'About'; and,

- The app is free. Users are invited, as they add local areas or regions, to make at least one donation to CAL to support the further development of the app and other projects.

Total PM_{2.5} is the sum of human-made (i.e. anthropogenic) and background (i.e. non-anthropogenic) mass concentrations of PM_{2.5}. The number of attributable deaths for an area depends on the attributable fraction and total number of deaths in that area, which means a larger, less polluted local area may have more such deaths than a smaller, more polluted local area.

CAL hopes to be able to create android, desktop and other versions of the app in future. For example, it would like to include estimates of short-term concentrations for air pollution (e.g. smog alerts) and show the Clean Air in Cities Index for every postcode. It would also like to show trends over time, costs and the impact of air pollution on morbidity (e.g. asthma etc.), personal exposure and other pollutants and extend the index to other public health risks.

"By using the latest technology, information obtained under access to environmental information laws and the new Clean Air in Cities Index, we are able to give people an indication of the health impact locally of long-term exposure to air pollution – the biggest public health risk after smoking. We hope the innovative new app and index will become a talking point and the EEA will support its wider use across Europe," said Simon Birkett.

Note: The app does not estimate or display the number of actual deaths from air pollution or the risk for an individual.

IPCC: Human influence clear

It is **extremely** likely that human activities have been the dominant cause of global warming, states the Intergovernmental Panel on Climate Change (IPCC) in the first part of the fifth assessment report, which was presented on 27 September in Stockholm. They also note that the last three decades have been the warmest compared to any other decade after 1850. In the northern hemisphere, it is very likely that the last thirty years have been the warmest in 1,400 years.

“Observations of changes in the climate system are based on multiple lines of independent evidence. Our assessment of the science finds that the atmosphere and ocean have warmed, the amount of snow and ice has diminished, the global mean sea level has risen and the concentrations of greenhouse gases have increased,” said



Qin Dahe, Co-Chair of IPCC Working Group I.

Thomas Stocker, the other Co-Chair of Working Group I said: “Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.”

For the first time, the IPCC provides a global budget for CO₂, which cannot be exceeded if we are to prevent devastating levels of global warming. Climate Action Network Europe notes in their press release, “since the report shows we have already blown through half our carbon budget, we must start reducing carbon emissions immediately” and then emphasises the gap between the state of knowledge and policy action, “we don’t want to see another comprehensive report on the grim realities of climate change gathering dust on politicians’ bookshelves while impacts mount”.

The report **IPCC WGI AR5 Climate Change 2013: The Physical Science Basis** is available at <http://www.climatechange2013.org/>

Save lives –
leave fossils in
the ground.



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Slash GHG emissions – save millions of lives

Reducing our reliance on fossil fuels will cut air pollution, saving lives and therefore money. So switching to clean energy would pay for itself almost immediately, according to a new analysis “Co-benefits of mitigating global greenhouse gas emissions for future air quality and human health” published in *Nature Climate Change*.

By 2050, 1.3 million early deaths could be avoided every year. From estimates of how much society values a human life, researchers deduce that the new energy supplies should be worth the cost. The global average marginal co-benefits of avoided mortality are US\$50–380 per tonne of CO₂, which exceed marginal CO₂ abatement costs in 2030 and 2050. The conclusion offers a strong incentive to countries to start cutting back on fossil fuels as soon as possible.

Source: New Scientist, 22 September 2013

Hot summer – high ozone pollution

Unusually high temperatures this summer have contributed to poor air quality in many European cities. Thresholds to protect health from ground-level ozone have been exceeded across Europe, according to preliminary data reported to the European Environment Agency (EEA).

Ozone pollution has serious effects on health, especially for older people and children, or those with asthma and other respiratory problems. More than 98 per cent of the total EU urban population are potentially exposed to ozone levels above the World Health Organization guidelines for protecting health. Reducing ozone pollution in the air depends on cutting the ‘precursor air pollutants’ that lead to ozone formation.

