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MEPs weaken air pollution ambition

The agriculture industry must also make an effort as member states strive to meet stricter 2025 and 2030 air pollution reduction targets under the National Emission Ceilings directive, says the European Parliament.

The vote was on the revision of the National Emission Ceilings (NEC) directive, which will set limits on emissions of air pollutants in each of the 28 EU member countries for the years 2020, 2025 and 2030.

The NEC directive is the EU's key legal instrument for improving air quality, as it sets national emission caps for a number of air pollutants, thus tackling cross-border pollution. It is also essential for implementing the EU's international commitments under the Convention on Long-Range Transboundary Air Pollution. The pollutants covered by the

current NEC directive are sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds and ammonia, and the Commission has also proposed the inclusion of particulate matter (PM_{2.5}), and methane.

Air pollution in the EU causes over 400,000 premature deaths and between €330 billion and €940 billion in health-related damage every year.

Just before the plenary vote, the EU environment commissioner, Karmenu Vella, told the members of the Parliament (MEPs) not to strengthen the emission targets but

Acid News

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

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

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

Air Pollution & Climate Secretariat

Första Långgatan 18, 41328 Göteborg, Sweden
Tel: +46 31 711 45 15
Fax: +46 31 711 46 20
E-mail: info@airclim.org
Internet: www.airclim.org

Editor: Maria Adervall Berglund
Assistant editors: Christer Ågren & Reinhold Pape
Layout: Karin Didring

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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

By setting binding national emission caps for a number of air pollutants, the National Emission Ceilings (NEC) directive is the EU's key legal instrument for improving air quality. The future level of ambition of these caps has recently been debated in the Parliament, and is currently the subject of negotiation among member states in the Council.

These negotiations are carried out in closed rooms, but it appears as if most member states are dragging their heels, trying to lower even further the

modest level of ambition of the Commission's proposal. One cannot help but wonder about the extent to which these arguments were open to public scrutiny.

Not only do they argue for weaker national emission reduction commitments and try to water down other important parts of the proposed legislation, but several member states are now also pushing to introduce a variety of additional flexibilities in order to make it easier for them to comply.

It should be noted that the Commission's proposal already includes several new flexibilities. Firstly by switching from absolute emission ceilings to percentage reductions, which among other things increases uncertainty about the extent to which the targeted health objectives will actually be achieved.

Secondly by allowing for adjustment of emission inventories (a flexibility taken from the 2012 Gothenburg Protocol), and thirdly by not setting binding targets for 2025, but instead only aiming to ensure that national emissions should be on a "linear trajectory" towards the 2030 binding targets.

But some member states want even more leeway. A new flexibility would open the door for three-year averaging of emissions, thus allowing countries to breach their annual targets during dry summers or cold winters, provided an average is met over three years. Paradoxically, however, dry summers and cold

winters exacerbate air quality problems, so instead of allowing higher emissions, it would be more logical to push for lower emissions during these periods.

Another flexibility would allow for adjustment of emission factors. A third would dilute the already weak 2025 targets even further by allowing for non-linear progression to the 2030 target. And

a fourth is linked to the concept of "force majeure" and would deem compliance if breaches can be said to be due to "exceptional and unforeseeable events".

As each flexibility must be clearly defined and limited, this will increase the complexity of the legal text, making the directive much more difficult to enforce.

The Council negotiations must be weighed against the importance and urgency of cutting air pollutant emissions. The current levels of air pollution are responsible for nearly half a million premature deaths in Europe every year, as well as respiratory and cardiovascular diseases that result in extra medication, hospitalisations and millions of lost working days.

A 52-per-cent cut in health damage between 2005 and 2030, as proposed by the Commission, would still leave us with more than a quarter of a million premature deaths in 2030, which of course is totally unacceptable. Despite this, many member states now push for a weakening of this target. They also want more flexibility, which will result in even higher emissions of air pollution, compared to those listed in the directive.

However, the gravity of the air pollution situation calls for a new NEC directive that establishes a very high level of ambition with binding targets for 2020, 2025 and 2030 that are enforceable. It is high time for citizens to voice their demand for something we should all take for granted, namely the right to breathe clean air.

Christer Ågren

"EU's key legal instrument for improving air quality"



The costs of melting permafrost

Researchers have for the first time modelled the economic impact caused by melting permafrost in the Arctic up to the end of the twenty-second century.



The effects of melting permafrost in the Arctic could cost \$43 trillion in extra economic damage by the end of the next century. This is in addition to the \$300 trillion of economic damage already predicted according to researchers from the University of Cambridge and the University of Colorado in the scientific journal *Nature Climate Change*. This roughly corresponds to the combined gross domestic product last year of the US, China, Japan, Germany, the UK, France and Brazil.

The Arctic is warming at a rate that is twice the global average, due to anthropogenic, or human-caused, greenhouse gas emissions. If emissions continue to rise at their current rates, Arctic warming will lead to the widespread thawing of permafrost and the release of hundreds of billions of tonnes of methane and CO₂ – about 1,700 gigatonnes of carbon are held in permafrost soils in the form of frozen organic matter.

Rising emissions will result in both economic and non-economic impacts, as well as a higher chance of catastrophic events, such as the melting of the Greenland and West Antarctic ice sheets, increased flooding and extreme weather. Economic impacts directly affect a country's gross domestic product (GDP), such as the loss of agricultural output and the additional cost of air conditioning, while non-economic impacts include effects on human health and ecosystems.

The scientists report that if emissions of greenhouse gases continue to rise as they are doing now, the thawing of the permafrost and the loss of the ice caps could release 1,700 billion metric tons of carbon now locked in as frozen organic matter.

The scientists used a computer model to simulate the impacts of what is now known as the business-as-usual-scenario, in which the world goes on burning more

and more fossil fuels, until the concentration of carbon dioxide in the atmosphere reaches 700 parts per million.

The researchers' models predict \$43 trillion in economic damage could be caused by the release of these greenhouse gases, an amount equivalent to more than half the current annual output of the global economy. This brings the total predicted impact of climate change by 2200 to \$369 trillion, up from \$326 trillion – an increase of 13 percent.

Their conclusion for expensive inaction: an extra \$43 trillion bill. An aggressive strategy to limit thawing of the permafrost, on the other hand, could save the world \$37 trillion.

Reinhold Pape

Source: Science Daily and Climate News Network

Journal Reference: 1. Chris Hope, Kevin Schaefer. Economic impacts of carbon dioxide and methane released from thawing permafrost. *Nature Climate Change*, 2015; DOI: 10.1038/nclimate2807

MEPs weaken air pollution ambition

Continued from front page 1

to support the Commission's proposal. The positions of co-legislators must not diverge too much, he said, expressing his concern that if the Parliament settled for a higher ambition level, this would jeopardise the chances of a final agreement.

This view was echoed by the rapporteur on the file, British Conservative MEP Julie Girling, who said that going for a higher level of ambition would lead to considerable delays.

Several other MEPs, especially from the socialist, liberal, left and green groups, disagreed, however. Bas Eickhout (Netherlands, Green Party) emphasised that there is an available Parliament impact assessment "showing that, with the same cost effectiveness, we can reduce emissions more, and deliver more on public health".

A majority of the Parliament decided to follow the cautious line, and the emission reduction targets in the adopted text remain the same as in the Commission's original proposal.

However, the targets for 2025, which the Commission proposed should only be indicative, have been made binding.

Despite heavy lobbying from the agricultural industry and, in particular, efforts by the centre-right European People's Party (EPP) to remove targets for ammonia and methane, the Parliament voted in favour of keeping these targets in the directive.

But while the text still includes methane, a last-minute oral amendment from Eric Andrieu (France, S&D) was passed, which excludes enteric emissions of methane from ruminant animals, i.e. emissions caused by the digestive processes of livestock.

The Parliament agreed on a number of changes to improve and strengthen the proposed directive, such as improved reporting, clearly stated long-term objectives, better access to justice, and the addition of a review clause. Agreement was also reached on the removal of a Commission proposal for flexibility that

would have allowed member states to offset reductions in emissions from international shipping, since such offsets would be extremely difficult to apply and would exclude landlocked countries.

Moreover, the Parliament wants the Commission to perform an impact assessment on including mercury in the directive, a weakening compared to the environment committee's call for mercury to be included outright.

Commenting on the outcome of the vote, the European Environmental Bureau (EEB) concluded that MEPs shied away from the more ambitious targets agreed by the Environment Committee in July, which by 2025 would have prevented 42,800 more premature deaths each year than the Commission's proposal.

Louise Duprez, Senior Policy Officer for Air Pollution at the European Environmental Bureau, said: "Despite evidence that the higher targets were cost-effective and feasible, and that they would save more lives, MEPs failed to

FACTS AND FIGURES ON AMMONIA

The targets for ammonia emission reductions from agriculture have been a matter of particular dispute during the ongoing debate on the proposed new National Emission Ceilings (NEC) directive.

According to the European Commission, there are some persistent misunderstandings of the treatment of agriculture under the NEC directive. It has therefore published a fact sheet in order to help decision-makers get the facts right.

Below are some of the facts and figures from the Commission's fact sheet. The full fact sheet can be downloaded at: http://ec.europa.eu/environment/air/review_air_policy.htm

How much does ammonia contribute to the concentration of fine particles?

Ammonia contributes significantly to background concentrations of particulate matter across the EU. It can also contribute significantly to high concentrations of particulate matter in urban areas, up to 58 per cent on average for Belgian cities. In the severe air pollution episode in Paris during spring 2014, 62 per cent of the fine particles were ammonia-induced.

Why is current action by the agricultural sector not enough?

The cost of current air legislation falls almost entirely on industry, transport and households. Only two per cent of those costs fall on agriculture. When looking for cost-effective further reductions, action is needed from sectors that have so far contributed little. In the EU, the reduction of ammonia emissions from 1990 to 2012 is only 28 per cent, much smaller than for other main air pollutants.

