

Significant cuts in carbon within reach

The CO₂ emissions of the Nordic and Baltic countries can be cut by 70 per cent by 2020 or soon after, and by 95 per cent by 2030, without nuclear power and CCS..

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Call for international nitrogen framework

A global framework on nutrients could be a way forward to address the extensive problems of pollution caused by excess nitrogen and other nutrients.

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Stricter US standards for road vehicles proposed

The proposed Tier 3 standards should reduce emissions of smog-forming volatile organic compounds and nitrogen oxides by 80 per cent, compared to today's car fleet average standards.

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Shipping should cut GHGs and air pollutants

The marine transport sector contributes significantly and increasingly to air pollution and climate change.

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Stricter rules for machinery on the way

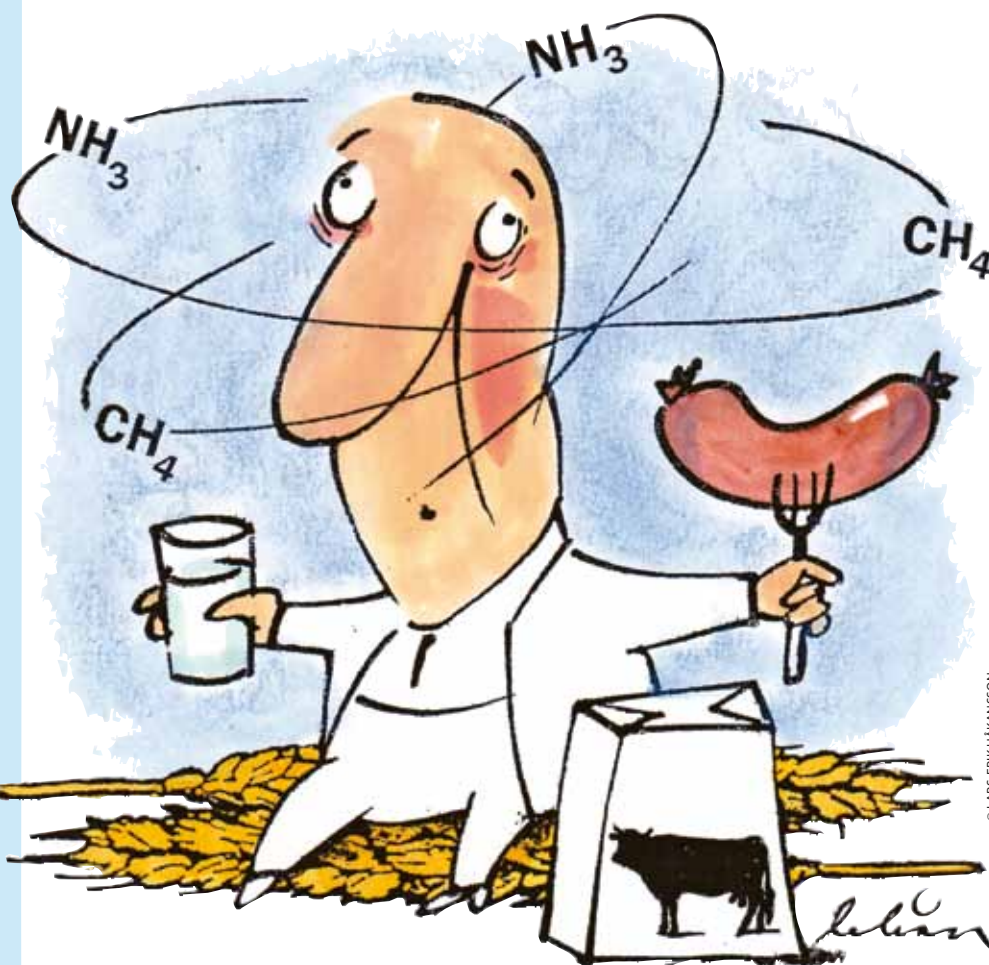
Emission standards for the non-road sector should be extended and strengthened in line with the Euro VI standards for road vehicles, environmental groups demand.

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CCS sidelined

Carbon, capture and storage (CCS) has still not proven to be anything else than an inordinately expensive technology on an experimental level. Nevertheless the European Commission continues to embrace it..

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Finding the ambition level

A tentative central ambition level for 2025 has been identified that would further reduce air pollution damage, but it is still insufficient to achieve the EU's long-term objective of effectively protecting peoples' health and the environment.

In a recent report¹ to the European Commission, the International Institute for Applied Systems Analysis (IIASA) presents a newly developed central emission scenario for the revision of the EU's Thematic Strategy on Air Pollution (TSAP)

and National Emissions Ceilings (NEC) directive.

Review and revision of EU air pollution policy started in March 2011 and is expected to result in a clean air strategy

Acid News

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

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

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

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The Air Pollution and Climate Secretariat

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

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

In furtherance of these aims, the Secretariat:

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

Editorial

Potatoes, milk and bacon, almost everything we eat comes from agriculture. That is plain fact, but agriculture is also responsible for 90 per cent of the ammonia emissions and at least 11 per cent of the greenhouse gases in the European Union.

The Common Agriculture Policy (CAP) for 2014-2020 is right now undergoing final negotiations in dialogue with an expected outcome in the end of June.

Back in February, EU leaders decided to allocate more than €50 billion a year between 2014 and 2020 to the CAP. That is about €100 for each EU citizen. Although the Council for the first time decided to cut the budget to agriculture, it is still by far the largest budget item.

This also makes agriculture quite unique; no other private sector receives such massive public subsidies. But there is reason for this, food production is an essential function in society and it can be seen as quite fair that it is treated differently from other types of production. But a healthy environment is a precondition for being able to produce food in the first place, so would it not be reasonable to use these vast sums to also guarantee this at the same time?

Indeed, the Council has reasoned along the same lines, in the budget it is concluded that the CAP should ensure "sustainable management of resources and climate action". Or public money for public environmental goods – as expressed by a coalition of environmental organisations.

About three-quarters of the CAP budget will be used for direct payments to farmers and market measures, also known as the first pillar. One of the reforms advocated for this CAP period is the so-called greening of this pillar. That is to say that payments to farms will be subject to certain environmental standards.



AirClim

More efficient nitrogen management, mixed farming, perennial grasslands and less meat production would be on my wish list for a more air- and climate-friendly agriculture – measures that would also have a positive impact on water and biodiversity.

However in the Commission's proposal, attempts to green the first pillar started off

quite weakly. There was certainly room for improvement. The Parliament and the Council of Ministers has since watered down the proposal further. What has been negotiated right now is a light-green greening that applies to most farms, versus a standard that applies to just to a fraction

of farms and is not set any higher than what is already common practice today. This difference is not insignificant. But even with a positive outcome it is not enough to ensure sustainable management of resources and climate action.

Despite this gloomy outlook, we do not need wait until 2020 for the next opportunity to green agricultural policy. In the coming year member states will design their own rural development programmes under CAP. What they can do is limited by the general framework, but there is enough flexibility to make some difference.

But there is a glaring risk that national agricultural lobby groups will argue that these national programmes will be as unambitious as possible in order to survive competition with other EU countries. With struggling economies in many member states a race to the bottom is not an unlikely outcome. A more ambitious EU-wide common ground would have saved us from this.

Kajsa Lindqvist

“With struggling economies in many member states a race to the bottom is not an unlikely outcome.”

Significant cuts in carbon emissions within reach

The CO₂ emissions of the Nordic and Baltic countries can be cut by 70 per cent by 2020 or soon after, and by 95 per cent by 2030, without nuclear power and CCS, shows a new AirClim report.

If there is a will there is a way. The task set for the report “70% less CO₂ by the early 2020s in the Nordic-Baltic region” was to achieve a 70 per cent reduction by 2020 and 95 per cent by 2030 in the region, i.e. Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, and Sweden.

This is not as difficult as it would have seemed five years ago. During that time global wind power has tripled, and Europe got 6.4 per cent of its electricity from the wind 2012. The scenario foresees 100 TWh of wind for the region by 2020 – five times the present, equivalent to upwards of 40 GW.

We know it can be built fast. Sweden had the greatest per capita installation of wind power in the world in 2011 and 2012, close to a hundred watt per capita each of the years. If all eight countries, with a total population of around 30 million, were to build just a little bit faster than Sweden is now, this could happen by 2020.

The report discusses the possibilities for integrating that much wind power. They are unusually good in the region. Hydro power, most of it in Norway and Sweden, acts as an enormous energy storage bank. Also, wind produces most power in the winter, which coincides with consumption peaks. Transport capacity within and outside the region is very good. There is also, as everywhere, a large untapped resource of demand-side management.

More wind only means less CO₂ if fossil power stations are closed down or run for fewer hours. The European emission trading system has essentially collapsed, and will not be easy to mend or complement. National instruments, such as CO₂ taxes, are now of essence. This will not be enough. For example, Estonian shale mining and use must be stopped, but other jobs must be created in the Narva region.



If all eight countries were to build just a little bit faster than Sweden is now, wind in the region could increase five-fold by 2020.

What is politically possible must be seen in a wider context. We are not alone. None of our neighbours deny that climate change is a problem, and some of our neighbours, such as Germany and the UK, have fairly ambitious climate policies. We postulate that everybody moves in the same direction but at different speeds. That gives the first mover an advantage for some time.

Heat and electricity are however the easy part, made even easier by the advent of cheap solar cells.

Transport is more difficult. We cannot know whether electric vehicles will make a big dent in emissions by 2020. Biofuels are, on the other hand, guaranteed a market in the EU. The scenario supposes that they will grow very fast in the region, but also that some of the biofuels or biomass will

be exported. They replace the same amount of oil whether used here or there – so exports of biomass should be accounted for as CO₂ cuts.

The same goes for exports of renewable electricity to Russia, Belarus, Germany, Poland, the Netherlands and the UK. That electricity replaces a fuel mix with a strong fossil component.

It takes a lot of effort, and a lot of diverse effort, to severely cut emissions from the transport sector, but it is possible.

The most difficult problem is heavy industry, because of the long investment cycles.

Given enough time, emissions can be cut drastically from industries such as cement works, ore-based steelworks, and oil refineries. To kill such industries would be meaningless, as they produce for the world market, and somebody else will fill the gap, with the same emissions. This is unlike the use of coal, shale and peat; if we cut their use, nobody else will fill the gap.

Cement can be based on other feedstock which does not emit CO₂, be replaced with other construction materials, be used in smaller quantities in higher-quality concrete, or a combination of all three. Refineries can shift from fossil feedstock to biomass and hydrogen. New methods can be used to reduce ore to iron without coal. This can happen by 2030 but not by 2020. So to achieve the stipulated 70 per cent reduction by 2020, crediting of exports is necessary.

Fredrik Lundberg

The report **70 % less CO₂ by the early 2020s in the Nordic-Baltic region** (June 2013) can be downloaded from www.airclim.org

Finding the ambition level

Continued from front page

package to be presented by the Commission in autumn 2013. One of the main components of the package will be a revised TSAP, updating the previous one from 2005, establishing new targets for reducing damage to health and the environment as well as associated ambition levels for future cuts in air pollutant emissions.