July this year was hotter than usual with warmer than average temperatures across most of Central and Western

Europe. In the first half of July, ozone concentrations exceeding the EU’s Information Threshold occurred mainly in northern Italy, Spain and southern France, but by the second half of the month similarly high pollutant concentrations were also found in parts of northern Europe. Ozone exceeded these limits in the Paris area and in the Netherlands, Belgium and western Germany. At the end of the month most of the exceedances were registered in northern Italy, with high values occasionally occurring also in the Central European region.

Source: EEA press release, 14 August 2013



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Coal power must be replaced with green energy

An additional 32,000 life years would be lost every year if the coal-fired power plants currently under construction or being planned in the EU go into operation.

In the EU, coal-fired power plants are the largest source of sulphur dioxide emissions, one of the key causes of particulate pollution. They also emit huge quantities of nitrogen oxides, as well as fine ash and soot particles that contribute to smog formation, and are the largest source of arsenic and mercury emissions.

To find out more about the health impacts of coal-burning power plants in the EU, Greenpeace International commissioned a study from Stuttgart University. Based on the results from this study, the new Greenpeace report investigates the health impacts of each of the 300 operating large coal-fired power plants in the EU, as well as the predicted impact of the 50 new large-scale coal projects if they come online.

The approximately 300 large coal-fired power plants that are in operation in the EU produce a quarter of all electricity consumed. They are responsible for over 70 per cent of the EU's sulphur dioxide emissions and over 40 per cent of nitrogen oxides emissions from the power sector and account for approximately half of all industrial mercury emissions, and a third of industrial arsenic emissions into the air. These coal-fired power plants are also



PHOTO: FLICKR.COM/KARA ALLYSON/CC BY-NC-SA

Health damage and loss of life linked to coal burning are entirely unnecessary.

responsible for almost a quarter of the EU's emissions of the main greenhouse, gas carbon dioxide.

Using a sophisticated health impact assessment model, the study estimates that pollution from coal-fired power plants in the EU resulted in approximately 22,000 premature deaths, shortening the lives of Europeans by an estimated total of 240,000

lost life years in 2010. In countries with heavy coal use, the results indicate that more people are killed by air pollution from coal than in traffic accidents. In the same year, illnesses and health problems from coal pollution were associated with an estimated total of 5 million lost working days.

Emissions of sulphur dioxide, nitrogen oxides and dust from coal burning are the biggest industrial contributors to microscopic particulate pollution that penetrates deep into the lungs and into the bloodstream. The pollution harms the health of babies, children and adults, causing heart attacks and lung cancer, as well as increasing asthma attacks and other respiratory problems. Moreover, coal burning releases tens of thousands of kilograms of toxic metals such as mercury, lead, arsenic and cadmium, contributing to cancer risk and harming children's development.

Despite these health risks, Greenpeace notes that European governments have failed to steer clear of this dirty old-