What are the key measures to reduce ammonia emissions?

About 80 per cent of agricultural ammonia emissions derive from manure, including livestock breeding, manure storage and manure application, with the remaining 20 per cent emitted by inorganic fertilisers. A range of proven measures, from livestock feeding strategies, to covered storage and more efficient application to land, offer the most cost-effective opportunities for reducing emissions. The NEC directive proposal includes a list (Annex III) of the most effective measures to be considered, and all the techniques listed have been deployed in several member states for years.

Will the proposed NEC directive rely on intensification of existing farms or a reduction of animal numbers?

Neither. The analysis underlying the proposed reduction targets does not rely on intensification of existing farms, towards more industrialised systems. The starting point was the existing structure of the sector, as well as the expected changes as a result of economic development. Intensification and reduction of animal numbers are not among the measures used in the analysis to achieve the reduction targets.

Will the reduction measures also have to be applied by very small farms?

No. Eighty per cent of agricultural ammonia emissions come from five per cent of farms. Measures are only suggested for large industrial holdings. It is up to the member states to decide how to distribute the burden, but impacts on small farms should be taken into account, for instance by exempting them where appropriate.

seize the opportunity. This means fewer lives saved and higher costs to society. With the Volkswagen scandal fresh in their minds, MEPs had a major opportunity to right a wrong and take action to clean up Europe's air. In the weeks and months ahead, they have a major responsibility to secure an outcome that is going to prevent the further loss of human life."

The next step in the legislative process is for the national governments to agree a common position in the Environment Council, after which representatives from all three institutions (Council, Parliament and Commission) will begin negotiations for a final compromise. A final deal is likely to be adopted in the first half of 2016.

Christer Ågren

Link to the text adopted by the Parliament:
<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2015-0381+0+DOC+XML+V0//EN&language=EN>



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Tipping points – no safe limit

18 possible tipping points well before +2°C is reached

New research reported by Climate News Network has identified at least 37 "tipping points" that would serve as evidence that climate change has happened – and happened abruptly in one particular region.

Eighteen of them could happen even before the world warms by an average of 2°C, the proposed "safe limit" for global warming.

Researchers report in the Proceedings of the National Academy of Sciences that they "screened" the massive ensemble of climate models that inform the most recent reports from the Intergovernmental Panel on Climate Change, and found evidence of abrupt regional changes in the oceans, sea ice, snow cover, permafrost and in the terrestrial biosphere that could happen as average global temperatures reached a certain level.

The models did not all simulate the same outcomes, but most of them did predict one or more abrupt regional shifts.

But the future is not an exact science according to the researchers. "Our results show that the different state-of-the-art

models agree that abrupt changes are likely, but that predicting when and where they will occur remains very difficult. Also, our results show that no safe limit exists and that many abrupt shifts already occur for global warming levels much lower than 2 °C."

The researchers explore some of the telltale indicators of such abrupt change. One of these would be the wholesale collapse of the Arctic Ocean winter ice: the Arctic is expected to be largely ice-free most summers in the next few decades. Winter ice would then become increasingly thin. Once sufficiently thin, warming and wave power would do the rest, and tend to leave clear blue water even in the coldest seasons.

Another indicator would involve massive unexpected plankton blooms in the Indian Ocean as a consequence of an upwelling of nutrient-rich waters from the ocean bottom, in response to changes in the Asian monsoon regime.

A third would involve massive snow melt on the Tibetan plateau: in 20 years,

the annual average snow cover could fall from 400 kilograms per square metre to a trifling 50 kg.

A fourth signal would be massive die-back in the Amazon rainforest over a few decades, mainly because of reduced rainfall.

Yet another telltale aspect of climate change would be the sudden, paradoxical dramatic drop in temperatures in the North Atlantic, as a response to global warming and a collapse of the ocean current that carries warm surface water north, while denser, colder and increasingly more saline water in the Arctic sinks to the bottom and flows back southward.

The researchers conclude: "An additional concern is that the present generation of climate models still does not account for several mechanisms that could potentially give rise to abrupt change. This includes ice sheet collapse, permafrost carbon decomposition, and methane hydrates release."

Reinhold Pape

Source: Climate News Network

New Energy [R]Evolution Scenario from Greenpeace

Greenpeace has published an updated version of its Energy [R]Evolution scenario. It delivers more CO₂ cuts than previous versions, and does away with nuclear and CCS. But is still not compatible with a fair chance of limiting warming to 1.5 degrees.

The new 364-page Greenpeace scenario (GPER)¹ portrays a world that is dominated by solar and wind by 2030 and even more so by 2050. Together they provide 43 per cent of electrical energy in 2030 and 75 per cent in 2050, replacing first lignite and nuclear, then coal and then gas. Biomass, geothermal and ocean power are given a minor role, but together with hydro they can help balance intermittent wind and photovoltaics. Much of this is what you would expect. Solar thermal, which produces power from solar heat, will also make also a big contribution, almost 19

hydrogen-powered fuel cell cars. GPER bets on both.

“The limited potentials of biofuels and probably also battery electric mobility make it necessary to have a third renewable option”, i.e. hydrogen.

This still means a tremendous increase in electricity (batteries) for road traffic: from 9 petajoules (PJ) in 2012, to 400 PJ in 2020 and 23,000 in 2050. Biofuels also increase, but only to about twice the present volume.

“The use of biofuels is limited by the

from 2010 to 2050. Obviously this was no way to save the world.

Intriguing. Greenpeace are no cowards. They are brave, outspoken, and smart!

They now have improved their act since 2008. The 2015 [R]Evolution sets 2050 CO₂ emissions at 4,358 Mtons, compared with 10,589 in the 2008 scenario. This means a fair chance of limiting warming to 2 degrees. But almost all the cuts are projected to take place after 2030. And this is not compatible with limiting warming to 1.5 degrees.

Maybe that is what is likely to happen, but what then is the point? The scenario should look at possibilities, to explain what Greenpeace wants, not what it guesses.

Now energy modelling is a tricky business. You feed in a lot of data and assumptions and the least you should ask for is internal consistency, so all the sums add up. It is mathematically quite demanding to construct a model that generates numbers on coal consumption in China in 2050 that fit together with economic growth assumptions and wind power installations in North America in 2025. Obviously you do not want wind power to grow very fast one year and then grind to a halt the next year, because unless you have a fairly consistent trend, the model will get very unstable, so a small change in one assumption will cause a landslide of big changes everywhere else. Unless the computer overheats.

But this requirement for stability and smoothness of curves in the model seems to lead to an unwarranted conservatism about the rate of change.

In the real world things happen super-fast, stop or even slide backwards, and then skyrocket again. Two neighbouring countries move at extremely different

	2007	2008	2009	2010	2011	2012	2013	2014
UK					0.2	01.4	2.0	3.9
Italy	^	0.2	0.7	1.9	10.8	18.9	21.6	23.7
Spain	0.5	2.6	6.1	7.1	8.7	12.0	12.7	13.7
Germany	3.1	4.4	6.6	11.7	19.6	26.4	31.0	34.9
China	0.1	0.2	0.4	0.9	2.6	6.4	15.5	29.1

per cent of all electricity by 2050, not so far behind PV. Heat can be stored, so power output is (somewhat) dispatchable, unlike PV, and can provide power at night. However, unlike photovoltaics, solar thermal power has so far not lived up to its promises. Greenpeace has long had high hopes for it, but has now postponed its breakthrough.

The hard part of reducing CO₂ emissions is not electricity, though. Neither is it heat, which can be provided via electricity, and that is what GPER counts on.

The hardest part is transport. There are three options: biofuels, electric cars, and hydrogen. Biofuels are produced in large quantity now, but mainly from farmland, where they may compete with food production and biodiversity. Electric cars are favoured by many car manufacturers, but Toyota, the biggest of them all, opts for

availability of sustainably grown biomass. It will primarily be committed to heavy machinery, aviation and shipping, where electricity does not seem to be an option for the next few decades. Outside the transport sector, biomass is needed for specific industries to supply process heat and carbon”.

Let me add a personal note. When I interviewed people at the pro-CCS organisation Bellona in Oslo in 2008, their main line of argument was that CCS is needed because you cannot cut emissions enough without it. “Look at Greenpeace’s brand new [R]Evolution scenario”, they said. “It does not do the job!”

I found that this was true. The 2008 GPER projected just a 2 per cent global emission drop from year 2000 to year 2030. Fossil use in global primary energy demand would decrease only 50 per cent



speeds. Take solar power development in a group of countries since 2007.

In 2007, Germany was practically alone in its quest for solar, though Spain had just started. Then several countries experienced growth rates of several hundred per cent for several years. Spain, for example, grew its solar production from 0.5 TWh in 2007 to 12 TWh in 2012, i.e. by a factor of 24, or an average annual growth of 89 per cent. The 2008 growth was more than 400 per cent. The reasons for the fits and starts are overwhelmingly political. The 470 per cent growth that was seen in Italy in 2011 decelerated in 2013 not because the infrastructure would not permit more or because the market was saturated. It decelerated because of political decisions, just as the boom started as a result of political decisions.

Much the same can be seen for wind power. Between 2013 and 2014, Egypt's wind power grew by 3,244 percent. Denmark's solar power capacity grew by 2,040 per cent in 2012.

The opposite, contraction, can also happen pretty quickly. As a result of the Fukushima accident, Japan went from 292.4 TWh of nuclear power in 2010 to zero in 2014. There was also a drastic

change in Germany. UK coal use fell by 20 per cent in 2014. Gas consumption in Europe fell dramatically between 2011 and 2014.

Over a longer time span and over larger regions, curves get smoother. Not because of physical constraints or saturation – but because governments cave in to the fossil and nuclear lobby.

But even on longer timescales and around the whole world, the models tend to underestimate change. The IEA has consistently overestimated nuclear and coal, and underestimated wind and solar in its canonical annual World Energy Outlooks.