The TSAP will be accompanied by a proposal to revise the 2001 NEC directive, setting binding emission reduction targets for each member state for five air pollutants. The target year for achieving the reductions is yet to be decided, but it is likely to be 2020, 2025 or 2030, or possibly there could be more than one target year.

The new report differs from the previous ones in that it uses the most recent EU projections for expected economic growth, energy use and agricultural activities. The updated future emissions of the five main air pollutants and resulting environmental impacts are shown in Tables 1 and 2.

According to the analysis, full application of readily available technical measures – known as the Maximum Technically Feasible Reductions (MTFR) – would offer a significant potential for further

improvements, which would bring the EU closer to the objective of its Environment Action Programme (EAP) which is to achieve “levels of air quality that do not give rise to significant negative impacts on, and risks to human health and environment.”

Last year, IIASA presented preliminary results of applying the optimisation mode of its GAINS computer model to identify the least-cost set of emission reduction measures for the EU as a whole that will achieve given interim environmental targets at differing levels of ambition. Together with information on the associated costs and benefits to health and the environment, this type of scenario analysis can be used to establish the level of ambition for EU air quality policy for future target years.

The optimised scenarios are constructed for what is known as a gap-closure approach, aiming at step-wise health and environmental improvements. In effect this means closing the gap between the impacts of the baseline and the MTFR scenarios.

In this new report, IIASA examines interim targets for 2025 that could serve as milestones towards the long-term



objective of the EAP. As a starting point, the marginal costs of further emission reductions are compared with the marginal health benefits. The approach applied is seen as extremely conservative because the monetised benefits are restricted to account only for those of adult mortality from exposure to PM_{2.5} and using the lowest mortality valuation, i.e. the median value of a lost life year (VOLY). Hence the comparison ignores benefits of reduced infant mortality, lower premature mortality from less exposure to ground-level ozone, morbidity and all benefits to agricultural crops and ecosystems.

Using this conservative approach, marginal health benefits are found to equal marginal costs of further measures slightly above a 75 per cent gap closure between the baseline and the MTFR. At this level, additional emission reduction costs (on top of the baseline) amount to €4.5 billion/year, while the health benefits are estimated at €30.4 billion/year in 2025.

While this approach identifies a health-related interim target, it does not account for the other benefits that are more difficult, or even impossible, to monetise. Additional analysis was therefore done to look at further environmental improvements, and the report assessed the improvements to these impacts that could be achieved for 5, 20 and 50 per cent higher costs compared to the health-only strategy. It was found that for 20 per cent higher costs, a 65 per cent gap closure for acidification could be realised, together with a 60 per cent gap closure for ground-level ozone and a 55 per cent gap closure for eutrophication.

The resulting cost-effective scenario was named A5. At costs of €5.8 billion/year (0.04% of GDP), the A5 scenario would cut sulphur dioxide by 77 per cent, nitrogen oxides by 65 per cent, volatile

Table 1: Emissions of air pollutants in EU-28 in 2005 and projections for 2025 under three different scenarios (kilotonnes).

	SO ₂	NO _x	VOCs	NH ₃	PM _{2.5}
2005	7,874	11,358	9,312	3,942	1,706
2025 BASE	2,521 (-68%)	4,597 (-60%)	5,561 (-40%)	3,733 (-5%)	1,274 (-25%)
2025 A5	1,773 (-77%)	3,943 (-65%)	4,310 (-54%)	2,864 (-27%)	861 (-50%)
2025 MTFR	1,666 (-79%)	3,679 (-68%)	3,366 (-64%)	2,621 (-34%)	707 (-59%)

Table 2: Annual impact on health and ecosystems in EU-28 in 2005 and in 2025 under three different scenarios.

	Average loss of statistical life expectancy due to PM _{2.5} (months)	Cases of premature deaths due to O ₃	Ecosystem area with excess nitrogen deposition (1000 km ²)	Forest area with excess acid deposition (1000 km ²)
2005	8.5	24,600	1,180	205
2025 BASE	5.3	17,735	898	49
2025 A5	4.3	16,124	755	25
2025 MTFR	3.9	15,189	700	22

BASE: Baseline – reflects full implementation of current legislation and policy

A5: A cost-effective emission control scenario between the baseline and the MTFR.

MTFR: Maximum technical feasible reductions – a gradual phase-in of currently available emission abatement techniques.

Source: IIASA TSAP Report 10 (March 2013)

organic compounds by 54 per cent, PM_{2.5} by 50 per cent, and ammonia by 27 per cent relative to 2005. In addition, the same measures would cut emissions of black carbon by 33 per cent, particle number emissions by 73 per cent and mercury emissions by 33 per cent.

If the highest mortality valuation is used instead, i.e. the mean value of a statistical life (VSL), the “cost-optimal” target (the point where marginal health benefits are found to equal marginal costs) would instead be at 92 per cent gap closure. Unfortunately, no further analysis of this more ambitious target is presented in the report.

In a letter to the Commission², a coalition of environmental organisations noted that the new approach of using marginal cost versus marginal benefits to investigate suitable levels of ambition brings with it the obvious risk of paying much higher attention to those air pollution impacts that can currently be monetised (i.e. health damage) than to the very significant and important damage air pollution causes to natural and semi-natural ecosystems, biodiversity, agricultural crops, modern materials and cultural monuments.

It should also be recognised, they say, that the costs are likely to be highly overestimated. This is because the cost estimates are based primarily on technical “end-of-pipe” abatement measures. Structural measures and behavioural changes are not included, despite the fact that some of these measures can reduce emissions at zero or low net cost, and many of them will also reduce emissions of greenhouse gases. Examples of such measures include those aimed at improving energy and transport efficiency, fuel switching, increased use of renewables and greening of agricultural policy.

They note further that the analysis is constrained by “current policy” scenarios for energy and agriculture, which hides the true potential for emission reductions and adds to the overestimation of perceived future air pollution abatement costs. It is also paradoxical because it is well known that the current addiction to fossil fuels is not sustainable – fast and drastic cuts in emissions of the main greenhouse gas, carbon dioxide, are necessary to keep global temperature rise below the high-

Cut air pollution – save up to €150 billion/year

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

Moving from the baseline to the A5 scenario (which aims for a 75% gap closure for PM health impacts; a 65% gap closure for acidification; a 60% gap closure for health impacts from ozone; and a 55% gap closure for acidification) would reduce annual health damage costs in 2025 by €45-150 billion in the EU-28. Implementing MTFR would provide health benefits valued at €59–206 billion.

Annual health improvements of moving from the baseline to the A5 scenario include avoiding 63,000 premature deaths, 12,000 respiratory hospital admissions, 28,000 cases of chronic bronchitis, and 50 million restricted activity days.

The costs for the additional emission abatement measures of moving from the baseline to the A5 scenario are es-

timated at €5.4 billion per year in 2025, while implementing MTFR is estimated to cost €45 billion/yr.

If expressed as a percentage of GDP in 2025, the cost for the A5 scenario is equivalent to 0.04 per cent, and for the MTFR 0.31 per cent as an average for the whole EU.

The monetised health benefits exceed the costs for the A5 scenario by between 8 times (lowest valuation) and 28 times (highest valuation). For the MTFR, the benefits-to-cost ratio is between 1.3 and 4.6.

It should be noted that these monetised benefits do not include impacts to ecosystems, agricultural crops, materials or cultural heritage. Nor do they include for example chronic effects of ozone on health.

¹ **Cost-benefit Analysis of Policy Scenarios for the Revision of the Thematic Strategy on Air pollution** (March 2013). Report to the European Commission by Mike Holland, EMRC.

risk level of 1.5–2 degrees. So if the EU and its member countries take action that is necessary to reduce emissions of carbon dioxide, the costs of reducing emissions of “traditional” air pollutants will be significantly lower.

These shortcomings in the approach result in overestimated costs and underestimated benefits of air pollution control, which is of great concern since it might significantly influence the overall level of ambition. According to the coalition of environmentalists, the overall level of ambition must be guided primarily by the objectives of the EU’s Sixth EAP, and therefore should not be based solely on a limited cost-benefit analysis.

The environmental groups expect the review of EU air pollution policy to include an identification of the emission reductions that are required to reach the EU’s long-term objectives for air quality, and the measures and actions that are needed for their attainment, i.e. it should show not only what needs to be done, but also how, and by whom.

IIASA’s new report was presented at a meeting with the Commission’s Stakeholder Expert Group (SEG) on 3 April,

together with an update on progress in other work areas, including possible action for certain targeted source-sectors. It has not yet been decided if there will be another SEG meeting before the Commission finalises its proposals.

Christer Ågren

¹ **Policy Scenarios for the Revision of the Thematic Strategy on Air Pollution**. TSAP Report #10 (March 2013).

² NGO comments to DG Environment following the fifth SEG meeting on the review of the Thematic Strategy on Air Pollution (19 April 2013). Submitted jointly by the European Environmental Bureau (EEB), Transport & Environment (T&E), the Air Pollution & Climate Secretariat (AirClim), the Health and Environmental Alliance (HEAL) and ClientEarth.

Note: The production and analysis by IIASA of emission scenarios and their environmental impacts was done on behalf of the European Commission as part of the ongoing process to review and revise EU air pollution policy (see previous articles in AN 3/2012 and 1/2013). The IIASA reports prepared for the EU air pollution policy review can be downloaded from: <http://gains.iiasa.ac.at/index.php/policyapplications/tsap>. The presentations given at the 3 April SEG meeting are available at a dedicated CIRCA library website that can be reached from: http://ec.europa.eu/environment/air/review_air_policy.htm

Call for international nitrogen framework

A global framework on nutrients could be a way forward to address the extensive problems of pollution caused by excess nitrogen and other nutrients, suggests a recent UNEP report.

Humans have affected nutrient flows on earth ever since man learned to manage fire and was able to turn forests into grasslands, and even more so since the introduction of agriculture, but the scale of the impact has rapidly accelerated since industrialisation, as noted in a global overview of nutrient management, “Our nutrient world” presented at the United Nations Environment Programme (UNEP) meeting in February in 2013. Professor Mark Sutton, lead author, said: “Our analysis shows that by improving the management of the flow of nutrients we can help protect the environment, climate and human health, while addressing food and energy security concerns.”

Since the development of the Haber-Bosch process in the early 1900s, it has been possible to produce cheap nitrogen fertiliser from atmospheric nitrogen. Between 1950 and 2000, the global use of mineral nitrogen increased from 4 Mt to 83 Mt. This has of course led to increased yields, but not to the same extent as the increased supply of nutrients. The amount of nitrogen in the yield per amount of nitrogen supplied, known as nutrient use

Nutrient use efficiency

The concept of nutrient use efficiency (NUE) describes the ratio of nutrient in outputs to the nutrient in inputs. This will vary depending on how system boundaries are set. For crops, NUE boundaries are set at field level, and can be defined as the ratio of nutrients in crop yield and nutrients applied, deposited and bound through biological nitrogen fixation

Full-chain NUE is defined as the ratio of nutrients in final products (e.g., human food consumed) to new nutrient inputs (e.g., Haber-Bosch number, biological N fixation, NO_x formation).

efficiency (NUE) has decreased by 60 per cent between 1966 and 2008.