Lost life years and lost working days

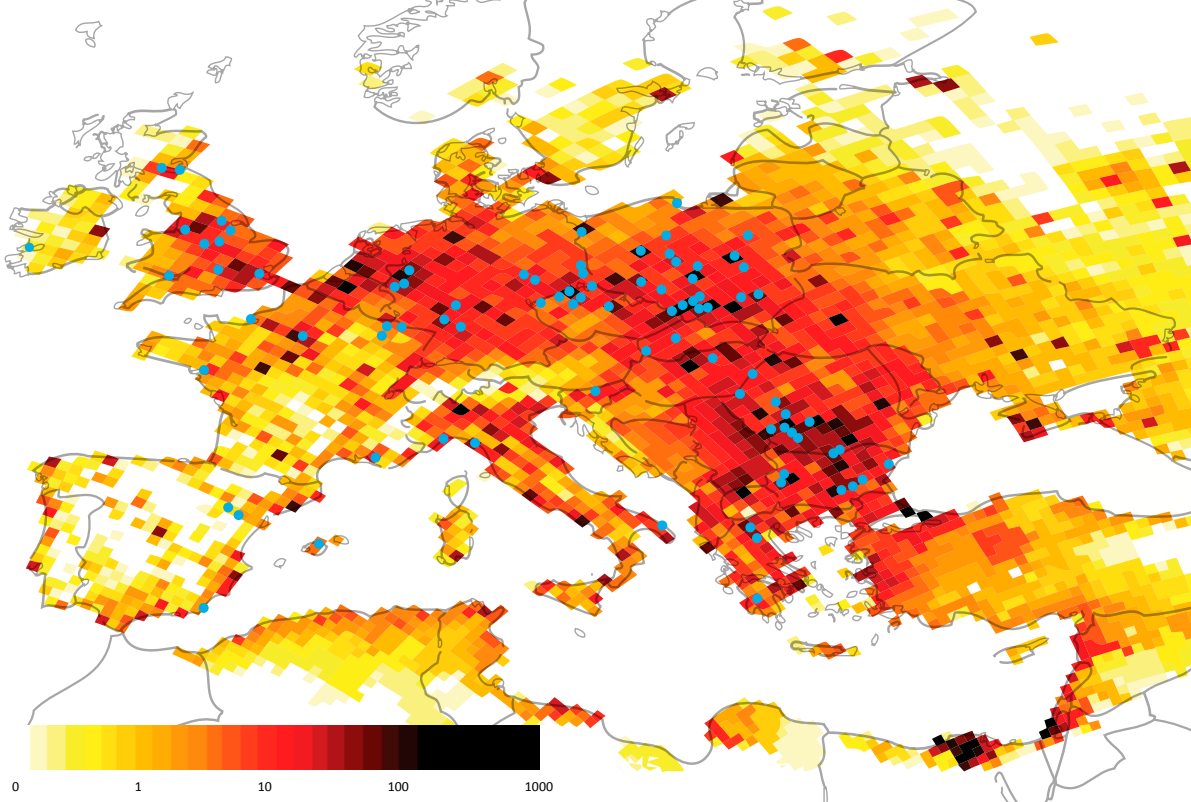
Lost life years: In this study the estimate of deaths attributed to air pollution is converted into the number of life years that were lost because of premature deaths. Each European whose death is attributable to exposure to particulate pollution has his or her life shortened by an estimated 11 years, and each death attributable to ozone exposure loses nine months of life. The results show that in 2010 approximately 22,000 deaths were attributable to pollution from coal-fired power plants in the EU, and the researchers estimate

that their lives were shortened by a total of 240,000 years.

Lost working days: Air pollution increases the risk of several diseases and health problems that can force people to take additional sick leave. This ranges from minor respiratory infections and coughs to recovery from heart attacks. The increase in sick leave days as a result of air pollution has been estimated from data collected in the US National Health Interview Survey.

Figure 1: Virtually everyone in Europe is breathing in invisible pollution from coal-fired power plants' smokestacks, resulting in an estimated total of 22,000 deaths in 2010. The colours show the estimated number of deaths in each 50 x 50 km grid tile. The blue dots mark the locations of the 100 most polluting power plants in Europe.

Map source: Greenpeace modelling using the EMEP MSC-W atmospheric chemistry-transport model, input data provided by EMEP and power plant emission data from the E-PRTR database.