NGO scenarios have tended to bend and stretch the IEA models, but to stay within their framework. In models, CO₂ emissions appear as a product of GDP, population, energy intensity etc. This is highly questionable, because emissions are real, while GDP and energy intensity are just derived numbers. Population is real but its effect on emissions is too erratic to be useful for any prediction or prescription. Luxemburg, with just 0.5 million people, uses as much electricity as Ethiopia, which has 100 million people.

The 2008 [R]Evolution scenario projected 386 TWh solar PV for 2020. Greenpeace

was too shy to even hope for what happened anyway.

Evolution, according to Charles Darwin, moves slowly by small, small steps. But then he did not know that all multicellular life started with one single extremely improbable event, and that one asteroid killed off all the dinosaurs 65 million years ago.

The world is less inert, more susceptible to change, than the models depict. Perhaps it would be better to think more about the next 15 years, never mind 2050!

It is hard to get it right even so. Who now believes the GPER assumption that the oil price will be \$106 by 2020 (and stay there)? It is \$45 in November 2015. The difference has large consequences for all energy markets – but it does not have a strong influence on political decisions such as feed-in-tariffs or renewable certificates.

One advantage of modelling is, however, that it can optimize the use of resources, for example by avoiding building more power lines and storage than is really needed. If the world would follow the GPER recipe, it would save a lot of money. But don't bet on a smooth transition!

Fredrik Lundberg

1. Also briefly presented in AN October 2015

Diesel cars will continue to exceed emission limits

With the new real driving emissions test coming into force from September 2017, new diesel cars will still be allowed to exceed the NO_x pollution limit by 110 per cent.

In the shadow of the Dieselgate scandal – the revelations of emissions cheating by Volkswagen – EU member states decided on 28 October that new diesel cars will be allowed to continue to exceed the Euro 6 emission limits for many years ahead.

The Euro 6 emission standards apply to all new passenger cars as from September 2014, and set an emission limit for nitrogen oxides (NO_x) for diesel cars at 80 milligrams per kilometre (mg/km). But, according to the Commission, in real driving conditions new diesel cars actually emit on average five times more, i.e. around 400 mg/km.

At a meeting of the Technical Committee for Motor Vehicles, member states' representatives have now agreed that a new real driving emissions (RDE) test will take effect from September 2017 for all newly approved types of diesel cars,

and two years later for all new diesel cars.

On top of giving car producers this time delay of several years, the decision also allows for a continued gap between the laboratory test limit value of 80 mg NO_x/km and the RDE test limit value. The latter limit value has been referred to as a not-to-exceed (NTE) emission limit.

So in the first step – in line with the dates given above – diesel cars will be allowed to emit 2.1 times the limit value, i.e. 168 mg NO_x/km, and in the second step (from January 2020 for new models and January 2021 for all new diesel cars) they will still be allowed to surpass the limit value by 1.5 times, i.e. emissions should be kept below 120 mg NO_x/km.

It is noticeable that the dates and limits adopted are much more generous to carmakers than those proposed by the

Commission, which had suggested “conformity factors” of 1.6 for the first step in 2017 and 1.2 for the second step in 2019.

Just before the Technical Committee meeting, on 27 October, the European Parliament passed by a wide majority a resolution urging the Commission to adopt and put in place the new RDE test cycle without delay and with minimum flexibility, adding that these tests should be widened to include all pollutants.

“This is a scandalous and cynical decision by EU governments,” said Dutch MEP Bas Eickhout from the Green Party. “It shows they are not only keeping their heads in the sand with regard to the ongoing car emissions scandal, but that they are also willing to ignore the major and growing public health problems linked to air pollution. This new test is being marketed as a ‘real driving emissions’ test but it is a

sham. It is instead a gift to car manufacturers who have made no effort to meet the EU's car pollution rules."

The draft regulation, as adopted by the Technical Committee for Motor Vehicles, has been sent to the European Parliament and the Council for regulatory scrutiny.

Commenting on the agreement, Greg Archer at Transport & Environment (T&E) said: "Citizens will wonder why their governments would rather help car-makers that cheat emissions tests than give them clean air to breathe. This disgraceful and legally questionable decision must be rejected by the European Parliament. It seems governments would rather citizens die as a result of diesel exhaust emissions than require carmakers to fit technology typically costing €100."

According to T&E, changing EU air pollution legislation by this closed-door 'comitology' process is highly questionable legally. The Commission has argued that uncertainties in the testing method justify setting a higher long-term limit, but this could be legally challenged when the decision is scrutinised by the European Parliament, which could reject the proposed limits as going beyond the powers of the Commission and member states.

T&E says that the recent Dieselgate scandal is the tip of an emerging iceberg in terms of a systematic manipulation of vehicle tests, as carmakers are allowed to test specially prepared "golden" vehicles in unrepresentative laboratory tests conducted by testing organisations they pay. The tests are overseen by national type approval authorities, which compete for the business of "approving" cars for sale and are paid by the carmakers.

In order to change this, T&E has proposed three key changes to the Type Approval Framework Directive that the Commission plans to reform:

- That the EU establishes a politically independent 'European Road Vehicle Inspection' body. This should be responsible for checking the performance of vehicles on sale against those tested in laboratories and undertaking inspections – a similar role to that performed by the US Environment Protection Agency. Funding should come through a small levy on new vehicle sales,

THE VW DIESEL SCANDAL

On 18 September the United States Environmental Protection Agency (EPA) issued a notice of violation of the US Clean Air Act to Volkswagen, because a large number of VW and Audi cars from model years 2009 to 2015 equipped with 2.0 litre diesel engines had been found to contain software that circumvents the US air pollutant emission standards.

The software results in cars that meet emission standards in the laboratory tests, but during normal operation the cars emit between 10 and 40 times more NOx than the standard. The software is defined as a "defeat device" by the Clean Air Act.

A few days later, on 22 September, VW admitted that as many as 11 million vehicles equipped with this type of diesel engine worldwide could contain the test-defeating software. Of these, nearly half a million had been sold in the US and around 8.5 million in the EU.

According to calculations published in the Guardian on 23 September, assuming that the affected cars emit 10 to 40 times the NOx standard for new models in the US, VW's defective vehicles could be responsible for between 237,000 and 949,000 additional tonnes of NOx emissions each year. For comparison, the total annual emissions of Sweden and Denmark combined amount to some 250,000 tonnes of NOx.

and the body should oversee the work of national authorities to ensure the level of scrutiny is consistently high.

- That the rules governing the type approval of vehicles must be strengthened so that National Type Approval Authorities operate a consistently high level of scrutiny.

- That new RDE tests are introduced for CO₂ emissions and other air pollutants in addition to diesel NOx emissions. These tests should be implemented from 2017 and performed on the same cars as sold in dealerships.

Moreover, T&E concludes that the legal limits must be met – not diluted through the backdoor, as is currently proposed for the 95g/km CO₂ limit for 2021 and 80mg/km Euro 6 limit for diesel NOx. New 2025 targets are also needed for both pollutants to ensure progress is delivered on the road, not just in the laboratory.

Christer Ågren

Source 1: T&E comments 28 October and 4 November 2015. Link to blog: <http://transenv.eu/1RSYIW9>

Source 2: European Commission press release, 28 October 2015. Link to European Commission fact sheet: http://europa.eu/rapid/press-release_MEMO-15-5705_en.htm

Note: See also T&E's report "Don't breathe here: Tackling air pollution from vehicles." The report as well as an executive summary can be downloaded from: <http://www.transportenvironment.org/publications/dont-breathe-here-tackling-air-pollution-vehicles>



Cut agricultural ammonia emissions

The additional cost for farmers to reduce ammonia emissions is only a small percentage of the total volume of subsidies that flow to the agricultural sector through the Common Agricultural Policy.

According to the European Environment Agency (EEA), excessive levels of fine particulate matter (PM) are responsible for 431,000 premature deaths every year in the EU. The key legislation for reducing PM levels in Europe is the EU National Emission Ceilings (NEC) directive, which covers not only emissions of primary, directly emitted PM, but also emissions of PM precursor gases, including ammonia, sulphur dioxide, and nitrogen oxides, which react in the atmosphere to form tiny particles of ammonium sulphate and ammonium nitrate.

In a recent article in the *Lancet*, a group of European health and nitrogen scientists points out that these secondary inorganic aerosols (SIA) can make up as much as 50 per cent of the total fine particle concentration in the air, and that the contribution of ammonia emissions often represents 10–20 per cent of PM levels in densely populated areas in Europe. In areas with intensive livestock farming, this share is even higher. Moreover, ammonia speeds up atmospheric reactions of primary sulphur dioxide and nitrogen oxide emissions, which results in larger concentrations of total SIA.

But what are the health effects of these secondary particles, and which precursor emissions are most important?

According to the authors, twenty years of research has not shown that any single particle components contribute more to health risks than others, which means that health benefits can be expected from all efforts to reduce PM concentrations in the air.

The proposal for a new NEC directive includes targets for future reductions in emissions of all three SIA precursors, but at very different percentages. From the

base year 2005 up to the first target year of 2020, total EU emissions of sulphur and nitrogen oxides should be reduced by 59 and 42 per cent respectively, while those of ammonia should be cut by only 6 per cent.

Larger reductions are proposed for 2025 and 2030, but the disparity between sulphur and nitrogen oxides on the one hand and ammonia on the other hand remains. It is pointed out that this is hard to defend scientifically, because to achieve the needed reduction in PM concentrations all precursor gases need to be cut. More importantly, abatement of ammonia is a key factor for abating SIA because ammonia reductions contribute more to lowering PM concentrations than do reductions of sulphur and nitrogen oxides.

More than 90 per cent of the total ammonia emissions in the EU originate from farming, especially livestock farming. The social cost of all nitrogen pollution in the EU member states has been estimated at €75–485 billion per year, of which close to half is attributed to health damage from SIA air pollution.