Although crop yields did not increase as much as the supply of fertiliser, they increased more than the need for food. The crop surplus created scope for substantially increased livestock production. Since the Food and Agriculture Organization began recording statistics in 1960, global meat consumption per capita has doubled. When a crop is converted to meat the

overall NUE is reduced, since nitrogen is lost in various stages of production. Considering the full chain of global food production, on average over 80 per cent of the nitrogen is lost to the environment.

Another aspect of modern livestock production is the concentration in certain regions, to which large quantities of nutrient-rich fodder are imported. This results in extremely high loads of nitrogen and other nutrients in these areas, which further hampers efficient use.

Co-author Dr Bruna Grizzetti said: “The option of localising agricultural production is a really important one. Crop and livestock farming are often separated by many hundreds of kilometres. Localisation helps improve nutrient recycling, reducing nutrient losses, while bringing the production benefits and pollution responsibilities closer together.”

In addition to the increased supply of nitrogen to agriculture, the formation of nitrogen oxides (NO_x) from combustion has also increased the supply of reactive nitrogen to global nutrition flows in the last century.



The increased flows of nitrogen from agriculture and from combustion have all in all led to an intertwined web of environmental problems such as eutrophication, acidification, stratospheric ozone depletion and the formation of greenhouse gases. So far, the most common policy approach has been to deal with one of the different forms of nitrogen pollution at a time. These include the Convention on Long-range Transboundary Air Pollution (CLRTAP) that deals with emissions of ammonia, the Euro standards for road vehicles that regulate emissions of NO_x, the EU's Nitrate directive that regulates nitrate pollution in water and the UN Framework Convention on Climate Change (FCCC) that deals with emissions of nitrous oxide.

Today there is no international framework that takes a holistic approach to these highly interlinked problems. The report authors argue that the lack of overview probably leads to an underestimation of the type of action that could have a positive impact on all these problems, while risking so called "pollution swapping", that is, measures that reduce emissions of a substance, e.g. ammonia, and increase emissions of another, e.g. nitrous oxide.

One of the key questions is whether it is best to start an entirely new process, or if it is better to expand an already existing one. The authors note that there are already many policy frameworks around and that the best approach is to go for the latter.

Professor Mark Sutton, said: "One option is to extend and strengthen the mandate of an existing agreement called the 'Global Programme of Action for the protection of the marine environment from land-based activities' (GPA). By clubbing together to meet multiple global challenges for food, energy, water and air pollution, climate and health, a

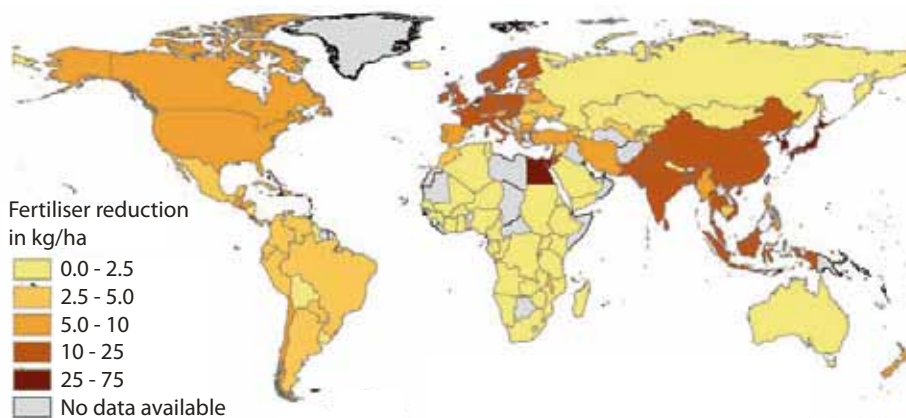


Figure: Absolute fertiliser savings achieved as a result of 20 per cent increased full-chain nitrogen NUE in countries where nitrogen NUE is below 50 per cent, if the constant output scenario was implemented.

much stronger gravity to motivate action can be expected."

As the name suggests, GPA works primarily with the protection of the marine environment, but within that scope nutrients are one of only three priorities. The prominent role of nutrients in the GPA can be compared to two other possible frameworks, the Convention on Biological Diversity (CBD), which has a much wider focus, and the FCCC, where the main focus is on greenhouse gases. Adding nutrients as a specific target to one of these would be difficult because of competition with other concerns. Another advantage with the GPA, according to the authors, is that it is not a convention with legally binding targets. These can take a long time to negotiate and years will be lost before any real world progress can be seen. The GPA is instead a programme for intergovernmental review that quite soon could develop a consensus around aspirational goals and share best practices. This could result in more rapid progress, they argue.

One aspirational goal that is suggested is to improve countries' nutrient use efficiency by 20 per cent between 2008 and

2020 – a target that should apply to both crop NUE and full chain NUE (see box for definitions).

As a long-term target, countries should strive to achieve a NUE for the crop sector of at least 70 per cent and full-chain NUE of at least 50 per cent. There are a few countries in Africa and Asia that already achieve these targets. These are countries where the use of chemical fertilisers is low and the risk of soil depletion and food insecurity is high. In these regions it might instead be necessary to increase the supply of nutrients to match removals from the systems.

The increased NUE, needed in most parts of the world, could be achieved either by making nutrient savings while keeping food and energy production at the current level (constant output scenario), or by increasing production using the same amount of nutrients as today (constant input scenario).

The constant output scenario would mean reduced costs for fertilisers and the reduction of nitrogen pollution (see figure). A rough cost-benefit analysis of the 2020 target shows savings in the magnitude of US\$ 50–400 billion (see table). The constant input scenario would not mean any savings on fertiliser costs, but less nitrogen pollution. The savings that could be made with this scenario are estimated at US\$ 15–165 billion without including the value of the increased production of food and energy that it would also lead to.

Kajsa Lindqvist

Our Nutrient World (February 2013) can be downloaded at <http://initrogen.org/index.php/publications/our-nutrient-world/>

Table: Indicative cost-benefit calculation of the global goal to improve nutrient use efficiency (NUE) for nitrogen by 20 per cent.

Benefits and costs	constant output scenario (billion US\$ per year)	constant input scenario (billion US\$ per year)
Fertiliser N savings	23 (18–28)	0
Environment and health benefits	160 (40–400)	80 (20–200)
Implementation cost	-12(-5–35)	-12(-5–35)
Value of additional food and energy prod.	0	?
Net economic benefit rounded	170 (50–400)	>70 (15–165)

Coal pollution kills Indians

Air pollution from India's coal power plants causes around 100,000 premature deaths every year – yet there are no national emission standards for key pollutants such as SO₂ and NO_x.

Whilst comprehensive studies of health impacts caused by air pollution from coal power plants have been made in the USA and parts of Europe, such data has so far been hard to come by in India. But a new study¹ shows that coal is taking a heavy toll on human life across large parts of the country.

According to the authors, the report is the first attempt to provide policymakers with objective information on the morbidity and mortality caused by coal plants in India, and it presents a clarion call for action to avoid the deadly, and entirely avoidable, impact this pollution is having on India's population.

The report found that in 2011–2012, emissions from 111 coal-fired power plants in India, representing a generation capacity of 121 gigawatts (GW), resulted in 80,000 to 115,000 premature deaths, more than 20 million asthma cases and 160 million restricted activity days every year.

The largest impact of these emissions is felt over the states of Delhi, Haryana, Maharashtra, Madhya Pradesh, Chhattisgarh, the Indo-Gangetic plain, and most of central-east India.

Using a conservative value of US\$ 40,000 per life lost, the premature mortality estimates from the study result in an annual health cost of US\$ 3.2 to 4.6 billion (160

to 230 billion rupees). The total annual monetised health damage was estimated to amount to US\$ 6.2–7.5 billion.

These alarming figures demonstrate, according to the authors, an urgent need to implement long-overdue pollution control regulations for coal-fired power plants, including mandating flue gas desulphurisation and introducing emission standards for pollutants such as sulphur dioxide (SO₂) and nitrogen oxides (NO_x).

India has the fifth largest electricity generation sector in the world, of which two-thirds comes from coal. Current plans envision deepening this reliance with 76 GW planned for the 12th Five-Year Plan (2012–2017) and 93 GW for the 13th Five-Year Plan (2017–2022). The majority of planned capacity additions are coal-based and according to government projections, coal's share in the country's electricity mix will remain largely constant.

Emission standards for power plants in India lag far behind those of China, Australia, the EU and the USA. For key pollutants like SO₂, NO_x and mercury, there are no prescribed emission standards in India.

The report stresses the need to bring the country's emission standards on par with other world leaders, to deploy the

most advanced pollution control technologies, implement cost-effective efficiency improvements, and increase the use of inherently cleaner sources of electricity. India also needs to update its procedures for environmental impact assessments for existing and newer plants to take into account the human health impacts from coal emissions. Measures are also needed to ensure that norms and standards are actually adhered to, with deterrents for non-compliance.

The report concludes that cleaning up the nation's power sector by strengthening and finalising stringent emission standards, as well as by reducing mercury and other toxics would provide a host of benefits – prominent among them the longevity of millions of Indians – and would help propel the nation to a healthier and more sustainable energy future.

Christer Ågren

¹ **Coal Kills – An Assessment of Death and Disease caused by India's Dirtiest Energy Source** (March 2013). By Conservation Action Trust, Urbanemissions.info and Greenpeace India. Available at: <http://www.cat.org.in/>



Eight countries continue to exceed their emission ceilings

Car fleet dieselisation combined with high real-life driving emissions contribute to seven countries still failing to meet NO_x reduction targets.

Seven member states – Austria, Belgium, France, Germany, Ireland, Luxembourg and Spain – continued to fail to meet their national emission ceilings for nitrogen oxides (NO_x) in 2011, according to provisional emission data published by the European Environment Agency (EEA). This is an improvement from last year's figure of eleven countries exceeding their legally binding NO_x caps (see Table).

The National Emissions Ceilings (NEC) directive covers four main air pollutants: sulphur dioxide (SO₂), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOCs) and ammonia (NH₃). These pollutants can damage human health, cause acidification and eutrophication of terrestrial and aquatic ecosystems, damage vegetation and harm biodiversity. The emission ceilings set in the 2001 NEC directive had to be met from 2010.

According to the provisional EEA data for 2011, Denmark met its cap on ammonia, leaving Finland Germany and Spain to continue being in non-compliance. Germany remained the only member state failing to meet its cap on emissions of volatile organic compounds, although it was only exceeded by a small margin. All countries achieved their sulphur dioxide limits.

Road transport contributes approximately 40 per cent of the NO_x emissions in the EU and is one of the main causes behind the large number of NO_x exceedances. Emission reductions from this sector have not been as large as originally anticipated, partly because traffic and the proportion of diesel cars have grown more than expected, and partly due to inadequate emission control measures. Moreover, EU emission standards for diesel vehicles have not delivered the anticipated level of NO_x reductions.

The ongoing review of EU air pollution policy (see front page) is expected

Table: EU countries' emissions compared to the national emission ceilings of the NEC directive – final data for 2010 and provisional data for 2011.