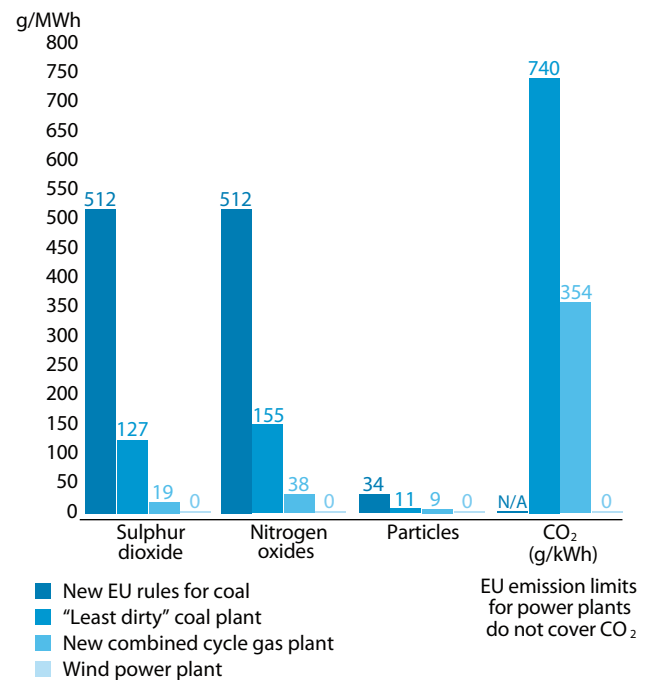
fashioned energy source, with coal burning increasing in the EU each year from 2009 to 2012, and with more than 50 new polluting power plants in development.

Air pollution is transported long distances by the winds, crosses borders and affects everyone in Europe, even in those countries with little or no domestic coal burning. As such, it is in the interests of all EU countries to act to stem these emissions. According to the modelling results, another 32,000 life years would be lost every year if the power plants currently under construction or at the planning stage go into operation – a total of 1.3 million lost life years if the power plants operate for a full lifetime of 40 years.

These serious health impacts are expected despite the significant advances in end-of-pipe pollution controls, such as flue gas desulphurisation, NOx catalysts and particulate filters. While the coal-fired power plants of today have lower emissions than those of last century, they continue to emit air pollutants that exact a heavy toll on people's health.

According to Greenpeace, there is no such thing as clean coal. Even so-called "clean coal" – the favourite buzzword of the energy lobby – is unacceptably dirty, as shown by the results in the report. Consequently, the only way to eliminate the thousands of deaths associated with coal burning in Europe is to phase out

Figure 2: EU's new air pollution rules for coal-fired power plants allow much higher emissions than can be achieved with best available technology, and more than 10 times higher emissions than a new gasfired power plant.



these dirty power plants in favour of clean and modern renewable energy sources.

Greenpeace concludes that the health damage and loss of life linked to coal burning are entirely unnecessary, as renewable energy and the latest cutting-edge energy-efficiency solutions enable us to keep our lights on without a single new coal-fired power plant, and to start phasing out all existing coal use in EU power generation. Coal burning also needs to be reduced rapidly, to stem the catastrophic impacts of climate change. In order to achieve this, European governments need to set targets for green energy that ensure coal can be phased out.

"This year is supposed to be the EU's Year of Air," writes Kumi Naidoo, Greenpeace International's Executive Director. "Yet, Europe's politicians are not stopping the more than 50 new coal-fired power plants being built or in the development stage that will increase the death toll. The coal industry will continue to have a licence to kill for decades. This death toll from coal must be stopped."

Christer Ågren

Silent Killers. Why Europe must replace coal power with green energy. Report by Greenpeace International. Published in June 2013. Available at: <http://www.greenpeace.org/international/silentkillers/>

More food, less climate change

Improved meat production in Latin America and higher crop yields in Africa are key measures to reduce greenhouse gas emissions from land-use change, while improving food security.

In large parts of the world there is a huge gap between actual agricultural production and what could be produced if modern technology and methods were applied. Minimising this gap and producing more food per hectare of arable land or per animal is usually recognised as a great way to both increase global food security and reduce greenhouse gas emissions, in particular from land-use change.

Reality is always a bit more complicated, and studies of historical developments have shown that the positive environmental effects are very dependent on how these productivity improvements are achieved.

If more fertilisers are used, increased emissions of nitrous oxide can counteract the decrease in emissions from land-use change. More frequent use of machinery for tillage, harvesting and irrigation will burn more fossil fuels and give a similar effect. However, even if there are actual emission savings per produced unit, total emissions might not go down. When productivity is improved it is likely that costs per production unit will go down, food will be cheaper and demand for the product will increase. That is, the environmental benefits that come from more efficient production are offset by an increase in production volume. This phenomenon is known as the rebound effect.