Abatement measures come at a cost, but the total cost for agriculture of the proposed emission controls in 2030 is a mere 2–3 per cent of the total air pollution emission control costs in the EU in

that year (about €2.5 billion per year out of €92 billion per year).

This cost is also a small percentage of the total volume of subsidies of about €60 billion that flow from the EU budget to the agricultural sector through the Common Agricultural Policy.

It is concluded that in view of the contribution of agriculture to PM concentrations, the health damage caused by air pollution from agriculture is estimated to be far greater than is the burden placed on this sector by the current proposal for a new NEC directive.

Moreover, as the EU starts to promote the circular economy, there is a strong case to reduce ammonia emissions as part of innovation to increase economy-wide nitrogen use efficiency. And, according to the authors, there is a major business opportunity in improving emission reduction and recycling technologies that further strengthen the case for revision of the NEC directive.

Christer Ågren

Source: Article by Bert Brunekreef, Roy Harrison, Nino Künzli, Xavier Querol, Mark Sutton, Dick Heederik, Torben Sigsgaard in the *Lancet Respiratory Medicine*, published online 8 October 2015.

Link: [http://dx.doi.org/10.1016/S2213-2600\(15\)00413-0](http://dx.doi.org/10.1016/S2213-2600(15)00413-0)



Coal phase-out in Germany and the UK has started?

Citizens movements and public debate are putting pressure on governments.

Citizens' movements against the building of new coal power plants and in favour of the closure of old ones have grown in the last few years. In Germany and the UK, governments have in recent months taken the first decision to close some coal power stations. But governments were under strong pressure from the fossil fuel industry and labour unions that represent coal workers, and unfortunately in Germany those lobby groups stopped the adoption of a law to phase-out coal. For example, one of the largest German environmental groups, BUND, proposed in 2014 such a phase-out law for German coal power stations. The details of the proposal are explained in the article on page 12-15 of this Acid News issue. Instead, the German government decided on 1 July 2015 that only 2.7 gigawatts of coal power stations in Rhineland and eastern Germany must be closed by 2020 to reduce CO₂ emissions by 12.5 million tonnes annually. The power stations will be put on standby as reserve capacity between 2016 and 2020, and BUND has criticised this decision strongly (see article on page 16-17 for details).

One of the power stations to be closed is Buschhaus near Helmstedt, a lignite power station which in the 1980s was a symbol of the German environmental movement. At that time climate change was not yet a major public issue, but instead forest death due to air pollution was very much in the

public eye. The Buschhaus lignite power station, rated at 302 MW, was built in the late 1970s with a 307-metre-high chimney and was designed to burn high-sulphur coal. Environmentalists campaigned for several years to install desulphurisation equipment, which the regional government initially refused to do. Buschhaus therefore became a symbol for the German environmental movement, and eventually the plant was modernised. But despite a strong climate change debate since the early 1990s it has produced around 2.2 million tonnes of CO₂ emissions annually since then, and is among the 30 dirtiest coal power plants in Germany with the highest CO₂ emissions.

Germany has commissioned several new coal power stations in the last few years, which are equipped with modern air pollution control technology but emit very large amounts of CO₂, including the Moorburg plant in Hamburg which began operating in 2015 and will produce 8,5 million tonnes of CO₂ emissions annually.

One of the countries in Europe with the strongest public debates on manmade climate change is the UK, and here the government has gone one step further than in Germany. On 18 November 2015, the UK energy minister, Amber Rudd, announced that the UK's remaining coal-fired power stations must be shut down by 2025 at the latest. Ms Rudd said according to UK press sources that it

is "perverse" that coal, the "dirtiest fossil fuel", is still such a major part of the UK's energy system – providing 29 per cent of the UK's electricity last year. "It cannot be satisfactory for an advanced economy like the UK to be relying on polluting, carbon-intensive, 50-year-old coal-fired power stations. Let me be clear: this is not the future," said Ms Rudd in her speech. She added that ageing coal plants are also becoming increasingly unreliable, highlighting breakdowns that forced the National Grid to impose emergency measures earlier this month.

The government said that the UK would have to build new gas-fired power stations. Environmental groups welcomed the decision to close all older and newer coal power stations, but criticised plans to focus on gas instead of renewables. "Switching from coal to gas is like an alcoholic switching from two bottles of whisky a day to two bottles of port," commented Friends of the Earth, according to the same UK press sources.

Another piece of good news about a possible start to phasing out coal is that rich countries will phase out export credits for coal power technology, after the Organisation for Economic Cooperation and Development (OECD) reached a deal in November 2015.

Reinhold Pape



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Legally binding phase-out law for coal

Extract from BUND's 2014 proposed plan to phase out all coal power stations in Germany by 2030.

The German Federal Government's plans for energy transition and climate protection aim to reduce greenhouse gas emissions by up to 90 per cent by the year 2050. To achieve this goal, electricity generation will have to be completely free from CO₂ emissions, in other words there must be a complete shift to renewables. In the medium term this will require phasing out fossil-based electricity production in Germany. To reach these important mile-

stones in climate protection, conventional power generation capacity will have to be fundamentally restructured and adapted to meet energy transition needs. The dominance of high-emission brown coal (lignite) and anthracite capacity must be cut back and power stations must become more flexible and efficient to reduce emissions. However, the current trend is in exactly the opposite direction.

A combination of low prices for CO₂

and coal, and the high price of natural gas, has led to a shift in electricity generation from gas to coal since 2010. Because exports of electricity have risen markedly since 2012, "cheap coal-fired electricity" is not just out-pricing natural gas power stations in Germany but also in neighbouring countries, such as the Netherlands. In 2013, the growth in electricity generation from coal again contributed to rising national greenhouse gas emissions (+1.2 per cent)

Table: These lignite power plants must be taken out of service by 2020 once operating lifetime has been limited to 35 years.

Number	Year of closure	Name of plant	Site	Owned by	Year commissioned	Age (2014)	Operating hours ((2013)	Nominal net output (el.) in MW	Own
1	2019	Buschhaus	D	Mibrag	1985	29	7030	352	
2	2019	Jänschwalde	D	Vattenfall	1985	29	7030	498	
3	2018	Jänschwalde	C	Vattenfall	1984	30	7030	498	
4	2016	Jänschwalde	B	Vattenfall	1982	32	7030	498	
5	2016	Jänschwalde	A	Vattenfall	1981	33	7030	498	
6	2016	Boxberg	P	Vattenfall	1980	34	7030	498	
7	2016	Boxberg	N	Vattenfall	1979	35	7030	465	
8	2016	Neurath	E	RWE	1976	38	7030	604	
9	2016	Neurath	D	RWE	1975	39	7030	607	
10	2016	Weisweiler	H	RWE	1975	39	7030	592	
11	2016	Niederaußem	G	RWE	1974	40	7030	653	
12	2016	Niederaußem	H	RWE	1974	40	7030	648	
13	2016	Weisweiler	G	RWE	1974	40	7030	590	
14	2016	Neurath	C	RWE	1973	41	7030	292	
15	2016	Neurath	B	RWE	1972	42	7030	288	
16	2016	Neurath	A	RWE	1972	42	7030	277	
17	2016	Niederaußem	F	RWE	1971	43	7030	299	
18	2016	Niederaußem	E	RWE	1970	44	7030	295	
19	2016	Frimmersdorf	Q	RWE	1970	44	7030	278	
20	2016	Niederaußem	D	RWE	1968	46	7030	297	
21	2016	Weisweiler	F	RWE	1967	47	7030	304	
22	2016	Frimmersdorf	P	RWE	1966	48	7030	284	
23	2016	Niederaußem	C	RWE	1965	49	7030	294	
24	2016	Weisweiler	E	RWE	1965	49	7030	312	

compared with the previous year. Specific CO₂ emissions from electricity generation also rose to 559 g/kWh in 2013.

Lignite, an energy source that produces the highest climate-warming carbon dioxide emissions per unit of energy produced, is benefiting most from current market conditions. In fact, in the “record year” of 2013, the largest point sources of carbon dioxide emissions – lignite power stations – generated as much electricity as they did 20 years ago, a full 161 terawatt hours. The resulting emissions of just under 170 million tonnes of CO₂ accounted for half of all climate-harming emissions from electricity generation. The nine largest lignite power stations alone account for almost 20 per cent of all carbon dioxide emissions in Germany. Electricity generation from lignite remains at a high level – around five percent higher than the average for the last ten years.

Neither the price of CO₂ nor production costs for electricity from lignite gives a fair picture of all of the external costs

to the climate, environment and health that arise from lignite-fired generation. Lignite is still by far the “most economically attractive choice” of fossil-based electricity generation on the market, while having the greatest impact on the climate and environment. Electricity generation from anthracite-fired plants fluctuates widely, but has remained at a high level since 2010. In contrast, generation from natural gas power plants has fallen dramatically, almost halving since the start of this decade.

The growing share of coal in the fossil fuel mix poses a threat to the national climate targets, not just up to 2020 but long beyond.

Germany is far from achieving its targets for climate protection. Since 1990 it has so far only achieved a reduction of 23.8 per cent, having achieved cuts of 25.6 percent by 2011. The Federal Government admits that if it continues along this path it will miss the critical interim target, to reduce greenhouse gas emissions by 40 per cent from 1990 levels by 2020.

The key to phasing out excess fossil capacity is to remove the most harmful and least efficient plants from the market first. It is important to start with the oldest lignite power stations, since they produce the highest specific emissions of carbon

dioxide. These plants are operated mainly to meet base load (rather than residual load) and there is little incentive to take them out of production. Climate-harming lock-ins to specific technology must be avoided, and lignite plants in particular should not produce electricity for longer than necessary. There is also a special need for political action, since lignite extraction involves major disruption to groundwater systems, the uprooting of thousands of people, massive disturbance to nature, damage to land and emissions of dust and heavy metals. Long-term power generation must be adapted to meet climate protection needs and the energy system must be restructured within a considerably shorter timeframe than the technical life of lignite power stations. Measures should therefore focus on reducing operating times for lignite power generation.

