NO. 2, JUNE 2017

Acid News

Potential to step up global climate ambitions

Right now, several parallel evaluation processes are under way that could lead to higher ambitions in global climate negotiations.

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We need to talk about nitrogen

Nitrogen in the air is one of the greatest threats to our wild plants, lichens and fungi, yet few people have even heard about it.

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CAP delivers meagre climate action

Climate action is one of three overarching objectives of the CAP, though only a small fraction of the funding goes to climate measures on the ground.

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CCS – from power plants to industrial plants

As the change from fossil fuels to renewable energy is gradually gaining wider acceptance, CCS is now seen more and more as a method mainly applicable to industrial processes.

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Renewables to be subsidy free

Almost 90 per cent of new power in Europe came from renewable sources in 2016. For the first time windfarms accounted for more than half of the capacity installed.

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Ruling against Bulgaria

The recent decision from the EU Court of Justice opens the door for the Commission to take more robust action in relation to air quality infringements.

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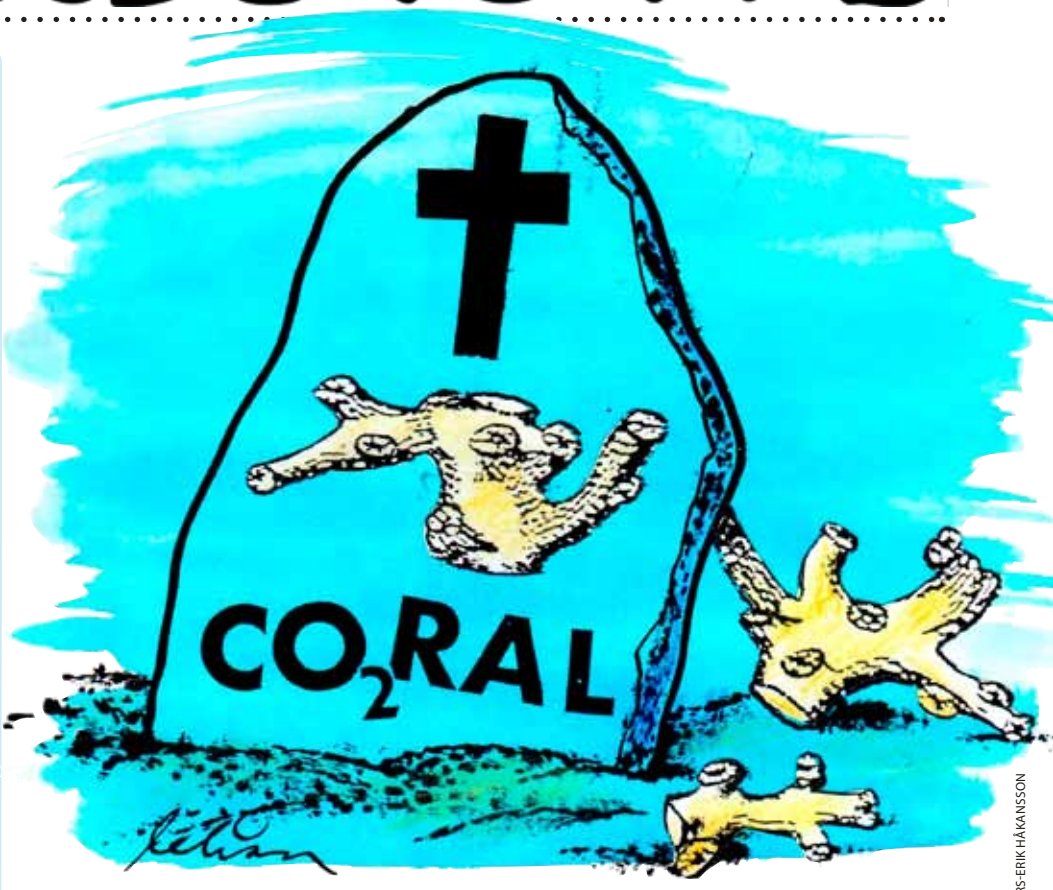

Ocean acidification threat to sea life

By absorbing CO_2 the ocean is becoming more acidic, and this is happening at a faster rate than during any other period in the past 300 million years.

The acidity of sea surface water has increased by almost 30 per cent since the year 1900. Increased temperatures and acidification will amplify the impacts on biodiversity at large, overfishing, pollution and habitat destruction. Evaluation of the scale of these threats suggests that ocean acidification is a driver for substantial change in ocean ecosystems, potentially leading to long-term shifts in species composition. It has been estimated that since the start of the industrial era the oceans have absorbed some 525 billion tons of CO_2 from the atmosphere, currently some 22 million tons per day. Thus, increases in carbon dioxide in the atmosphere have made the oceans more acidic, leading to major shifts in global climate and mass destruction of species. Ocean acidification is a global stressor that constitutes a rapidly emerging problem for marine organisms, ecosystem functioning and services.