In a recent study, three different pathways to increased productivity have been modelled to see what impact they would have on food security (calories per capita) and climate change (CO₂ equivalent per year):

- Conventional intensification – more of all inputs, e.g. fertilisers, pesticides, irrigation as well as investments in

machinery.

- Sustainable intensification – productivity gains, without adding more fertilisers, using instead improved crop rotation, crop-livestock integration, precision farming (e.g. using satellite monitoring and GPS systems). For livestock this scenario is similar to conventional intensification.

- Free-tech is a third pathway relying more on innovation, through more public spending on research and development and infrastructure. For this pathway all input factors remain constant.

The researchers also compared different scenarios, one where productivity increases slower than the projected baseline. This could be the case if there is a failure in technology adaption, lack of investments, land degradation and increased pressure from climate change.

In another scenario, the productivity gap in Africa, Latin America and Asia is closed faster than projected. This scenario was also divided into two sub-scenarios; one where only livestock productivity is improved and the other where only crop productivity is improved.

When comparing the scenarios the result is quite clear – slow progress in productivity improvements will mean more hungry people and more greenhouse gas emissions regardless of the pathway chosen, while a more rapid improvement would have the opposite effect.

But there are still some significant differences between the pathways. The increase in nitrous oxide emissions from synthetic fertilisers in the conventional intensification pathway largely offsets the reductions in carbon dioxide emissions from reduced land use change within the

crop sector. Since the free-tech scenario doesn't imply any extra costs for the farmer, it will result in lower food prices than the other two scenarios and thus a stronger rebound effect from increased food consumption. But the authors also note that these results are very sensitive to the price elasticity assumed. Thus, it may be that this effect is either highly overrated or highly underrated. However it is still possible to say from the results that sustainable intensification is the best option for reducing greenhouse gas emissions, and free-tech is preferable in respect of food security, even if it is difficult to predict how big the difference is.

The study also shows some interesting differences between different regions. An increase in livestock productivity would have a significant impact on emissions from land-use change in Latin America, where animal husbandry is one of the strongest forces behind deforestation. This despite the fact that productivity improvements would also result in Latin Americans eating significantly more meat.

In Sub-Saharan Africa and South Asia, increased productivity in the livestock sector does not have such noticeable effects on greenhouse gas emissions or food security. In these parts of the world there are somewhat different drivers causing deforestation and land-use change. Higher crop yields per hectare would here be of greater importance in curbing deforestation, preventing degradation of soils as well as improving the population's calorie intake.

Kajsa Lindqvist

Agricultural productivity and greenhouse gas emissions: trade-offs or synergies between mitigation and food security? By H Vakub, P Havlik, A Mosnier, E Schmid and M Obesrsteiner. Published in *Environmental Research Letters* #8, 2013 <http://iopscience.iop.org/1748-9326/8/3/035019/article>



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The Common Agriculture Policy deal does not deviate much from previous lines.

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New CAP deal: “little more than greenwash”

The new Common Agricultural Policy (CAP) for the period 2014–2020 was sold as a green reform, when the Commission launched its proposal a bit more than a year ago. For the first time, direct payments, the EU budget’s biggest single expenditure, would require certain environmental standards.

When the Parliament and the Council presented their final agreement 25 June, there was no applause from green groups. Friends of the Earth described it as an “environmental disaster” and Trees Robijns from Bird Life commented: “Disguising this round of reform as green does not represent the truth. European citizens pay for this policy through their taxes and they have a right to know that the final deal is little more than greenwash.”

However the new CAP retains the principle of greening of direct payments. The basic rule is that the last thirty per cent will only be paid if a farm meets requirements in three areas: crop diversification, protection of permanent grasslands and creation of ecological focus areas. But critics argue that standards have been set at ankle height and a large proportion of all farms are covered by various exceptions.