Member State	NO _x above/ below ceiling		NMVOC % above/ below ceiling		SO ₂ % above/ below ceiling		NH ₃ % above/ below ceiling	
	2010	2011	2010	2011	2010	2011	2010	2011
Austria	43	40	-17	-21	-52	-53	-5	-6
Belgium	25	19	-23	-28	-35	-44	-9	-9
Bulgaria	-53	-53	-47	-46	-54	-54	-53	-55
Cyprus	-22	-9	-17	-31	-43	-46	-39	-43
Czech Republic	-16	-21	-31	-34	-36	-36	-14	-18
Denmark	5	-1	1	-6	-73	-75	0,4	-1
Estonia	-39	-41	-29	-32	-17	-27	-65	-64
Finland	-2	-9	-10	-16	-39	-48	21	20
France	33	24	-23	-30	-23	-32	-17	-14
Germany	27	23	6	1	-15	-14	0,4	2
Greece	-7	-14	-29	-39	-49	-50	-12	-16
Hungary	-18	-35	-21	-27	-94	-93	-27	-28
Ireland	16	4	-19	-22	-38	-44	-7	-6
Italy	-3	-5	-7	-11	-56	-56	-10	-7
Latvia	-44	-48	-51	-49	-97	-97	-61	-71
Lithuania	-50	-54	-25	-25	-77	-75	-64	-65
Luxembourg	63	64	-6	-1	-45	-57	-34	-34
Malta	1	-2	-79	-75	-10	-12	-48	-48
Netherlands	5	0	-22	-22	-32	-33	-5	-7
Poland	-2	-3	-18	-19	-32	-35	-42	-42
Portugal	-26	-30	-2	-2	-67	-71	-48	-48
Romania	-50	-49	-30	-32	-62	-64	-24	-24
Slovakia	-32	-35	-55	-51	-37	-38	-36	-38
Slovenia	-1	-1	-14	-25	-64	-60	-13	-16
Spain	6	10	-6	-10	-40	-33	10	8
Sweden	4	-2	-24	-26	-53	-56	-9	-9
United Kingdom	-5	-11	-36	-37	-30	-35	-4	-2
EU-27	-1	-4	-19	-22	-46	-47	-16	-15
Total achieved	16	20	25	26	27	27	23	24
Total not met	11	7	2	1	0	0	4	3

to result in a revised NEC directive that sets stricter emission ceilings for 2020, 2025 or 2030 in order to further improve protection of health and the environment. National ceilings for emissions of particulate matter (PM_{2,5}) are also expected to be introduced. Until such new legislation is in place, however, the current NEC directive

remains in force and requires countries to keep their emissions below the current national ceilings in years to come.

Christer Ågren

Source: NEC Directive status report 2012 (May 2013). EEA Technical Report No 6/2013. Link: <http://www.eea.europa.eu/publications/nec-directive-status-report-2012>



Stricter US standards for road vehicles proposed

The proposed Tier 3 standards should reduce emissions of smog-forming volatile organic compounds and nitrogen oxides by 80 per cent and particulate matter by 70 per cent, compared to today's car fleet average standards.

A proposed rule to reduce air pollution from passenger cars and trucks was issued by the US Environmental Protection Agency (EPA) in late March. When finalised, the new Tier 3 standards would set new vehicle emissions standards and lower the sulphur content of gasoline starting in 2017.

Considering the vehicle and its fuel as an integrated system, the new vehicle standards would reduce both tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles.

The proposed gasoline sulphur standard of 10 parts per million (ppm) would make vehicle emission control systems more effective for both existing and new vehicles, and would enable more stringent vehicle emissions standards, the EPA says, explaining that removing sulphur allows a vehicle's catalyst to work more efficiently and enables the development of lower-cost technologies to improve fuel economy and reduce greenhouse gas emissions. The proposed sulphur standard is similar to levels already being achieved in California, Europe, Japan, South Korea, and several other countries.

The Tier 3 vehicle emission standards, combined with the proposed sulphur limit, would reduce motor vehicle emissions of nitrogen oxides (NO_x), volatile organic compounds (VOCs), particulate matter (PM_{2.5}), carbon monoxide (CO) and air toxics, such as benzene and 1,3-butadiene.

Compared to current standards, the proposed tailpipe standards for light-

duty vehicles represent an 80 per cent reduction of VOCs and NO_x from today's fleet average and a 70 per cent reduction in per-vehicle PM standards. For heavy-duty vehicles, the proposed new standards mean a 60 per cent reduction in both fleet average VOCs and NO_x emissions and per-vehicle PM standards. It is also proposed to extend the period during which the standards apply from 120,000 miles to 150,000 miles.

A study by the National Association of Clean Air Agencies (NACAA) on the costs and benefits of the Tier 3 proposal, estimates that by 2030 it will reduce mobile source emissions of NO_x, VOCs and CO by 29, 26 and 38 per cent, respectively.

EPA estimates that the proposed cleaner fuels and cars programme will by 2030 annually prevent up to 2,400 premature deaths, 23,000 cases of respiratory ailments in children, 3,200 hospital admissions and asthma-related emergency room visits, and 1.8 million lost school days, work days and days when activities would be restricted due to air pollution. Total health-related benefits in 2030 will be between US\$8 and 23 billion annually.

The annual cost of the overall programme in 2030 is estimated at US\$3.4 billion, which means that the proposal would provide up to seven dollars in health benefits for every dollar spent to meet the standards. The proposed sulphur standards will cost refineries less than a

penny per gallon of gasoline on average, and the proposed vehicle standards will have an average cost of about US\$130 per vehicle in 2025.

The Tier 3 proposal is harmonised with the California Air Resources Board Low-Emission Vehicle (LEV III) programme, so automakers could sell the same vehicles in all 50 states. It is aligned with and designed to be implemented over the same timeframe as EPA's programme for reducing greenhouse gas emissions from light-duty vehicles starting in model year 2017.

Paul Billings, senior vice president of the American Lung Association, said, "We support cleaner gasoline and vehicles standards. We will carefully review the proposal and file detailed comments to support the maximum pollution reductions. The American Lung Association will encourage the public to weigh in during EPA's public comment period. These new standards must not be delayed. EPA must set the cleaner gasoline and vehicle standards before the end of the year."

Once published in the Federal Register, the proposal will be available for public comment and EPA will hold public hearings to receive further public input.

Christer Ågren

Sources: US EPA press release, 29 March 2013, Environment News Service, 1 April 2013.

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





Every breath we take – air quality in Europe

In the 2013 edition of their Signals report, the European Environment Agency (EEA) takes a closer look at air quality. “Signals 2013 – Every breath we take” consists of short and accessible articles covering a wide range of aspects related to air quality. They include, among others, the state of Europe’s air today, main information sources, links between climate change and air, the way different pollutants can form in the atmosphere, and a short overview of the European legislation affecting air quality. The 2013 edition is prepared in the context of the European Year of Air, when EU policy makers are planning to revisit air quality laws.

It was launched in Ireland at the Air Science Policy Forum, an event organised on 15 April by the Irish Environmental Protection Agency and Department of the Environment, Community and Local Government, as part of the Irish Presidency of the European Union.

While air quality in Europe has improved greatly in recent decades, air pollution is still a problem with severe impacts. Air pollution can trigger and aggravate respiratory diseases; it can damage forests, acidify soils and waters, reduce crop yields and corrode buildings.

In particular, pollution from particulate matter (PM) and pollution from ozone pose serious health risks to European

citizens. Almost one-third of Europe’s city dwellers are still exposed to concentrations of airborne PM that exceed the EU limit values. Even worse, more than 90 per cent of the urban population is exposed to levels of PM and ozone in excess of the World Health Organization’s recommended guidelines. Air pollution is also found to reduce the life expectancy of the average city dweller by eight months in Europe, or up to two years in some areas.

Emissions from car exhausts in urban areas; forest fires; ammonia emitted by agriculture; coal-fired power plants across the planet; and even volcano eruptions affect the quality of the air we breathe. In some cases, the pollutant sources are located thousands of kilometres away from where the damage occurs. Moreover, many air pollutants contribute to climate change and climate change itself is going to affect air quality in the future.

The Signals report will be made available in 26 European languages as an e-book and PDF. It will also be available in print in some languages.

For more information and to download the report, go to: <http://www.eea.europa.eu/>

US anti-coal campaign crosses halfway mark

Environmental group the Sierra Club has announced that its Beyond Coal campaign is more than halfway toward meeting its goal of responsibly securing the retirement of a third of the coal-fired power capacity in the United States. By early March, the campaign and its allies of more than 100 organizations nationwide had secured the retirement of 142 coal-burning power plants, representing nearly 54,000 megawatts (MW). The goal is to close down 105,000 MW of coal by 2015.

According to the Clean Air Task Force, the nearly 54,000 megawatts of coal retired by the campaign so far will result in approximately 3,900 lives saved, 6,000 heart attacks avoided, and \$1.8 billion in health costs saved, every year. It also will prevent 206 million metric tons of climate-disrupting carbon pollution from being dumped into our air every year – the equivalent of removing 43 million cars from the road.

Source: Sierra Club press release, 1 March 2013

Climate and energy package on its way

The EU’s 2030 package will hopefully be ready for adoption just before the deadline for a new UN agreement on climate change, energy commissioner Günther Oettinger states.

EU climate commissioner Connie Hedegaard and Mr. Oettinger together presented a consultation document for 2030 targeting climate and energy policy. Energy efficiency, carbon reduction and renewable energy are regularly the first-choice areas for setting new targets, whether they will be binding, as Mr. Oettinger would like them to be, or not. A 40 per cent reduction in CO₂ emissions, as part of the low-carbon roadmap, had already been put forward by the European Commission, and other scenarios point to a minimum share of 30 per cent for renewables by 2030. But the strength of the post-2020 targets will be determined after the consultation period on 2 July.

Source: ENDS Europe Daily, 27 March 2013

Consultation: http://ec.europa.eu/energy/consultations/20130702_green_paper_2030_en.htm

Guidance on renewable energy subsidies

Renewables will soon be the subject of a new guidance that the EU Commission will publish in July. The paper will give advice on how to set up support schemes, how to fine-tune existing ones and how to phase out subsidies on technologies which have become mature. This guidance is expected to recommend a bi-annual review of the RES and will moreover facilitate the compliance with rules on state aid, due to be published in revised form next year.

In accordance with a consultation document on revising the state aid rules, the nuclear sector could largely benefit from this update. It is based on a guideline from 2012, stating that any subsidies for nuclear should be based on sound assessment if market failures justify an intervention, and it recommends the inclusion of external costs in transparent evaluation. In addition it says that the competition between the different energy sources should be fair through “consistent application of the state aid principles”.

Source: ENDS Daily 22 April 2013

Green tax revenue unchanged in 2011

The EU's revenue from environmental taxes has stagnated for the second year in succession, recent figures from Eurostat indicate. In 2012 environmental taxation contributed €302.7 to treasuries, which is about one euro for every 16 euro of overall taxation. This low share shows that environmental protection does not have a very high priority, according to Eurostat.