BUND proposes a legal framework for phasing out excess capacity in fossil energy generation that will benefit the climate. In the next phase of market reorganisation it is proposed that decommissioning a large proportion of old lignite plants should be a high priority. Legislation should be put in place to set an operating lifetime of 35 years for lignite plants that were brought on line before 1985 and have a net output of over 100 MW.



consumption*	Efficiency (el.)	Specific CO ₂ emissions (g/kWh)	Annual CO ₂ emissions in millions of tons
9.7 %	37 %	1092	2.99
7.0 %	37 %	1092	4.1
7.0 %	37 %	1092	4.1
7.0 %	37 %	1092	4.1
7.0 %	37 %	1092	4.1
7.0 %	37 %	1092	3.83
7.0 %	37 %	1092	3.83
6.2 %	37 %	1092	4.94
5.7 %	37 %	1092	4.94
6.5 %	37 %	1092	4.85
6.3 %	34 %	1188	5.82
6.0 %	34 %	1188	5.75
6.5 %	34 %	1188	2.26
6.1 %	34 %	1188	2.59
6.2 %	34 %	1188	2.56
10.1 %	34 %	1188	2.57
6.6 %	34 %	1188	2.67
6.9 %	34 %	1188	2.64
10.3 %	34 %	1188	2.58
6.6 %	34 %	1188	2.65
10.1 %	34 %	1188	2.82
12.6 %	34 %	1188	2.71
12.0 %	34 %	1188	2.78
12.8 %	34 %	1188	2.98

This measure would mean that between 2016 and 2020, a total of 24 lignite plants that were commissioned between 1965 and 1985 and have a combined net capacity of around 10 GW will be shut down. These plants, which have a generation efficiency of 34 to 37 per cent and an average self-consumption of 7.5 per cent, are among the most inefficient plants in Germany. By 2020 this would mean that just under half the net installed capacity of lignite power plants is taken out of production (currently total 20.9 gigawatts – updated 16 July 2014, BNetzA). The only way to ensure that lignite power plants are decommissioned is through appropriate legislation.

When the oldest lignite plants are taken out of service the gross reduction potential for carbon dioxide will be around 76 million tonnes per year from the end of 2016, around 81 million tonnes from 2018, and around 88 million tonnes from 2020. A lifetime of 35 years has special significance, as it means that only plants that have already been written off will be taken out of operation, and because this measure makes the biggest contribution to reducing climate-harming emissions while maintaining a secure supply. We can assume that there will be substitution effects – i.e. that the loss of electricity generated from lignite (unless it leads to a reduction in exports) will be replaced by production at anthracite- and natural gas-fired plants – so it is important to aim for the highest possible gross reduction potential.

This phase-out plan covers seven power station sites: four in North Rhine-Westphalia (Niederaußem, Neurath, Frimmersdorf and Weisweiler), two in Lusatia (Jänschwalde in Brandenburg, Boxberg in Saxony) and the final site in Helmstedt district (Buschhaus). Three of the sites (Buschhaus, Weisweiler and Frimmersdorf) must be completely shut down by 2020.

The closure of old plants will require intervention in asset ownership. There are likely to be fewer constitutional problems for older plants. Intervention can be justified by higher values, such as protection of the climate, environment, nature and health. Since lignite power stations are generally written off after 20 years there will be no

significant losses for owners if plants are closed after 35 years. Losses will be limited to profits from old, written-off plants, the emissions from which generate extensive damage costs that are not incurred by the owners, but by the general public.

Even after taking the phasing out of nuclear energy into account, the oldest lignite plants can be shut down by 2020 without posing a threat to the security of supply. The existing overcapacity of fossil fuel power plants must be phased out. The key question is not whether power plants will be decommissioned, but which ones.

The proposed measures are intended to meet two objectives in particular: first to start the orderly phasing out of excess fossil capacity and thus fulfil climate policy objectives, and second, to begin the necessary restructuring of power station to meet the needs of the energy transition.

The lignite plants are also located in regions where there is already sufficient production capacity. Removing these plants can therefore also help to relieve grid problems that arise due to the “unfavourable distribution of conventional supply”. The need for reserve generation capacity over the next few years is not due to a shortage of installed power station capacity, but primarily delays in grid expansion.

To reliably eliminate any threat to security of supply due to decommissioning 24 lignite plants, legislation should be extended to make security of supply provisions for the Federal Network Agency, Bundesnetzagentur. In the event of supply difficulties the phasing out of individual lignite plants could be postponed.

The phasing out of base load plants only has a limited impact on the price of electricity. According to estimates by Öko-Institut, the decommissioning of just under half of the capacity of German lignite-fired power stations by 2020 will only lead to a moderate price increase of one euro cent per kWh. The rise in electricity price due to increased carbon pricing is considerably higher.

According to estimates by the German environmental authority, Umweltbundesamt UBA, the total environmental costs of generating electricity from lignite are 10.75 euro cents/2010/kWhel. In 2010, environmental costs totalled €40.7 billion,

according to UBA. Reducing power station capacity for lignite-fired power generation offers significant potential cost savings for the national budget, which must be taken into account when considering any future increases for electricity.

The decommissioning of coal-fired power generation in the medium term must start now.

To achieve the Federal Government's climate and energy transition targets, lignite power stations will need to be closed down in stages, before they reach 35 years in service. It will also be necessary to progressively phase out anthracite-fired plants. Once a decision has been taken to phase out the oldest lignite plants the next step should be to phase out energy production from coal within the foreseeable future in order to secure climate and energy policy objectives in the longer term. In the view of BUND, the phasing out of climate-damaging coal-fired electricity production by 2030 is possible if the political will exists.

As with the phasing out of nuclear power, BUND proposes the appointment of a commission which, like the Ethics Commission for a Safe Energy Supply (Ethikkommission für eine sichere Energieversorgung) in 2011, could promote social consensus on the phasing out of coal, as well as a debate on the technical, ethical, economic and social policy aspects of the phasing out of lignite- and anthracite-fired power stations in Germany.

The sooner a fundamental policy decision is taken to phase out coal-fired power generation in the medium term, the better. This will ensure a clear future for everyone concerned and allow brown coal to be phased out in good time, taking into account social requirements. The task of implementing a structural shift away from lignite should have been initiated long ago and is a priority for the whole of Germany. Now is the time to translate it into a consistent reality.

Reinhold Pape

Source: Bund für Umwelt und Naturschutz Deutschland e.V. (BUND) – The Federation for Environment and Nature Conservation Germany (FOE Germany)

(BUND is one of the largest environmental organisations in Germany, with hundreds of local groups throughout Germany and over 530,000 members)

Global health risks from short-lived climate pollutants

The World Health Organization (WHO) has released a new report that highlights the urgent need to reduce emissions of black carbon, ozone and methane, which all contribute to more than 7 million premature deaths annually linked to outdoor and indoor air pollution.

The report “Reducing global health risks through mitigation of short-lived climate pollutants” shows that interventions to cut these pollutants can reduce disease and death and contribute to food security, improve diets and increase physical activity.

A previous report – the 2011 assessment by the UN Environment Programme and World Meteorological Organization – estimated that a global deployment of 16 reduction measures for short-lived climate pollutants would prevent an average of 2.4 million premature deaths annually by 2030.

The new estimates could raise that figure to 3.5 million lives saved annually by 2030, and between 3 to 5 million lives per year by 2050. These new projections take into account WHO’s latest data on deaths linked to air pollution as well as some new abatement measures.

WHO rated more than twenty available and affordable measures to see which have the greatest potential to improve health, reduce short-lived climate pollutant emissions and prevent climate change.

Four measures are rated medium to high in all three categories:

- Reducing vehicle emissions by implementing stricter emissions and efficiency standards could reduce black carbon and other co-pollutants from fossil fuels, improve air quality and reduce the disease burden attributable to outdoor air pollution.
- Policies and investments that prioritize dedicated rapid transit, such as buses and trains, and foster safe pedestrian and cycle networks, can promote multiple benefits, including: safer active travel and reduced health risks from air and noise pollution, physical inactivity, and road traffic injuries.
- Providing cleaner and more efficient stove and fuel alternatives to the approximately 2.8 billion low-income households

worldwide dependent on primarily wood, dung and other solid fuels for heating and cooking, could reduce air-pollution-related diseases and reduce the health risks and time invested in fuel-gathering.

ministries, and cities can take right now to reduce emissions, protect health and avoid illness and premature deaths, which often take the greatest toll on the most vulnerable.”



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- Encouraging high and middle-income populations to increase their consumption of nutritious plant-based foods could reduce heart disease and some cancers, and slow methane emissions associated with some animal-sourced foods.

“Every day, these pollutants threaten the health of men, women and children,” said Dr Flavia Bustreo, Assistant Director-General at WHO. “For the first time, this report recommends actions that countries, health and environment

Evidence from previous WHO studies on healthy transport already suggests that shifts to mass transport and the introduction of safe walking and cycling networks are relatively inexpensive when compared with the loss of life and costs of treating people for air-pollution-related illnesses, traffic injuries and diseases related to physical inactivity.

Source: WHO news release, 22 October 2015

The WHO report: <http://who.int/phe/publications/climate-reducing-health-risks/en>

BUND criticises lignite reserves: Not making the grade

The lignite reserve will be no more than an expensive placebo for climate protection if the Federal Government does not step up its measures. This is an extract from BUND's call for the reserve to be doubled at least, and for costs to be minimised.

The German Federal Government decided in December 2014 that in addition to the measures already in place, the electricity sector needs to save a further 22 million tonnes of carbon dioxide (CO₂). This would enable emissions from the sector to be reduced to a total of 290 million tonnes of CO₂ over the next five years.