For instance, in the original proposal

all farms with more than three hectares of land would be required to grow three different crops. In the final outcome only farms with more than 30 hectares have to apply this standard. Farms between 10 and 30 hectares only have to grow two types of crops, while all others are completely exempt. According to the Commission these exceptions from the three crops requirement correspond to around 94 per cent of all EU farms and 46 per cent of all farmland.

There has also been a watering down of the rules of cross-compliance, i.e. requirements that farms comply with other EU legislation in order to gain access to CAP funds. Inclusion of the water framework directive and the legislation of sustainable pesticide use were rejected. In addition key elements of existing legislation have been removed from the cross-compliance systems, including elements from the Birds & Habitats Directives.

One of the few positive outcomes is that member states now have the option to move 15 per cent of funds in pillar one (direct payments) to pillar two (i.e. rural development programme). It is highly uncertain to what extent member states will make use of this, but if so, it could

mean increased funding for environmental measures. Less encouraging is that member states also have the possibility of moving 15 to 25 per cent of funds in the opposite direction.

Another new addition is that 30 per cent of the funds in the rural development programme are earmarked for environmental and climate-related measures. However the definition is wide and includes several measures with zero or little environmental delivery.

The amount of environmental benefit achieved in the end will to a large extent be determined by how member states choose to use the flexibility within the rural development programme. The previous lack of ambition in many of the national programmes is described by Bird Life as follows: “many of these so-called environmental measures are little more than income support in disguise”, and they conclude “it is vital that they [member states] make the best of the deal at home and do all they can to protect the environment with the limited tools and funding available.”

Kajsa Lindqvist

Dutch lakes suffer from eutrophication

Shallow soft-water lakes in the Netherlands are recovering from acidification but remain under threat from eutrophication.

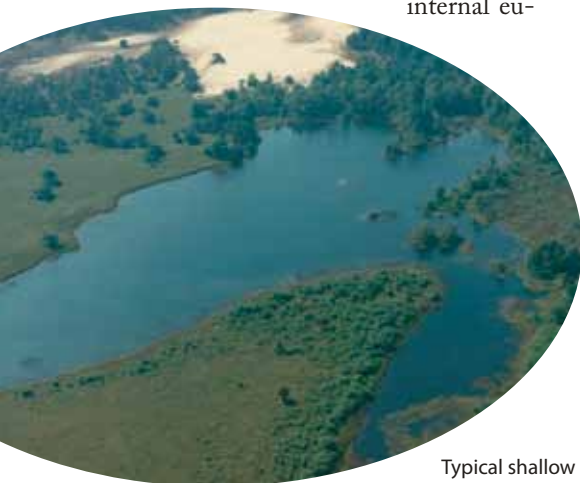
Due to national and international policy measures the atmospheric deposition of nitrogen and sulphur compounds in shallow Dutch soft-water lakes over the last three decades has decreased by about 50 and 90 per cent, respectively. At the same time, concentrations of sulphate and ammonium in the lakes decreased substantially, much faster than in deep lakes in other European countries. However, increased decomposition of the sediment, also enhanced by climate change, has caused internal eu-

trophication, particularly in the lakes with steep shores.

Current total nitrogen deposition on these Dutch lakes is estimated at about 0.75 kilomoles per hectare per year (kmol/ha/y), while the critical load for poorly buffered lakes in the Netherlands is 0.36–0.71 kmol/ha/y. The current sulphur deposition is about 0.13 kmol/ha/y, which is well below the critical load of 0.40 kmol/ha/y.

Nutrients are stored in the sediments as a legacy of excessive atmospheric deposition in the past. While careful removal of accumulated organic matter might prevent further eutrophication, this is not a sustainable measure as long as the atmospheric deposition remains above the critical load. Under current policy, a reduction in atmospheric nitrogen deposition of only 10–15 per cent by 2030 is expected.

Source: "Partial recovery of shallow acid-sensitive lakes from acidification." By H. van Dam and A. Mertens, Environmental Scientist, April 2013.



Typical shallow soft-water lake in the Netherlands.