The original purpose of energy taxes was to raise money, not to sustain a sound environment, they added. Almost a three quarters of the total was due to taxes on energy –on transport fuel as well as on industrial energy use and heating. These levies were highest in Belgium, Latvia and Slovenia, while the level of taxes on pollution was led by the Netherlands, Estonia and Denmark. The latter brought in €13.3 billion in 2011, which represents only 4.4 per cent of the overall revenue.

Source: Eurostat press release, 29 April 2013

Call for long-term CO₂ targets

The European Parliament Environment Committee has proposed a 120kph speed limit for vans from 2014 and 2025 CO₂ targets for both cars and vans.

There is a need for a 2025 target for carbon dioxide emissions from cars by 2017, says the European Parliament's Environment Committee in its response on 24 April to the European Commission's proposed rules to achieve the 2020 targets. The target should be in the range 68 to 78 grams of carbon dioxide per kilometre, which would mean a reduction of about a quarter compared to the 2020 target, which is 95 g/km.

Franziska Achterberg from Greenpeace welcomed the proposal to soon adopt a target for 2025, but considers that the proposed range is not low enough: “This timeline would give carmakers enough time to clean up their act. But the range they indicate is still too high to truly drive investments in technological innovation. Greenpeace is calling for a target of no more than 60 grams of CO₂ per kilometre in 2025.”

The committee also supported improvements to the standard for how cars are tested. Recent studies show that car manufacturer statements on CO₂ emissions exaggerate real-world driving situations by up to 23 per cent.

Moreover, the Environment Committee backed a super-credit scheme, under which cars that emit less than 50 grams per kilometre will count as 1.5 cars in 2016–2023. This proposal is more generous than the one put forward by the European Commission, in which cars that emit less than 35 grams per kilometre will count as 1.3 cars in 2020–2023.

Consumer and environmental groups criticise these types of super-credit schemes for being loopholes for car manufactures.

However, environmental groups together with the aluminium industry welcomed the Environment Committee's support for abandoning the weight-based model that has been used so far for the CO₂ targets

and instead moving to a footprint-based model in a post-2020 regulation.

Two weeks later, on 7 May, the Environment Committee submitted its response to the corresponding draft regulation for vans. Similarly to cars they urge the Commission to propose targets for 2025 that should be set by 2017 in the range of 105–120 g/km. That represents a tightening of the existing 147 g/km target for 2020 by 18–28 per cent.

The target for vans has been criticised for not being as ambitious as the one for cars and therefore risking that carmakers will reclassify big cars as vans. Under the parliament's proposal there is a risk that the unbalanced relationship between the targets will persist.

William Todts from Transport & Environment: “The proposed 2025 target range is a step forward but needs to be more ambitious. The technologies used in cars and vans are very similar and targets should also be equivalent.”

Unlike the Commission, the Environment Committee wants a super-credit scheme for vans that follows the same model as for cars. This would apply for the years 2018–2023. The committee also supported amendments to improve the testing procedure for vans along the same lines as they did for cars two weeks earlier.

The committee also wants a 120 kph speed limit for vans from 2014. Capping van speed will encourage the supply of smaller engines, reducing average van fuel consumption and emissions by at least six per cent, according to Transport & Environment, which also highlights the fact that vans are the only type of commercial vehicle without speed limits today.

The proposed regulations for vans and cars will be negotiated in trilogue in the coming weeks with expected final outcomes by the end of June.



Eighteen years after this issue was published, only 14,000 electric cars were sold in the EU.

In the week in between the Environment Committee's two meetings, the European Environment Agency released figures showing the effect of the present CO₂ targets for cars that are being phased in. The average car sold in the EU in 2012 emitted 132.2 grams of CO₂ per kilometre. That is a 2.6 per cent decrease compared to 2011, which is less than between 2010 and 2011 when emissions fell by 3.3 per cent.

Cars with the lowest average emissions were sold in Denmark (117 g/km) and in Portugal (118 g/km). The largest improvements in efficiency were in Greece (9%) and in Denmark (6%). Improvements in efficiency occurred in almost all EU countries, except Hungary and Belgium. The countries with the highest average emissions were Latvia (152 g/km) and Estonia (150 g/km).

Out of the 12 million new cars sold in the whole of EU in 2012, only 14,000 were electric vehicles. That is however a great increase compared to 2010 when sales reached only around 700. Most of the electric cars were sold in France (more than 5500 vehicles) and Germany (almost 3000 vehicles).

Car sales in general have fallen in the EU since the peak year 2007, when 15.5 million vehicles were registered. The greatest decrease in new car registrations in 2012 was not surprisingly in countries struggling with economic difficulties: Greece (-41%), Portugal (-38%) and Cyprus (-25%). Estonia and Hungary had on the contrary an increase in sales of more than 12 per cent.

Kajsa Lindqvist

Sources: ENDS Europe Daily 24 April and 7 May 2013, and EEA press release 30 April 2013

Climate change up in UN Security Council

China and Russia blocked a proposal to have climate change recognised as an international security threat, when the issue was brought up by Pakistan and the United Kingdom in the UN Security Council on 15 February.

The issue is controversial. Many developing countries argue that it would threaten the principle of common but differentiated responsibility, since the Security Council does not operate according to it.

Invited to the meeting was Tony de Brum, the minister in assistance to the President of the Marshall Islands to speak out on the desperate situation for his nation:

"My country will be destroyed by climate change. It will be removed from the map by rising seas. Because it is happening inch by inch does not make the situation any less desperate, or any less urgent. This is an emergency."

It was the third time climate change was discussed in the Security Council.

Tony de Brum's speech: <http://www.independent-diplomat.org/debrumspeech>

Source: Responding to Climate Change, 18 February 2013

Parliament wants to strengthen 7EAP

On 25 April, the European Parliament's environment committee adopted a number of amendments for strengthening the EU's 7th Environment Action Programme (7EAP), proposed by the European Commission last year.

For example, the MEPs called for binding 2030 targets for carbon reduction, renewables and energy efficiency. Although the environment action programme only deals with the period to 2020, the parliament feels long term certainty must be given now.

The Parliament will now discuss the 7EAP with the Council (member states' representatives) and the Commission in trilogue negotiations, starting at the end of May. A vote in plenary could be held in July.

Source: ENDS Europe Daily, 26 April 2013.

Shipping should cut greenhouse gases and air pollutants

Due to its dependence on fossil fuels and the fact that it is one of the least regulated emission sources, emissions from the marine transport sector contribute significantly and increasingly to air pollution and climate change.

Emissions of air pollutants and greenhouse gases from the shipping sector have increased substantially in the last two decades, contributing to both climate change and air pollution problems, according to a report¹ from the European Environment Agency (EEA).

The sector's environmental impact is significant as emissions such as carbon dioxide (CO₂), nitrogen oxides (NO_x), sulphur dioxide (SO₂) and particulate matter (PM_{2.5}) from shipping occurring in European waters can contribute up to 10–20 per cent of overall worldwide shipping emissions. When considering all ship traffic from national and international shipping arriving or departing from EU ports the contribution can be up to 30 per cent for CO₂.

Air pollutants emitted by shipping can affect air quality in many areas, particularly around ports and busy shipping channels. The release of greenhouse gases and air pollutants from international shipping has a complex effect on the climate – greenhouse gas emissions have a warming effect, while on the other hand some air pollutants lead to cooling.

To systematically address both types of emissions together there is a need for an integrated EU-wide monitoring, reporting and verification system for emissions of both greenhouse gases and air pollutants from international shipping in European waters, the report says.

Compared to other

economic sectors, shipping is currently one of the most unregulated sources of air pollutant emissions. Air pollution from shipping harms health, increasing heart disease, respiratory illnesses and premature deaths. It also damages the environment through acidification and eutrophication.

While some air pollutants are emitted far from land, more than two-thirds of the global emissions from ships are within 400 km of coastlines, and this rate is much higher in European waters. Moreover, some pollutants from ships can travel hundreds of kilometres in the atmosphere.

In some areas, ships can contribute up to 20–30 per cent of the local fine particulate matter (PM_{2.5}) concentrations and up to 15 per cent for ground-level ozone. Around some busy ports and shipping channels, ships can contribute



as much as 80 per cent of NO_x and SO₂ pollution. The report highlights that there is relatively little measurement data available to attribute shipping's contribution to local air pollution, although there are some modelling studies.

The report includes a review of recently developed scenario studies on ship emissions and shows that NO_x emissions from international maritime transport in European waters are expected to continue to increase and could be equal to land-based emissions sources from 2020 onwards. SO₂ emissions in European waters will decrease further from 2020 onwards due to already adopted legislation on the sulphur content in fuel. It is expected that the sulphur standards will also lead to a decrease in emissions of PM_{2.5}.

Regarding carbon emissions, national and international shipping was in 2007 responsible for 3.3 per cent of global CO₂ emissions – and around 30 per cent of this was emitted on routes passing through European ports. Emissions from the sector are projected to grow by up to four per cent per year over the next decade.

As there is a clear link between economic growth and the movement of goods, emissions from shipping currently change largely in step with the level of economic activity. Between 1990 and 2010, emissions of CO₂ from international shipping departing from EU ports increased by approximately 35 per cent.

Emissions of greenhouse gases and air pollutants from international maritime transport contribute to climate forcing in a rather complex manner. This can come via a variety of processes such as the absorbing (leading to a warming effect) or scattering of radiation (leading to a cooling effect) as well as influencing cloud formation over oceans (cooling, the so-called indirect aerosol effect) and depositing black carbon on snow and ice (warming). The net warming or cooling effect of global ship emissions is rather uncertain but most recent studies indicate that currently at a global level, the indirect aerosol effect (cooling) is more important than the warming.

Reducing fuel consumption, including by reducing speed, is the best way to reduce emissions, according to the report. Better

fuel efficiency can cut both air pollution and greenhouse gases, and the report recommends technical improvements and different ship operating procedures. If ships reduced their speed by 10 per cent, known as 'slow steaming', it could cut energy demand by approximately 19 per cent, taking into account reduced engine power and increased travel time, according to one study.

The need and potential for ships to switch to renewable fuels are not mentioned in the report, but it is noted that some shipping sectors are already switching to liquid natural gas (LNG), leading to an eradication of SO₂ emissions, 90 per cent reduction of NO_x and 20 per cent reduction of greenhouse gases. Exhaust gas cleaning technologies, such as seawater scrubbing to reduce SO₂ emissions or selective catalytic reduction (SCR) of NO_x, can also significantly reduce air pollutants.

Jacqueline McGlade, EEA Executive Director, said: "This study shows the complex effects different emissions are having on the planet. We need initiatives that protect the environment as an overall system. The choice between either clean air or mitigating climate change is a false dichotomy – Europe needs both. By avoiding unnecessary movement of goods and improving transport efficiency, we can address both air pollution and greenhouse gas mitigation together."

Christer Ågren

¹ **The impact of international shipping on European air quality and climate forcing** (March 2013). EEA Technical Report No 4/2013. http://www.eea.europa.eu/highlights/international-shipping-should-cut-air?utm_campaign=international-shipping-should-cut-air

Shipping and aviation emits more CO₂

Shipping and aviation represented around 3.2 and 2.1 per cent respectively of global CO₂ emissions in the mid-2000s. A wide range of projections and scenarios shows that both sectors are likely to grow over the coming decades with a resultant increase in CO₂ emissions by 2050, despite mitigation efforts through technology, operations, and usage of low-carbon fuels.