Once the government coalition has reached agreement with the coal lobby on a lignite reserve these decision will no longer apply. Under the agreement reached on 1 July 2015, lignite power stations with an output of 2.7 gigawatts will be put "on standby" as a capacity reserve until 2020, and then shut down completely. In return, the companies will receive compensation payments that are still to be negotiated.

The real purpose of the capacity reserve is to ensure security of supply; this "stockpile" is intended to avoid any bottlenecks in production. But considering the current 10 gigawatts of overcapacity, such a precautionary measure does not seem to be a high priority. The reserve has therefore been relabelled the "climate and capacity reserve", and will include old lignite power plants that will also receive state compensation, a so-called "scrappage bonus" (Abwrackprämie). The result is that the state is buying very little climate protection from energy companies at a high price.

Whether this is permissible under European law on state aid to industry is in doubt, and the Federal Government will have to convince the EU Commission on this point. The outcome is that this agreement and other accounting tricks in the climate action programme will lead to Germany missing its climate target for 2020.

A reserve capacity of 2.7 gigawatts is far too small to actively contribute to the necessary cuts in carbon dioxide emissions. The reduction in carbon dioxide

emissions would amount to 10 million tonnes, i.e. less than the government itself has estimated.

In its carbon dioxide forecasts the government has assumed that 0.7 gigawatts of power station output and the corresponding emissions will be cut from the grid by 2020 due to aging stock. According to government wishes these 0.7 gigawatts will be deducted from the accounts again, so that the net reserve only amounts to 2 gigawatts.

To compensate for the failure of coal-fired power plants, a further four million tonnes of carbon dioxide will be saved by promoting combined heat and power (CHP). In the best case this would allow carbon dioxide emissions from CHP plants to be reduced to 303 million tonnes. In total, the electricity sector would not contribute the 22 million tonnes of CO₂ reductions that have actually been agreed, but only about 14 million tonnes.

As an emergency measure, on 1 July 2015 the government agreed on further climate protection measures worth a claimed total of 5.5 million tonnes of CO₂. Once again there are question marks concerning this list, for which some of the measures have not even been specified. Basically there is also a lack of evidence for the assumptions made for renewables and efficiency savings by 2020, so the savings are likely to be lower than assumed. Traffic emissions are also rising rather than falling, as the government still assumes in its climate protection calculations.

The shortfall in reaching the climate goal is likely to be even greater, since the government estimates do not provide any safety margins. They are close to the bottom of the forecast climate protection deficit of five to eight per cent. This is despite the fact that the electricity sector, which accounts for around 40 per cent of all emissions,

not only generates the highest carbon dioxide emissions but has also contributed less than average to emission reductions since 1990 (17.7% reduction compared to an overall reduction of 24.7% in 2012). Furthermore, electricity generation is the sector that would offer the largest and most cost-effective reduction potential.

In the case of generation from fossil sources, highly emitting lignite plants have not yet made any contribution to CO₂ reductions. On the contrary: Since the year 2000, climate-damaging emissions from lignite have risen by three per cent, while emissions from anthracite have fallen by 20 per cent, and from gas and oil by six per cent.

Coal-fired power generation from lignite, etc., is also responsible for the steadily rising electricity surplus. A new record of eight per cent was set for electricity exports in the first half of 2015. This overproduction undermines market prices (currently around 3 euro cents/kWh), out-prices power stations with lower emissions in Germany and abroad, and raises emissions in Germany.

To ensure that the Federal Republic can still meet its climate target by 2020, BUND is calling for the closure of lignite power plants to be ramped up considerably. To achieve emission reductions of at least 22 million tonnes, based on the government's estimates, at least 5.5 to 6 gigawatts of capacity should be decommissioned. The right climate policy path will clearly only be found if more coal-fired power plants are closed down in the long term. The oldest power plants with the highest emissions should be removed from the grid first.

Regarding costs: Power stations should not in principle receive closure payments if they would have been removed from the grid anyway due to age and under safe

conditions. The 0.7 gigawatts of power plants that would have been closed down by 2020 in any case should not be accounted for twice and definitely not receive compensation. In reality, even after the coalition decision on 1 July, a total of 3.5 gigawatts will be disconnected from the grid (2.7 plus 0.7 gigawatts). The power plants that will definitely be disconnected are Goldenberg, Frimmersdorf (sites P and Q) and Niederaußem (sites C, D, E and F). These have already been notified of closure⁶, have long since been considered uneconomic by the company, or have been reported to Bundesnetzagentur (an authority that monitors competition in the electricity, gas, postal, telecom and railway industries).

Any payments to power stations with reserve status must be in line with actual operating costs. There must be no golden handshakes for obsolete power stations; this

would be hard to explain to the general public.

Given an operating lifetime of 50 years or more, many of the lignite power plants will have reached the age limit by 2020. This applies to power stations with a total output of two gigawatts. Whether these are closed down will naturally depend to a large extent on commercial considerations. But in the end it is very likely that electricity customers will have to pay for the closure of power plants that would in any case have been closed down in the next few years.

The dubious agreement with coal lobby will be expensive for the climate and the public.

Sources: Bund für Umwelt und Naturschutz Deutschland (BUND) – The Federation for Environment and Nature Conservation Germany (FOE Germany)

(BUND is one of the largest environmental organisations in Germany, with hundreds of local groups throughout Germany and over 530,000 members).



Better enforcement and stiffer fines wanted

Shipping industry and environment groups urge member states to take action to ensure proper implementation of the EU ship sulphur limits.

Limits for ship fuel sulphur content are set in EU legislation (directive 2012/33) as well as in the global MARPOL Convention's Annex VI under the International Maritime Organization. From 1 January 2015, ships that operate in designated Sulphur Emission Control Areas (SECA) – which in Europe cover the Baltic Sea, the North Sea and the English Channel – are obliged either to switch to fuels with a maximum sulphur content of 0.10 per cent or to install exhaust gas cleaning technology (scrubbers) that achieve equivalent emission reductions.

The EU directive requires member states to “determine the penalties applicable” and that these penalties “must be effective, proportionate and dissuasive”.

At a workshop in the European Parliament on 21 October, environmental groups and shipping industry representatives jointly criticised the fact that the existing surveillance schemes in place to check whether ships meet the required sulphur standards are much too weak and that the level of fines is often set much too low, or

in some member states has not yet even been determined.

Dea Forchhammer, from the Danish shipping company Maersk, noted that compliance inspections were largely limited to ports and that there is also a need to check compliance at sea. She also questioned the level of the fines for non-compliance, saying that while a ship operator that ignores the sulphur limit could save as much as US\$100,000 in a single voyage inside the European SECA, the fines in some member states could be as low as €1500.

For the period January to July 2015 the European Maritime Safety Agency (EMSA) has reported that 3,821 ships had been inspected and that 622 fuel samples had been analysed. The proportion of fuel samples that were non-compliant was reportedly six per cent.

Based on this data, Kåre Press-Kristensen from the Danish Ecological Council concluded that out of a total of around

400,000 port calls in the EU, less than one per cent of the ships are currently inspected and only 0.15 per cent of the ships undergo bunker fuel analysis. Even though these figures are set to increase somewhat as from 2016, they are still clearly inadequate to ensure compliance.

Installation of continuous emissions monitoring systems (CEMS) on ships is a promising option to ensure compliance throughout the ship voyage, according to Press-Kristensen. Application of this type of monitoring, which can also be checked by satellite, will be even more important from 2020, when the global sulphur limit will come down to 0.50 per cent.

Currently there is a lack of surveillance and a lack of international cooperation and cohesion regarding potential fines, and thus a significant economic advantage for those who use the dirtier but cheaper fuel, stated German environmental group Nature and Biodiversity Conservation Union (NABU), one of the organisers of the workshop.



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According to NABU, the number of controls – not only in ports, but in particular on the open sea – must be significantly increased. To do this, the national authorities have to be equipped with an adequate number of staff as well as modern hardware and software. Moreover, the responsible authorities of different member states and the European Commission must co-operate regarding information exchange and surveillance operations.

On top of an increasing number of high-sea patrols, NABU wants mobile and stationary remote sensors (sniffers) to guarantee better enforcement of the sulphur legislation. Finally, it is essential that member states impose stiff penalties for those who do not comply.

Christer Ågren

Link to NABU's statement: <https://en.nabu.de/news/19685.html>

Sweden first to ratify the Gothenburg Protocol

Sweden has become the first Party to accept the 2012 amendments to the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol) under the Convention on Long-Range Transboundary Air Pollution (CLRTAP).

The amended Gothenburg Protocol includes national emission reduction commitments to be achieved in 2020 and beyond for five main air pollutants: sulphur dioxide (SO₂), nitrogen oxides (NO_x), non-methane volatile organic compounds (NM-VOC), ammonia (NH₃), and fine particulate matter (PM_{2.5}). Because it deals simultaneously with several pollutants and their different effects, the Gothenburg Protocol has been referred to as multi-pollutant and multi-effect protocol.

Source: UNECE Weekly 646, 23-27 November 201

Link: www.unece.org/env/lrtap/multi_h1.html



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Air quality benefits of low-sulphur marine fuel

Air quality monitoring in Denmark and southern Sweden shows that atmospheric levels of sulphur dioxide (SO₂) have fallen by roughly half since tougher emission standards for ships were introduced as from 1 January 2015 in sulphur emission control areas (SECAs).

Data from three Danish and two Swedish monitoring stations show a clear fall in SO₂ levels in the first half of 2015 as compared to the average levels in the same months of previous years.

Sources: Report by the Danish Centre for Environment and Energy (5 October 2015) and press release from the Swedish Environmental Research Institute IVL (5 November 2015).