©HERMAN VAN DAM



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Pigs and poultry BAT up for revision

A second draft of the revised guidance document for best available techniques (known as a BAT BREF) for poultry and pigs was presented in early august. It contains a more complete set of emissions data than the existing guidance document that was agreed in 2003.

The proposal includes associated emission levels of ammonia, dust and odour for BAT techniques within four categories: laying hens, broilers, ducks and turkeys. The document also describes BAT techniques for manure storage and manure spreading.

Stakeholders may submit comments until 21 October.

Source: ENDS Europe Daily 13 august 2013

The proposal: http://eippcb.jrc.ec.europa.eu/reference/BREF/IRPP_D2_082013online.pdf

400 ppm exceeded at Mauna Loa

The symbolic level of 400 ppm of carbon dioxide in the atmosphere has been exceeded at Mauna Loa in Hawaii for the first time since records began in 1958. It is the oldest of all the atmospheric measurement stations in the network of stations that the Global Atmosphere Watch coordinates. It was on 9 May this year that a reading of 400.3 ppm was recorded as the daily average. Levels exceeding 400 ppm have previously been recorded at several more northerly stations. The first was Barrow in Alaska, where the threshold was exceeded back in April 2012. The plus 400 ppm reading at Mauna Loa has since been

followed by stations at locations closer to the equator, including the Canary Islands.

The highest concentrations of carbon dioxide over the year generally occur during the northern atmospheric spring, just before large amounts of carbon dioxide are absorbed by growing vegetation.

The global annual average concentration in 2011 was 390.9 ppm, that is 40 per cent higher than pre-industrial levels. With the current rate of increase it is estimated that the global annual average concentration will exceed 400 ppm by 2015 or 2016.

Carbon dioxide is responsible for 85 per cent of the increase in radiative forcing –

the warming effect on our climate – over the past decade. Between 1990 and 2011 there was a 30 per cent increase in radiative forcing because of greenhouse gases.

United Nations Environment Programme, Press release, 14 May 2013 <http://www.unep.org/newscentre/default.aspx?DocumentID=2716&ArticleID=9503>

The Mauna Loa record, systematically zooming in to the finer more recent data (From: <http://keelingcurve.ucsd.edu/>)

Where are air pollution science and policy heading?

Future directions in air pollution science and policy were the focus of an international workshop held in Gothenburg, Sweden in June 2013. Attention focused on international air pollution control activities, primarily those linked to the ongoing review of the EU's Thematic Strategy on Air Pollution and the long-term strategy of the Convention on Long-Range Transboundary Air Pollution.

Topics of main concern were combined air pollution and climate change policies, actions to reduce emissions of reactive nitrogen, health impacts of air pollution, effects-based air pollution policies and the roadmap for going from regional to global air pollution policies.

The discussions focused on possibilities to achieve improved air quality to protect health, ecosystems and materials while at the same time ensure benefits for climate change, biodiversity and other related policy areas.

Some selected key conclusions and recommendations were:

- Further emission reductions, especially from diesel cars, non-road mobile machinery, domestic solid fuel combustion and agriculture are needed to reduce long-term population exposure;
- It is crucial that the EU road vehicle standards (Euro 6/VI) will also deliver the anticipated emission reductions under real-world driving conditions;
- The forthcoming revised EU National Emissions Ceilings (NEC) Directive could be used as a first step for addressing emissions of the ozone precursors methane and carbon monoxide for both air quality and health purposes, at the same time benefiting near-term climate;
- For the new Thematic Strategy on Air Pollution and related revisions of EU legislation, the European Commission should consider making optimal use of the available technical abatement potential in 2025 and move towards the long-term objective of "no significant impacts on health and ecosystems" by 2030, at which time it should be possible

to incorporate the potential co-benefits from the climate and energy package and the Common Agricultural Policy revision;

- Local and national governments should reduce exposure of urban population to air pollution through additional incentives to reduce emissions from local combustion sources. Fuel switching, retrofitting and/or early replacement of vehicles and small-scale combustion installations, as well as incentives to reduce car mobility and energy use should have priority;
- Local and national governments should develop reduction plans to bring nitrogen deposition, and concentrations of ammonia and nitrogen oxides over designated nature protection areas, such as Natura2000 sites, down towards critical loads and levels.