If current projections of emissions from shipping and aviation to 2050 are placed in the context of an overall global 2°C emissions reduction pathway, then shipping might contribute between approximately 6 and 18 per cent of median permissible total CO₂-equivalent emissions in 2050 to meet the pathway, and aviation might contribute between approximately 4 and 15 per cent, according to a recent study published by Transport & Environment.

Report: **Shipping and aviation emissions in the context of a 2°C emission pathway** (March 2013). By D. S. Lee, Ling Lim, and B. Owen, Manchester Metropolitan University. Available at: <http://www.transportenvironment.org/publications/shipping-and-aviation-emissions>

Sea-level rise world map

Are you worried you will get wet feet in the future? Now you can easily find out with an online world map showing the coastlines with different levels of sea-level rise. Even with a rise of just one metre in sea level, most parts of cities like Amsterdam, Venice and Alexandria will be under water.

Online world map: <http://geology.com/sea-level-rise/>



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Ferries to switch from oil to methanol

Swedish ferry operator Stena Line is investigating the opportunity to convert 25 of its vessels to run on methanol. The case for methanol as an alternative fuel – and the reason why Stena prefers it to liquefied natural gas (LNG) – was presented at an IMO meeting in early February.

Converting vessels to run on methanol would be considerably less expensive and complicated than converting to LNG, said Per Stefenson, a naval architect working for

Stena. Methanol can be produced from natural gas, biomass – including waste – and in the future probably from hydrogen and captured

carbon dioxide (CO₂). Producing it from natural gas requires about 25 per cent of the total energy compared to 10 per cent of the total energy when making LNG, meaning that LNG is cheaper and more energy efficient to produce.

Stefenson showed calculations suggesting that both LNG and methanol would have a price comparable with marine gas oil (MGO) if supplied alongside in Gothenburg, Sweden. In fact, methanol could be slightly cheaper than LNG in terms of energy supplied, and both methanol and LNG would be cheaper than MGO.

Exhaust emissions of sulphur dioxide (SO₂), particulate matter (PM) and nitrogen oxides (NOx) when using methanol are equivalent to LNG, said Stefenson.

Source: Sustainable Shipping News, 4 February 2013

Decision on NECAs in the Baltic due in October

Countries surrounding the Baltic Sea will decide on when to apply to the International Maritime Organization (IMO) for the creation of a Nitrogen Oxides Emission Control Area (NECA) at a ministerial meeting of Helcom, the Helsinki-based commission for the protection of the Baltic Sea, to be held in October.

Helcom has thoroughly analysed and for some years now debated a possible Baltic NECA, but economic and technical concerns from some countries have repeatedly delayed making a decision.

From 2016, all new ships sailing within designated NECAs will have to meet IMO's Tier III NOx emission standards, which require NOx emissions to be cut by about 75 per cent compared to the current generally applicable Tier II standards.

Source: ENDS Europe Daily, 1 February 2013



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Ships' NOx limit may be delayed

The International Maritime Organization (IMO) may delay the implementation of stricter limits for nitrogen oxide (NOx) emissions for ships operating in emission control areas (ECA), possibly by five years.

The decision on 15 May by the IMO's Marine Environment Protection Committee (MEPC) was taken despite the fact that an IMO correspondence group reported that there is no need for a delay as technologies needed to meet new NOx standards are available.

Agreed back in 2008, the Tier III NOx standard will impose a 75 per cent reduction in NOx emissions for new engines on ships operating in agreed NOx ECAs as from 2016. At present, this NOx limit has only been agreed for the North American ECA, while ECAs in Europe only restrict sulphur emissions.

The environmental groups Seas at Risk and Transport & Environment, both founding members of the IMO observer organisation, Clean Shipping Coalition, condemned moves to force a delay.

Antoine Kedzierski, T&E clean shipping officer, said: "Today's decision to delay ship engine NOx standards is a shameful act by the IMO. Two years before the entry into force of the next emissions limit, the IMO punishes those who have chosen to invest in clean innovation in order to comply and rewards those who have cynically waited and lobbied for postponement."

The call was led by Russia, but the lack of a common EU position is also to blame."

John Maggs from Seas at Risks commented: "If left unregulated, shipping will soon become the biggest source of NOx emissions in Europe, exceeding all land-based emissions put together. Due to IMO's sudden and abrupt change of direction, Europe should now act by itself and set clean engine standards at EU level."

NOx emissions form a big part of the air pollution coming from international shipping. Any delay means that shipping NOx emissions most likely will to continue to increase for, at least, the next decade.

The IMO decision to delay the Tier III NOx standard in ECAs from 2016 to 2021 needs to be adopted by vote by the next MEPC meeting, expected to be held in March 2014.

Sources: Sustainable Shipping News and T&E press release, 15 May 2013.



Waiting for shipping to become the largest NOx source.

Stricter air pollution rules for machinery on the way

Emission standards for the non-road sector should be extended and strengthened in line with the Euro VI standards for road vehicles, environmental groups demand.

Earlier this year a European Commission consultation suggested tightening emission limits for engines covered by the non-road mobile machinery (NRMM) directive and bringing more types of engines under the scope of these air pollution rules.

The NRMM directive regulates emissions of some major air pollutants (NO_x, HC, PM, CO) from diesel and petrol engines in a wide variety of applications, including bulldozers, trains, chainsaws, larger inland boats and many other forms of machinery. The directive dates back to 1997, but has been amended and extended several times since then.

Despite the emission limits set by NRMM directive, emissions of nitrogen oxides (NO_x) and particle matter (PM) pollutants from this sector are still high and have grown in relative terms. This is explained by the steep increase in the number of non-road machines put into service and by the fact that the emission limits set for NRMM are less strict compared to those mandated for similar engines used by road vehicles.

In its response to the consultation, green group Transport & Environment listed the following main priorities for the revision of the directive:

- Given serious persistent air quality problems in Europe, Euro VI levels for heavy-duty on-road engines should serve as a benchmark for new standards for NRMM. We are concerned with the much lower ambition levels hinted at in the consultation document;
- In particular there is a need to solve the problem of diesel PM emissions, and related black carbon, once and for all by introducing Euro VI equivalent standards for particle number count for all engines covered;
- The scope of the legislation should be extended to also cover engines below 37kW and above 560 kW, and by also including stationary applications (e.g.



The Euro VI levels for heavy-duty on-road engines should serve as a benchmark.

diesel generators and air conditioning engines);

- Following developments in standards for the on-road sector, we would prefer moving towards a regulation instead of a directive;
- Standards should be fuel-neutral.
- Greenhouse gas emissions (carbon dioxide and methane) should be measured and reported;
- Exemptions, flexibilities etc. should be cut drastically so that it is impossible to sell machinery equipped engines complying with an old standard a limited time after entry into force of the standard;
- In-service emissions need to be a top priority. As a minimum, relevant provisions of Euro VI legislation should be copied to also cover non-road engines;
- Emissions from existing engines need to be addressed;
- Transparency should be ensured by mandatory publication of engine emissions

performance in an EU-wide publicly accessible database.

According to a recent Commission consultancy study prepared by IIASA for the revision of the EU's Thematic Strategy on Air Pollution, the NRMM sector was responsible for 16 per cent of EU total emissions of nitrogen oxides in 2010 and 6 per cent of PM_{2.5} emissions.

The Commission is expected to come up with specific proposals for a revised NRMM directive later this year.

Christer Ågren

Consultation response from Transport & Environment: <http://www.transportenvironment.org/publications/air-pollution-standards-non-road-engines>

European Commission's NRMM website: http://ec.europa.eu/enterprise/sectors/automotive/environment/non-road-mobile-machinery/index_en.htm

UK in breach of EU air quality rules

Britain's highest appeal court, the Supreme Court, has ruled that the UK is in breach of the EU air quality directive. However, before deciding on further action, the Supreme Court referred a number of legal questions to the European Court of Justice (ECJ) in Luxembourg, which could take up to 18 months to answer.

The Supreme Court could eventually force the UK government to take certain steps to improve air quality but does not have the power to issue fines, according to Alan Andrews, lawyer at ClientEarth which brought the case against the government in 2011. ClientEarth wanted to force the government to come up with an air quality plan to comply with EU limits on nitrogen dioxide (NO₂) concentrations by 2015.

The ECJ will be asked to consider whether applying for a time extension is mandatory. If it is not, it is asked to define "as short as possible" in the context of reaching compliance under article 23 of the directive.

Sources: ENDS Europe Daily, 1 May 2013 and PlanetArk, 2 May 2013.

Air pollution scourge underestimated

Air pollution is an underestimated scourge that kills far more people than AIDS and malaria and a shift to cleaner energy could easily halve the toll by 2030, according to United Nations officials.

A 2012 World Health Organization (WHO) study found that 3.5 million people die early annually from indoor air pollution and 3.3 million from outdoor air pollution.

"The problem has been underestimated in the past," Maria Neira, the WHO's director of public health and environment, told Reuters. "More than 6 million deaths every year are caused by air pollution," she said. "The horrible thing is that this will be growing because of rising use of fossil fuels."

"If we increase access to clean energy ... the health benefits will be enormous," she said.

Source: Reuters, 10 April 2013.

Coal costs health €43 billion a year

A phase-out of coal power generation is imperative, with a moratorium on new coal power plants as a first step.

Health damage due to air pollution from coal-fired power stations adds a financial burden to the EU population of up to €42.8 billion a year, according to a new study published by the Health and Environment Alliance (HEAL).

The report, entitled "The unpaid health bill: How coal power plants make us sick", provides scientific evidence on the health impacts of air pollution from coal-fired power generation and calculations of the effects on chronic lung disease and some heart conditions.

It is estimated that the impacts in the EU amount to more than 18,200 premature deaths, or 196,200 life years lost, about 8,500 new cases of chronic bronchitis, and over four million lost working days each year. Adding emissions from coal power plants in Croatia, Serbia and Turkey, the figures for mortality would increase to 23,300 premature deaths, or 250,600 life years lost, while the total costs are up to €54.7 billion annually.

Together, coal power plants in three countries – Poland, Romania and Germany – are responsible for more than half of the total health impacts. Substantial impacts are further attributed to coal combustion in Bulgaria, Czech Republic, France, Greece,

Serbia, Turkey and the United Kingdom (see Table).

Coal power generation in Poland is associated with the highest health impacts as well as health costs, estimated at over €8 billion per year. Romania and Germany both rank second, with more than €6 billion in health costs each. The evaluation is based on a calculation of the costs associated with premature deaths resulting from

exposure to coal-related air pollution, medical visits, hospitalisations, medication and reduced activity, including working days lost.

"The findings are particularly worrying given that the use of coal is now rising after years of decline. The startlingly high costs to human health should trigger a major rethink on EU energy policy," says Genon Jensen, Executive Director at HEAL.

The report launch marks the beginning of a coal and health campaign in which HEAL will work closely with medical, health and climate advocacy groups, especially in countries where coal is a particular threat to health.