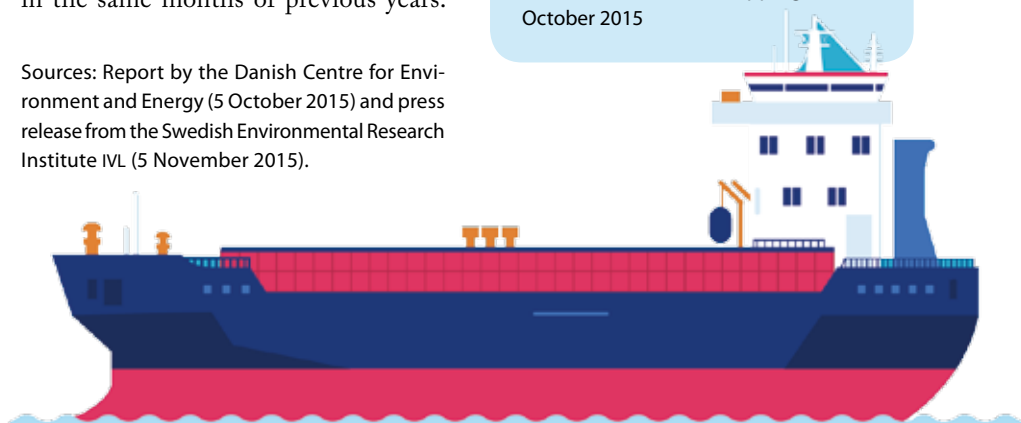
Port achieves emission reduction targets

In 2005, the Port of Los Angeles began tracking emissions, setting goals in 2010 to achieve a 72 per cent reduction in diesel particulate matter (PM), a 22 per cent reduction in nitrogen oxides (NO_x) and a 93 per cent reduction in sulphur dioxide (SO₂) emissions by 2014.

Data from 2014 reveals that the port has exceeded its goals for that year, reducing PM by 85 per cent, NO_x by 52 per cent and SO₂ by 97 per cent. The areas measured include: emissions from twenty-foot equivalent unit (TEU), ocean-going vessels, cargo handling equipment, rail, trucks, and harbour craft.

The Port of Los Angeles attributed the emission reductions to state regulations, which entered into force on 1 January 2014, including requiring ships to plug into shore power while at berth, and requiring ships to burn fuel containing 0.1 per cent sulphur or less within 24 nautical miles of the California coast. As of January 2015, vessels are required to use such low-sulphur fuel within 200 nautical miles of all of North America. Participation in the port's Vessel Speed Reduction Program remains high, with 95 per cent of vessels slowing down to 12 knots within 20 nautical miles of the port and 84 per cent of vessels slowing to 12 knots between 20 to 40 nautical miles from the port.

Source: Sustainable Shipping News, 2 October 2015



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The structure and power of the fossil gas industry

The oil and gas lobby is very strong and has strong political links.



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The fossil gas industry faces strategic choices. If it projects itself as a transitory fuel on the road to 100 per cent renewables it will have to answer a lot of questions from investors and others. If it intends to stay for a long time, it will have to fight against all scientists and most world leaders on climate change by December 2015.

On 1 June 2015, six gas company executives wrote a letter to the Financial Times about the role of gas in relation to COP21 in Paris. They represented Statoil, Total, BG, Shell, ENI and BP. Their message is that renewables will grow fast, and that their companies are investing a lot in them. But that the “need to cut emissions is so essential that we have to pursue all options to lower carbon”, and gas power emits half the carbon compared to coal.

This obviously sets gas against coal, not a popular message everywhere. Less obviously, they state that gas will just have a transitory and limited role.

This message is problematic for em-

ployees and for investors. Who wants to invest their time and money in a business for a dying swan?

Two companies that did not sign the letter, and actually opposed it, were the US giants Exxon Mobil and Chevron. Exxon’s official line¹ is that the movement to stop investment in fossil fuels is “out of step with reality”, and that in fact the share of renewables in the world energy mix will hardly even grow through 2040, and that fossil growth is the only way to beat world poverty!

Exxon does not come out against coal. This is unsurprising as the company has some coal assets. It has invested in coal-to-liquid, a particularly dirty way to produce petroleum products. They are also into coalbed methane, which often means that first you take the gas, then you mine the coal. It expects gas to grow fastest of all fuels² at 65 per cent from 2010 to 2040, while coal also grows. That leaves only three ways to handle climate change: deny it, ignore it and CCS. Exxon has financed

climate deniers, but the present line is to just ignore it, while CCS is getting nowhere. They still give a lot of money to obstructionist politicians in the US.

Exxon leaders must have as a working assumption that they can defeat any effort to limit fossil use or hold back growth of natural gas.

Grant King, CEO of Origin Energy in Australia, was more explicit than the letter to FT. He said³ that “the Greenies” loved gas ten years ago, but that that changed with fracking: “there is a lot of gas out there... it’s not a transitional fuel and people will be switching to gas for hundreds of years.”

The European gas industry do not deny or ignore. They say what is politically correct, which is that they will survive even under a strong climate policy regime, at the expense of coal, and that this will be achieved through “widespread carbon pricing in all countries”.

All countries, high carbon prices? Not likely anytime soon. So if it is a bluff it will not be called.

The difference between the ignorers and deniers of climate change is not so big. They are all playing for time, aiming for more gas and ensuing greenhouse gas emissions for the foreseeable future – while saying one thing or the other.

Even if Exxon is less anti-coal they all use the same selling point: that fossils are absolutely required, and that gas is much better than coal.

This is not necessarily true, but the gas lobby is very strong and has strong political links. This follows from the structure of the business.

Gas is fed through pipelines. The transport and distribution grids are monopolies, either owned by governments or private monopolies supervised by governments. A gas user, whether it is a private home or a big power station, will then have little choice once it is hooked up to a distribution point. They can't change fuel and they can't change access point. They can change supplier, but only if they have not signed a contract for a very long time. But the pipe is where it is, the sources are where they are, and the suppliers are few and large. The ultimate supplier, even if the gas is resold under different brands, is usually Gazprom or any of the six companies that signed the letter to FT.

Some gas is imported by LNG tankers. This introduces some supply competition, but LNG terminals and ships are few and expensive. During 2015, US gas will be introduced to Europe, but the previous high hopes of large amounts of very cheap US fracking gas have vanished. However much LNG gas is fed into the European system, it will still pass through the same grid.

In order to make investments, the gas companies want long-term contracts (captive customers), political backing, and political stability. So would any business, but the gas industry has more clout.

The gas companies are often also oil companies and in the power business. Some of them are among the biggest companies in Europe and the world. In Europe, the gas industry is represented by two large organisations: Eurogas and GasNaturally.

The career of Gerhard Schröder is illustrative. As Chancellor of Germany he was a strong advocate for the Nord-

Stream pipeline from Russia to Germany though the Baltic Sea. His government granted a one billion euro credit guarantee for a share of the project. Soon thereafter, Schröder stepped down and took up a position as chairman of NordStream AG shareholders' committee. The majority owner of NordStream AG, which first built and now operates the pipeline, is Gazprom. Other shareholders are E.ON, Wintershall (BASF), GDF Suez and NV Nederlandse Gasunie.

The Schröder story invites questions, but it is not certain that Gazprom bought him. It is bad enough that such a thing even could be alleged. A more generous interpretation is that Schröder's energy and climate policy required more natural gas for the phase-out of nuclear power and further CO₂ cuts, or so he believed. And that he saw nothing wrong with working to that end even after he quit politics.

He is not alone.

Former UK Prime Minister Tony Blair and German ex-foreign minister Hans-Dietrich Genscher are advisers to the consortium behind the Trans-Adriatic Pipeline from Azerbaijan to Italy⁴. The consortium is owned by the authoritarian Azeri regime, BP and others.

The gas industry in Sweden managed to recruit another top politician, the previous Minister of Finance, Pär Nuder, as advisor for the venture capital group ECT, while ECT acquired grid company Swedgas and used Guernsey as tax haven.

The gas industry even bought one of the most respected NGOs, US Sierra Club. Their anti-coal campaign was secretly but massively funded by gas company Cheasapeake. That stopped in 2010. The campaign goes on, but is now directed against coal, gas and nuclear.

Some NGOs still think it makes sense to see increased gas use as a way to phase out coal and nuclear. B.U.N.D Friends of the Earth and Greenpeace Germany⁵ in Germany are examples.

All serious NGOs aim for 100 per cent



re-
new-
able energy

by mid-century globally, and earlier in rich countries. The case for a long transition seems to have weakened over the past few years, as renewables, storage, and efficiency are advancing rapidly. Smart grid technology and other demand-side measures can push the limit for the renewable share of electricity even in a country such as Germany with little hydro and modest wind and solar potential.

Such technology is in high demand in other countries for other reasons, such as aging or inadequate power infrastructure.

If Germany can cut coal, gas and nuclear at the same time, most other countries can do so more easily. And Germany is doing it right now. Between 2010 and 2014, fossil power decreased from 361 to 330 TWh, nuclear from 141 to 97 TWh and net energy exports went up from 18 to 36 TWh. The trend has continued in the first six months of 2015.

Fredrik Lundberg

1. <http://www.exxonmobilperspectives.com/2014/10/10/some-thoughts-on-divestment/>
2. <http://corporate.exxonmobil.com/en/company/news-and-updates/speeches/natural-gas-and-the-policies-of-the-future>
3. <http://www.afr.com/business/energy/gas/energy-giants-turn-on-coal-before-paris-climate-conference-20150604-ghgjtik>
4. <http://www.theguardian.com/politics/2014/aug/02/tony-blair-gas-pipeline-italy>
5. <https://www.greenpeace-energy.de/engagement/unser-gasqualitaet/erdgas-als-bruecke.html>

Biggest oil and gas companies in the world

Six of the seven largest companies in the world are in the oil and gas business. The one exception in the top is #1 retailer Walmart.

The list is taken from Wikipedia's world list of all companies, rated by revenue after the last reported financial year, usually ending 31 December 2014. Several of those not included here have some stake in natural gas, for example conglomerates Berkshire Hathaway (Warren Buffett, #16), Koch Industries (Koch Brothers, #49), E.On

and produce different results, but oil and gas features high on any list. They have a lot of money, which either stems from or results in political power.