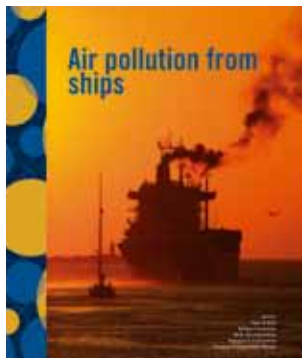
Further information on the workshop "**Saltsjöbaden V – Taking international air pollution policies into the future**", including the conclusions and recommendations can be found at <http://www.saltsjobaden5.ivl.se/>.



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

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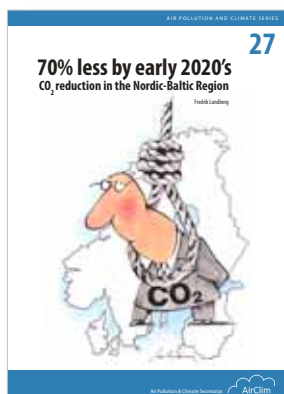


Ship emissions

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.

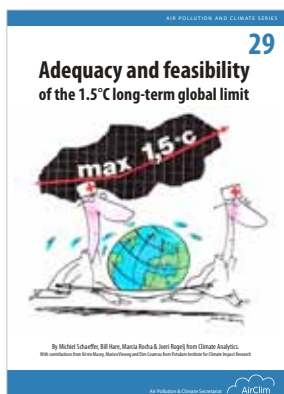
Technical measures exist that could cut the level of pollution from ships by at least 80-90 per cent and doing so would be much cheaper than cutting the same amount from land-based sources.



CO₂ reductions in the Nordic-Baltic region

A 70 per cent cut in CO₂ emissions by 2020 since 1990, and 95 percent by 2030 in the Nordic-Baltic region is feasible, using known technology and not exceeding reasonable costs.

Main elements are a five-fold increase in wind power, energy efficiency of buildings, solar heating, efficient new cars, investments in second-generation biofuels, a slow-down in oil and gas production and a complete phase-out of shale and peat.



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?

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Coming events

IUAPPA 16th Annual World Congress on Air Quality. Cape Town, South Africa, 29 September - 4 October 2013. Information: <http://www.iuappa.org/>

EU Environment Council. 14 October 2013. Information: <http://europa.eu/newsroom/calendar/>

Clean Power for Transport Conference. Brussels, Belgium, 21 October 2013. Information: http://ec.europa.eu/transport/themes/urban/events/2013-10-21-cpt-conference_en.htm

International Conference on Regional Climate - CORDEX 2013. Brussels, Belgium, 4 - 7 November 2013. Information: <http://cordex2013.wcrp-climate.org/>

UN FCCC COP 19. Warsaw, Poland, 11 - 22 November 2013. Information: <http://unfccc.int/>

6th International Nitrogen Conference (N2013) Kampala, Uganda, 18 - 22 November 2013. Information: <http://initrogen.org/>

Air Quality: From home to the whole planet. Closing conference of the European Year of Air. Strasbourg, France, 9 December 2013. Information: http://www.atmo-alsace.net/site/all4clean-erair4all/index_en.php

CLRTAP Executive Body. Geneva, Switzerland, 9 - 13 December 2013. Information: <http://www.unece.org/env/lrtap/>

EU Environment Council. 13 December. Information: <http://europa.eu/newsroom/calendar/>

The Radical Emission Reduction Conference. London, UK, 10 - 11 December 2013. Information: <http://www.tyndall.ac.uk/radical-emission-reduction-conference>

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

Green Ship Technology Conference. Oslo, Norway, March 2014, Information: <http://www.informamaritimeevents.com/event/greenshiptech-nology>

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

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