On top of the benefits to health from cleaner air, the report also highlights how stronger regulation of coal would help mitigate climate change. Coal is the most carbon-intensive energy source in Europe – responsible for approximately 20 per cent of carbon emissions. Controlling long-term temperature rises and avoiding heat waves are particularly important for vulnerable groups, such

Table: Annual health costs associated with air pollution from coal-fired power generation per country. Based on 2009 emission data.

Country	Total costs (€ million)
Poland	8,219
Romania	6,409
Germany	6,385
Bulgaria	4,629
Greece	4,089
UK	3,682
Czech Republic	2,842
France	1,879
Slovakia	925
Italy	857
Spain	827
Estonia	445
Netherlands	386
Hungary	268
Slovenia	228
Ireland	201
Finland	169
Belgium	134
Portugal	90
Austria	74
Denmark	63
Sweden	7
Latvia	3
EU27	42,811
Turkey	6,689
Serbia	4,987
Croatia	243
TOTAL	54,730

HEAL's policy recommendations

To the EU

The phasing out of coal power in Europe is possible by 2040 and constitutes an important step to improve air quality, reduce chronic disease and cut greenhouse gas emissions at the same time. The EU should:

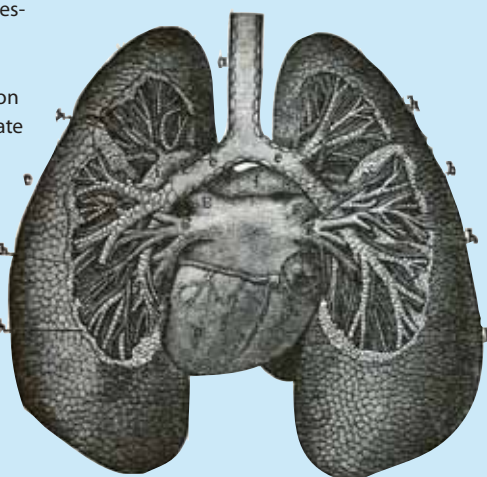
- ✱ Ensure that the costs and benefits to health are taken into account in any energy and climate policy assessments and decisions.
- ✱ Strengthen the Industrial Emission Directive, which regulates air pollution from coal power plants, by removing all exemptions for existing plants.
- ✱ Adopt stricter emission limit values, comparable to recent Chinese and USA standards, for the whole of the EU by 2020 and introduce binding mercury emission limit values.
- ✱ Make sure that Croatia as an EU accession country is required to meet EU pollution control standards for coal power plants without any derogation by 2018, and encourage EU candidate countries to do likewise.

Support a termination of all EU lending, including by EU financial institutions, to coal plants, coal mining and infrastructure projects that would contribute to an increase in coal capacity. Similarly, support an ending of EU subsidies for Carbon Capture and Storage (CCS) technologies.

To national authorities

National authorities have to take the gloves off and reduce outdoor air pollution from coal power plants. In the interest of their citizens' health as well as their neighbouring countries, national authorities should:

- ✱ Introduce a moratorium on the construction of new coal power plants.
- ✱ Develop a national phase-out plan for coal in power generation.
- ✱ End all exemptions from the highest pollution control standards for existing coal plants.
- ✱ End all direct and indirect subsidies and tax exemptions for hard coal and lignite mining as well as coal power generation by 2018, when direct hard coal mining subsidies are already required to end.



CORI KINDRED/FLICKR.COM/CC BY-SA

Another one bites the dust

On 15 March, the 45-year-old 1200 MW coal-fired power station Cockenzie in Edinburgh, Scotland, finally closed after having reached its life-time limit under 2001 the EU's Large Combustion Plant Directive.

Environmental campaign groups have welcomed the closure of the plant. WWF Scotland director Lang Banks said: "Cockenzie had been one of the most polluting power stations in Europe, and its closure marks an important milestone in Scotland's progression to a 100 per cent renewable future. Renewables now generate more of Scotland's electricity needs than either coal or gas."

One week later, on 23 March, the 43 year old 2000 MW coal-fired power station Didcot-A in Oxfordshire, UK, closed for the same reason.

This follows the closure of the 2000 MW Kingsnorth coal-fired power station in Kent (near London) on 19 December 2012. Many other will follow over the coming months and years.

Source: STV Edinburgh, 15 March 2013.

Plans for Polish coal power plant buried

Poland's biggest energy provider, PGE, has dropped its plans to invest in two new units at its coal-fired power installation in Opole even though the plans have been successfully defended against a legal challenge by a Polish environmental NGO. Client Earth doubted if the environmental impact assessment concerning the expansion of Opole was valid, since the company did not plan to make the new units ready for carbon, capture and storage (CCS) technology, which is required under the EU's CCS directive. Poland has failed to implement this directive into national law so far.

Despite the European Commission's decision not to fund Opole II and other investments in the Polish power sector through free carbon allowances under the ETS, PGE stated that the reason for abandoning the plans was the decline in electricity prices following a fall in demand.

Source: ENDS Europe Daily, 8 April 2013

as young children and older people and anyone with an existing respiratory or heart condition.

Member of the European Parliament and medical doctor Peter Liese recognises coal as both an immediate and a long-term threat to public health because of its contribution to climate change: "The EU has committed to protect public health from air pollution as well as from climate change impacts. As the use of coal in Europe is currently increasing, there is a significant threat to people's health in the short and long term."

HEAL's report recommends that no new coal plants should be built and that Europe should abandon coal by 2040 for better public health (see Box with policy recommendations). The huge public health benefits that arise from decreasing the burning of fossil fuels such as coal can

substantially mitigate costs of greenhouse gas reductions. Putting it the other way around, mitigating climate change saves enormous costs in air pollution control.

"If accepted, this approach would avoid the unnecessary respiratory and heart problems associated with exposure to coal pollutants in the air. It would offer longer-term health benefits by mitigating climate change. Opting for alternatives to coal would also put right a current injustice in which Europeans are made to shoulder the burden of an unpaid health bill caused by coal," said Ms Jensen.

Christer Ågren

Source: HEAL press release 7 March 2013. Link to report on website www.env-health.org.

Consultation on future climate policy

The EU Commission has opened a public consultation on how to best shape an international climate change regime between 2020 and 2030. The consultation consists of nine open questions, including how to raise the overall ambition level, what principles that should determine an equitable distribution of commitments and the use of flexible mechanisms.

The consultation is open until 26 June 2013. http://ec.europa.eu/clima/consultations/0020/index_en.htm

French maize will suffer in a warmer climate

Yields of maize in France are likely to decrease by more than ten per cent over the next two decades as a result of a warmer climate.

Maize yields are reduced significantly every day that temperatures exceed around 32 degrees Celsius, and the number of days with such high temperatures has doubled in parts of the country over the past 50 years.

It has already been observed that the yields are not increasing as much as before although losses from drought have been reduced through improved irrigation.

Dr Ed Hawkins, at the University of Reading, said:

"We expect hot days to become more frequent still, and our work on maize suggests that current advances in agriculture are too slow to offset the expected damage to crops from heat stress in the future."

Source: Press release, University of Reading, 14 January 2013



IIITA IMAGE LIBRARY/Flickr.COM/CC BY-NC

CCS sidelined by tenuous financing

Carbon, capture and storage (CCS) has still not proven to be anything else than an inordinately expensive technology on an experimental level. Nevertheless the European Commission continues to embrace it.

New coal powered plants are still constructed in the EU and could still be operating in 2050, even though it would be totally inconsistent with the 80 percent CO₂ reduction has been targeted for that time referred to 1990. Rather than phasing out fossil fuels, however, the European Commission is resolved to "decarbonise" power stations and heavy industry using carbon capture and storage (CCS).

This technology is regarded essential e.g. by the EU Commission for limiting global warming to 2°C if coal dependency is not abandoned. Yet the decarbonisation objective must be implemented worldwide, since Europe is responsible for only 11 per cent of all CO₂ emissions.

Estimates of the International Energy Agency (IEA) indicate that equipping 3,400 power plants and industrial facilities with CCS could provide 19 per cent of the total CO₂ avoidance required by 2050. However action will be needed before 2030, since the maximum two-degree 1,000 billion tonne CO₂ budget calculated by the Zürich Technical Institute (ETH) for 2000 – 2050 would be exceeded by that time on the current emissions trajectory. The necessary pace of implementation translates to a new CCS power plant or factory built every two days over the next 18 years. Adequate geological and logistical prerequisites for CO₂ storage remain highly questionable at the scale required.

This perspective also neglects over 1,100 coal power plants counted by the World Resources Institute that are currently being designed or built without CO₂ capture. Three quarters of the projects are located in China and India, where the absence of economic justification precludes CCS implementation.

In a report presented in April 2013 to the "Clean Energy Ministerial" (govern-

ments representing 80 per cent of global CO₂ emissions), the IEA has conceded that there are now only 13 large-scale CCS demonstration projects worldwide, and not one commercial plant with carbon dioxide separation.

The prospects for CCS are impeded in North America by inexpensive natural gas with inherently low CO₂ emissions. In Europe, renewable energies are narrowing profit margins for coal generation. CCS is additionally burdened by high equipment costs and incalculable risks. The CO₂ forced into deep sandstone formations must overcome the fluid resistance of native brine formations. Wide-area subterranean pressurisation may cause earth tremors or extrude saltwater through geological faults into overlying freshwater aquifers.

The Swedish state power corporation Vattenfall forecast in 2001 that an "avoidance cost for a whole system" of "about 30 €/ton of CO₂" could ultimately be achieved. CCS investments were to be offset by the EU Emissions Trading Scheme (ETS), affirmed by Directive 2009/29/EC to be "a predictable path" for controlling emissions. However, the IEA has since estimated CCS costs of US\$50–65 /tCO₂ by 2030 for coal combustion and up to US\$90 for gas-fired power plants. By contrast, ETS prices are languishing below €5/tCO₂. The European Commission concluded on 27 March 2013, that at "current ETS prices well below €40/tCO₂, and without any other legal constraint or incentive, there is no rationale for economic operators to invest in CCS".

The Earth's atmosphere will thus remain a no-charge CO₂ repository unless alternative decarbonisation strategies can be implemented. Yet carbon taxes imposed for this purpose would restrict



High time to search for solutions elsewhere.

Melting of Siberian permafrost not far away

One climate tipping point that many fear is the melting of the Siberian permafrost. This would lead to the decomposition of the extremely carbon-rich soils found there and inevitably run-away climate change. Such a scenario could be reality at a global temperature increase of only 1.5 degrees, according to a group of researchers. They have studied stalactites in caves to create a picture of historical climate change in the region. Stalactites can only grow when there is running water, in other words no permafrost. Last time it happened in the most northerly cave was during a warm period between 424,000 and 374,000 years ago. Average global temperature was at that time about half a degree warmer than today.

Source: New Scientist, 21 February 2013

Climate change already affecting the US

The American people are already feeling the impact of global warming; this message is clear in the draft of a US National Climate Assessment Report that was released in January 2013.

“Corn producers in Iowa, oyster growers in Washington and maple syrup producers in Vermont have observed changes in their local climate that are outside their experience,” states the report.