Link: https://en.wikipedia.org/wiki/List_of_largest_companies_by_revenue downloaded 15-08-26

Company name	Business	Revenue (USD billions)	Country
Sinopec	Oil and gas	\$461	China
China National Petroleum Corporation	Oil and gas	\$432	China
Royal Dutch Shell	Oil and gas	\$421	UK, NL
ExxonMobil	Oil and gas	\$394	US
Saudi Aramco	Oil and gas	\$378	Saudi
BP	Oil and gas	\$359	UK, NL
Total	Oil and gas	\$212	France, Netherlands
Chevron	Oil and gas	\$192	US
Phillips 66	Oil and gas	\$161	US
Gazprom	Oil and gas	\$160	Russia
Eni	Oil and gas	\$144	Italy
Rosneft	Oil and gas	\$143	Russia
Petrobras	Oil and gas	\$141	Brazil
Lukoil	Oil and gas	\$141	Russia
Kuwait Petroleum Corporation	Oil and gas	\$140	Kuwait
Valero Energy	Oil and gas	\$138	US
PDVSA	Oil and gas	\$134	Venezuela
Pemex	Oil and gas	\$123	Mexico
JX Holdings	Oil and gas	\$120	Japan
GDF Suez	Electricity and gas utility	\$119	France
National Iranian Oil Company	Oil and gas	\$110	Iran
Statoil	Oil and gas	\$104	Norway

(#21) and BASF (#60), but only those described by Wikipedia under the heading of gas are listed below. No distinction is made between gas and oil, because most companies are into both.

Other lists of biggest companies in the world, such as Forbes or Fortune, are based on other metrics, e.g. market value,

A diesel car emits four times more NOx than a bus

The Norwegian Centre for Transport Research and the Finnish Technical Research Centre VTT have conducted emission measurements on 12 Euro VI heavy vehicles and seven Euro 6 diesel cars. The vehicles were tested in a laboratory under conditions that as far as possible should correspond to the actual use of the vehicles.

Their measurements show that Euro 6 type-approved diesel cars emit 4–20 times more NOx in city traffic and during cold weather than the type approval limit value of 80 mg/km. Moreover, the average NOx emissions from the tested Euro 6 diesel cars were about four times higher than the average NOx emissions from the tested city buses and heavy vehicles with Euro VI engines.

Link: <https://www.toi.no/environment-and-climate/diesel-cars-have-high-emissions-in-real-traffic-article33388-1314.html>

Air pollution in China kills 4,000 people a day

Deaths related to tiny particles total 1.6 million a year, or 17 per cent of China's mortality level, according to a study by Berkeley Earth, an independent research group funded largely by educational grants.

After having analyzed four months of hourly data for some 1,500 air monitoring stations in the country, the researchers found that 92 per cent of China's population experienced at least 120 hours of unhealthy air during the study period, from 5 April 2014 to 5 August 2015. For 38 per cent of the population, the average pollution level across the entire four-month period was deemed unhealthy.

Breathing Beijing's air is the equivalent of smoking almost 40 cigarettes a day, said Berkeley Earth's scientific director, Richard Muller. According to the study, most of the pollution comes from the burning of coal, both for electricity and heating homes.

Source: Bloomberg.com, 13 August, 2015

Air pollution takes 3.3 million lives per year

Farming emissions of ammonia are a leading cause of air pollution health damage and premature deaths in Europe and eastern United States.

Every year 3.3 million people die prematurely from the effects of outdoor air pollution worldwide – a figure that could double by 2050 unless clean-up measures are taken. This is shown in a study carried out by a team of researchers at the Max Planck Institute for Chemistry in Mainz, Germany, recently published in the journal *Nature*.

The study focuses on the most critical outdoor air pollutants, namely fine particulate matter (PM_{2.5}) and ozone. It is estimated that nearly three-quarters of the deaths are due to strokes and heart attacks, and one quarter to respiratory diseases and lung cancer.

This is the first study to single out different outdoor air pollution source-sectors and estimate the number of premature deaths they each cause, considering seven source categories: residential and commercial energy use; agriculture; power generation; land transport (i.e. excluding shipping and aviation); industry; biomass burning; and natural sources.

A surprising discovery, according to the authors, is that the two largest sources of health damage from air pollution are not industry and transport, but small domestic fires and agriculture.

Residential and commercial energy use is the largest source category worldwide, contributing nearly one-third of the premature deaths, and with particularly high shares in countries such as India and Indonesia. This category includes diesel generators, small stoves and smoky open wood fires, which many people in Asia use for heating and cooking. (Note that this study's estimate of 1.0 million deaths per year from this sector is in addition to the 3.54 million deaths per year due to indoor air pollution from essentially the same source.)

By contrast, a leading cause of air pollution in Europe, Russia, Turkey, Japan and

the eastern United States is agriculture. Ammonia is emitted into the atmosphere as a result of intensive livestock farming and use of fertilizers. It then reacts with other air pollutants, namely sulphur dioxide and nitrogen oxides, to form ammonium sulphate and ammonium nitrate, which are tiny airborne particles.

Globally, agriculture is the cause of one-fifth of all deaths due to air pollution. In many European countries, its contribution is 40 per cent or higher. Since the abundance of ammonia is often a limiting factor in PM_{2.5} formation, a reduction in its emissions can make an important contribution to air quality improvements.

The finding that agriculture is the second-largest contributor to global mortality from PM_{2.5} is highly valuable, said environmental health expert Professor Michael Jerrett, at the University of California, because agriculture has generally not been seen as a major source of air pollution or premature death, and because it suggests that much more attention needs to be paid

to agricultural sources, by both scientists and policymakers.

Other major sources are coal-fired power plants, industry, biomass combustion and motor vehicles. Taken together, they account for another third of premature deaths. Just under a fifth of premature deaths are attributed to natural dust sources, particularly desert dust in North Africa and the Middle East.

The authors conclude that: "Our results suggest that if the projected increase in mortality attributable to air pollution is to be avoided, intensive air quality control measures will be needed, particularly in South and East Asia."

Christer Ågren

Source: Max Planck Institute press release 16 September, 2015

The article: "The contribution of outdoor air pollution sources to premature mortality on a global scale." By J. Lelieveld, J. S. Evans, D. Giannadaki, M. Fnais and A. Pozzer. Published in *Nature*, 17 September 2015; doi: 10.1038/nature15371



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Air Pollution & Climate Secretariat
Första Långgatan 18
413 28 Göteborg
Sweden

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Gasping for air

Air pollution is one of Europe's gravest environmental threats. Every year 400,000 people die prematurely because of poor air quality, but the European Parliament has the power to change that. Members of the European Parliament are now starting to work on a number of EU laws, including the National Emissions Ceilings and Medium Combustion Plants Directives, which could substantially improve the air we breathe.

Twelve factsheets reveal how air pollution affects us, from our health to our economy, and explain what the main sources of pollution are. Crucially, they contain policy recommendations to MEPs that will help clean up our air. Everywhere.

The 10 best climate measures in Northern Europe

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

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

Carbon Capture and Storage in Norway – The moon landing that failed

The Norwegian interest in CCS depends largely on the oil and gas sector. In the 1990s, oil companies operating in Norway began research and development. In 2005 the government took the lead. Prime minister Jens Stoltenberg announced the building of a full-scale CCS plant at Mongstad outside Bergen in 2006, a project equivalent to the moon landing, in his own words. For a period the per capita investment in CCS research and development was among the highest in the world. In 2013 the project to build a full-scale CCS plant at Mongstad in Norway was ended.

Coming events

CLRTAP Working Group on Strategies and Review and Executive Body. Geneva, Switzerland, 15-18 December 2015. Information: www.unece.org/env/lrtap/

EU Environment Council. Brussels, Belgium, 16 December 2015. Information: <http://europa.eu/newsroom/calendar/>

IMO PPR 3 (Sub-Committee on Pollution Prevention and Response). London, UK, 15-19 February 2016. Information: www.imo.org

ICAPC 2016: 18th International Conference on Air Pollution and Control. Paris, France, 22-23 February 2016. Information: www.waset.org/conference/2016/02/paris/ICAPC

10th International Conference on Air Quality – Science and Application. Milan, Italy, 14 - 28 March 2016. Information: <http://www.airqualityconference.org/>

IMO MEPC 69 (Marine Environment Protection Committee). London, UK, 18 - 22 April 2016. Information: www.imo.org

CLRTAP Executive Body. Geneva, Switzerland, 2-4 May 2016. Information: www.unece.org/env/lrtap/welcome.html

21st International Transport and Air Pollution (TAP) Conference. Lyon, France, 24-26 May 2016. Information: <http://tap2016.sciencesconf.org>

World Bioenergy trade fair and conference. Stockholm, Sweden 24-26 May 2016. Information: <http://www.elmia.se/en/worldbioenergy/>

Environment for Europe Ministerial Conference. Batumi, Georgia, 8-10 June 2016. Information:

Air Pollution 2016: The 24th International Conference on Modelling, Monitoring and Management of Air Pollution. Crete, Greece, 20-22 June 2016. Information: <http://www.wessex.ac.uk/conferences/2016/air-pollution-2016>

European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC 2016). Munich, Germany 20-24 June 2016. Information: <http://www.photovoltaic-conference.com>

17th IUAPPA World Clean Air Congress and 9th Better Air Quality Conference – Clean Air for Cities – Perspectives and Solutions. Busan, South Korea, 29 August - 2 September 2016. Information: www.wcac2016.org

7th International Nitrogen Initiative (INI 2016). Melbourne, Australia, 4-8 December 2016. Information: <http://www.ini2016.com/>

CLRTAP Working Group on Strategies and Review. Geneva, Switzerland, 13-16 December 2015. Information: www.unece.org/env/lrtap/welcome.html

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