Since 1895, the average temperature has risen by 0.8 C, and 80 per cent of this increase has occurred since 1980. In the last 50 years much of the country has experienced longer periods of extremely high temperatures, an increase in heavy rains and in some regions severe drought.

A team of 240 scientists wrote the report and it is the third time this kind of assessment has been carried out. A final version will be issued after a revision when scientists and the public have been given the opportunity to submit comments.

Source: Federal Advisory Committee Draft Climate Assessment Report <http://ncadac.globalchange.gov/>

the development of EU energy-intensive industries, many of which are proving more cost-effective in North America due to abundant shale gas and oil.

On 10 October 2012, the Commission responded to this challenge by announcing “a number of priority actions to stimulate investments in new technologies” for bringing industry back to Europe. However, the only way to promote this objective in line with CO₂ reduction targets will be to discontinue coal plant construction in favour of renewable energies. Continuing on a CCS path would raise the cost of doing business in the EU and obstruct the progress of sustainable global decarbonisation.

Jeffrey Michel

The report **Lost hopes for CCS – added urgency for renewable energy**. APC No. 28 (June 2013) by Jeffrey Michel can be downloaded from www.airclim.org

For more information:

Last Gasp of the Coal Industry, APC No.21 and **Carbon Capture and Storage in Norway**, APC No. 22 can be downloaded from www.airclim.org

EU is discussing CCS: On 27 March 2013, the European Commission launched a consultative communication on the future of Carbon Capture and Storage (CCS) in Europe under the title Clean Coal Technologies. The EU announced that the purpose of the Communication is to “initiate a debate on the options available to ensure CCS timely development and that CCS is needed to reduce greenhouse gas emissions and to enable fossil fuels to remain an integral part of the energy mix in the EU”.

Contributions should be sent by 2 July 2013 to:

European Commission
Directorate General Energy
Unit C1 – Renewables and CCS
Rue De Mot 24, B-1049 Bruxelles
Belgium
E-mail : ENER-CCS-COMMUNICATION

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Creepy crawlies food of the future?

A recent Dutch study has found that protein from mealworms generates about half as much greenhouse gas emissions compared to protein from milk, pork or chicken, and about a tenth of protein from beef. The major difference is the consumption of feed and consequently also land area. The use of direct energy in production is level with or even slightly higher than for traditional protein sources.

As the demand for protein increases in the world, protein from invertebrates has been highlighted as a more sustainable alternative to traditional sources of animal protein. But so far, there have been few practical studies and the mealworm study is, according to the authors, the first

true lifecycle analysis for a system where the insects are bred as a protein source.

"A more efficient, and more sustainable system of food production is needed. Now, for the first time it has been shown that mealworms, and possibly other edible insects, can aid in achieving such a system," Dennis Oonincx, one of the authors, told Science Daily.

Source: Environmental Impact of the Production of Mealworms as a Protein Source for Humans – A Life Cycle Assessment (2012) by Oonincx DGAB, de Boer IJM (2012) <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0051145>

European Parliament rejected backloading

On 16 April, the European Parliament voted to reject a proposal to "backload" 900 million carbon allowances, as a way to temporarily revive the EU Emissions Trading Scheme (ETS).

The proposal lost by only 19 votes (315 to 334). However, Parliament also voted to send the proposal back to the Environment Committee for further discussion. The Environmental Committee will then vote on an adjusted backloading proposal on 19 June followed by a full parliament vote expected at the beginning of July.

After the vote, carbon prices fell to a record low of €2.7 per tonne, less than a third of the price compared to when the Commission originally presented the proposal.

Source: ENDS Europe Daily 16 April 2013

Smaller carbon footprint from food

German diets have become more climate-friendly in the past twenty years, but there is great scope to reduce the carbon footprint from food consumption even more.

In the late 1980s the food consumption of the average German caused greenhouse gas emissions of 2.3 tonnes a year, in 2006 this figure had decreased to 2.1 tonnes, according to a recent study. The difference can be explained by a 20 kg a year drop in meat consumption.

The study has also estimated the carbon footprint of diets in line with the official recommendations of the German Nutrition Society and alternative recommendations from the Federation for Independent Health, as well as a lacto-ovo vegetarian diet and a vegan diet. They all have a lower carbon footprint than the average diet of 2006, and the vegan diet contributes the lowest greenhouse gas emissions, only 1 tonne a year.

Comparisons were also made between the ammonia emissions, primary energy, land, water and phosphorus use for the different diets. All indicators, except water, followed the same pattern as for

greenhouse gas emissions, with the 1980s diet scoring the highest (=worst) and the vegan diet the lowest (=best). The vegan diet has however the greatest water footprint due to the high water consumption for producing nuts and seeds.

For 2006 the researchers also studied the difference between the diets of women and men. Women ate more in accordance with official recommendations, i.e. less meat and more vegetables and had thus a lower carbon footprint.

In the study all diets consist of 2000 calories a day and thus do not take into account the possibility of reducing the total calories consumed as a way to abate the environmental impact. Today most Europeans have a greater energy intake than recommended for health reasons.

Source: Environmental Impacts of Dietary Recommendations and Dietary Styles: Germany As an Example (2013) by Meier, T., O. Christen in Environment Science Technology 47 (2) <http://www.nutrition-impacts.org/index.php/de/component/content/article/52>



The vegan diet produces the lowest greenhouse gas emissions.

Europe's dirty dozen

The most polluting point sources in Europe increased their carbon, sulphur and nitrogen oxides emissions in 2011.

The latest figures for emissions from industrial installations have been published recently by the European Pollutant Release and Transfer Register (E-PRTR).

The top twelve polluters of carbon dioxide (CO₂) are, apart from one metal-processing facility in France, all thermal power plants. There are only small changes in rank and order compared to the 2010 ranking (see AN 2/2012). Germany still dominates the top twelve, with seven of the top carbon polluters. The emissions of the top twelve point-emission sources amount to 227.3 million tons in 2011, an increase by 4.2 per cent compared to the previous year.

Bełchatów in Poland remains in top place for both its CO₂ and nitrogen oxides (NO_x) emissions. While the NO_x emissions of the top twelve dropped nearly one-fifth in 2010, they increased by 2 per cent in 2011, amounting to 268.4 kilotons.

Only one western European country is represented among the top twelve sulphur dioxide (SO₂) emitters, the UK in the eleventh spot – the other major polluters are located in eastern Europe. Emissions of SO₂ from the dirty dozen increased by 10 per cent compared to 2010. The first-placed plant is still Martisa 2 in Bulgaria, which emitted almost twice as much as in 2010. The increase in the overall emissions of SO₂ from plants



The steam plumes of Frimmersdorf, Neurath and Niederaußem in Germany, all to be found among the top eight CO₂ emitters.

covered by the E-PRTR was 1.1 per cent for all reporting countries.

Several developments contributed to the increase in point-source air pollutants in 2011, including recovery from the economic crisis, which hit Europe in 2008/2009; many facilities are now operating at full capacity again. Another reason is the combination of high gas prices and cheap coal imports from the US, which has caused a shift in fuel mix in some parts of Europe.

The E-PRTR is a service managed by the European Commission and the Eu-

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

Moritz Mez

The European Pollutant Release and Transfer Register can be found at: <http://prtr.ec.europa.eu>

CO ₂		
Plant		Thousand tonnes
1 (1)	Bełchatów	34,400
2 (2)	Niederaußem	28,600
3 (3)	Jänschwalde	24,300
4 (4)	Drax	21,300
5 (6)	Neurath	19,600
6 (5)	Eschweiler	19,300
7 (7)	Boxberg	16,200
8 (8)	Frimmersdorf	15,200
9 (9)	Agios Dimitrios	14,200
10 (11)	Schwarze Pumpe	11,900
11 (13)	Brindisi South	11,400
12 (15)	Dunkerque	10,900

NO _x		
Plant		Tonnes
1 (1)	Bełchatów	40,600
2 (2)	Drax	39,100
3 (11)	Obrenovac A	21,600
4 (4)	Agios Dimitrios	21,000
5 (3)	Kozienice	20,400
6 (5)	Jänschwalde	19,600
7 (6)	Cottam	19,100
8 (8)	Niederaußem	18,500
9 (7)	Aberthaw	18,500
10 (16)	Turceni	17,200
11 (104)	Teruel	16,500
12 (14)	Longannet	16,300

SO ₂		
Plant		Tonnes
1 (1)	Martisa 2	258,000
2 (2)	Obrenovac A	126,000
3 (6)	Kostolac B	97,800
4 (5)	Bełchatów	78,900
5 (4)	Turceni	76,300
6 (3)	Obrenovac B	66,600
7 (9)	Kostolac A	51,700
8 (14)	Bobovdol	46,200
9 (17)	Novaki	39,500
10 (8)	Rovinari	39,000
11 (13)	Longannet	37,700
12 (20)	Varna	36,600

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

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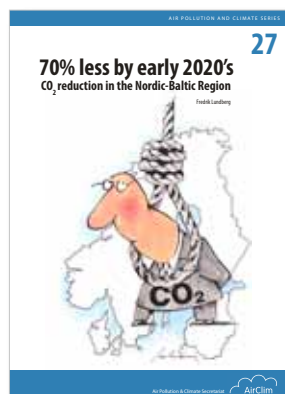


Ship emissions

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.



Carbon capture and storage

Commercial carbon capture and storage technologies will not be widely available in the foreseeable future. They cannot deliver competitive CO₂-free power at projected emissions trading prices, while fuel, water, and geological sequestration requirements exclude them as a universal solution to global warming.

Nevertheless decision-makers continue to embrace it, which delays necessary investments in renewable energy.

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Coming events

21st International Conference on Modelling, Monitoring and Management of Air Pollution. Siena, Italy, 3 - 5 June, 2013. Information: <http://www.wessex.ac.uk/13-conferences/air-pollution-2013.html>

UN FCCC Meeting of Subsidiary Bodies. Bonn, Germany, 3 - 14 June 2013. Information: <http://unfccc.int/>

Clean Air For All - EU Green Week Conference. Brussels, Belgium 4 - 7 June 2013. Information: <http://ec.europa.eu/environment/greenweek/>

EU Environment Council. Brussels, Belgium, 18 June 2013. Information: <http://europa.eu/newsroom/calendar/>

Saltsjöbaden 5 - Taking international air pollution policies into the future. Göteborg, Sweden, 24 - 26 June 2013. Information: <http://www.saltsjobaden5.ivl.se>

IRENEC - 3rd International 100% Renewable Energy Conference. Istanbul, Turkey, 27 - 29 June 2013. Information: www.irenecon2013.com

Mercury 2013. Edinburgh, Scotland, UK, 28 July - 2 August 2013. Information: www.mercury2013.com

Air Protection 2013. Eighth Croatian Scientific and Professional Conference. Šibenik, Croatia, 9 - 14 September 2013. Information: http://www.huzz.hr/skupovi_eng.html

CLRTAP EMEP Steering Body. Geneva, Switzerland, 9 - 11 September 2013. Information: <http://www.unece.org/env/lrtap/>

CLRTAP Working Group on Effects. Geneva, Switzerland, 12 - 13 September 2013. Information: <http://www.unece.org/env/lrtap/>

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

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