Basically, the issue of ocean chemistry is quite straightforward. Two important things happen when carbon dioxide dissolves in seawater. First, the pH drops as the water becomes more acidic. Second, this process binds up carbonate ions and makes them less abundant. This process reduces the ability of many aquatic organisms to build their shells and skeletons.

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Acid News

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

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

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

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

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

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

In furtherance of these aims, the Secretariat:

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

AirClim

Editorial

The globally averaged concentration of carbon dioxide (CO_2) in the atmosphere reached the symbolic milestone of 400 parts per million for the first time in 2015 and surged again to new records in 2016. CO_2 concentrations stayed above 400 ppm for the whole of 2016 and will not dip below that level for many generations according to the World Meteorological Organization (WMO). On 15 May 2017 the CO_2 concentration had already reached 411 ppm.

"these six years are crucial for our chances of staying below a 1.5°C target"

CO_2 accounts today for about 65 per cent of radiative forcing and is responsible for around 80 per cent of global warming since pre-industrial times. The WMO recently confirmed 2016 as the hottest year on record, about 1.1°C above the pre-industrial era.

In Paris 2015 the UN decided that the long-term target to avoid dangerous climate change is a 1.5°C increase in global temperature. This target is a result of scientific assessment by the IPCC and the first periodic climate science review by the UN, covering the period 2013–2015.

But the current global temperature increase of 1.1 degrees is already causing dangerous climate change for global ecosystems like coral reefs (see page 4) and food security in i.a. several African countries. CO_2 emissions are already causing acidification of the oceans not seen for 300 million years (see front page). New climate research suggests that the tipping point for destruction of several global ecosystems around sea-ice, glaciers, ice shields on Greenland and in Antarctica, in high mountain regions, parts of Africa and in the Amazon could lie at below 1.5°C global temperature rise, potentially causing very large losses of biodiversity and dangerous sea-level rise of several metres. Thirty per cent of ocean biodiversity is found in areas such as coral reef ecosystems. Studies estimate that up to 90 per cent of coral reefs will die at 1.5°C global temperature increase.

CO_2 emissions, as well as all other greenhouse gases, must be reduced sharply so that global temperature rise can be kept below 1.5°C. Many countries, organisations and people all over the world have in the recent years called for a Global Marshall Plan for climate protection and actions. In 2009 the UN e.g. recommended a new Marshall Plan of more than $500 billion per year, or one per cent of global output, to help developing countries.

The Paris Agreement (PA) of December 2015 actually provides this Marshall Plan level of action. The PA must be implemented now!

All governments should adapt their economic and environmental protection programmes to the targets and actions agreed by 195 countries in Paris. Over the coming months the negotiations in the PA should lead to strict rules and implementation of all elements of the PA. It should not promote mechanisms and measures that allow countries to escape from their responsibilities based on equity and fair share. At the same time the UN should review announced national GHG reduction targets and increase ambition in the PA so that the national development plan commitments (NDCs) are in line with the reductions needed to reach the 1.5°C long-term target. Fossil fuel use must be phased out and a 100% renewable energy system must be built up globally. This also has co-benefits, such as reducing health problems caused by fossil fuel burning, and the protection of forests and biodiversity. An estimated 12.6 million people worldwide died as a result of living or working in an unhealthy environment in 2012 (WHO) and many heat-related illnesses could be avoided.

The first global stocktake of the PA will be in 2018; the second periodic science review of the Convention starts in 2019 and will be followed up by the next global stocktake of the PA in 2023 (see page 7). These six years are crucial for our chances of staying below a 1.5°C target over the next few centuries and making the PA an ambitious global climate action plan.

Reinhold Pape

Ocean acidification threat to sea life

Continued from front page

Most life on earth, both terrestrial and aquatic, requires carbon dioxide; plants need it to grow and animals exhale it when they breathe. Thanks to our burning of fossil fuels there is now an increasing amount of CO_2 in the atmosphere, and most of the carbon dioxide is retained, creating a blanket around the Earth. Because the atmosphere absorbs heat from the sun this leads to increasing temperatures. Some 30 per cent of this CO_2 is dissolved in seawater, where chemical changes break down the CO_2 molecules and recombine them. When water and carbon dioxide mix, they form carbonic acid, which is a weak acid, but like all acids it releases hydrogen ions which bond with other molecules. By definition, seawater that contains more hydrogen ions is more acidic, i.e. it has a lower pH. pH is the scale used to measure the concentration of H+ ions in a solution. The lower the pH the more acidic the solution. So far, ocean pH has dropped from 8.2 to 8.1 since the start of the industrial era, and it is expected to fall by another 0.3–0.4 pH units by the end of the 21st century. A drop in pH of 0.1 pH units might not seem so large, but the pH scale is logarithmic. A pH value of 4 is thus 100 times more acidic than pH 6. An increase in emissions of carbon dioxide at current rates would, by the end of this century, make the ocean more acidic than it has been for at least the past 20 million years.

Such a rapid change in ocean chemistry will not give marine life much time to evolve and adapt. The shells of some animals are already dissolving in the more acidic seawater, and it is expected that acidification will have mostly negative impacts on ocean ecosystems.

Many plants and algae may thrive under more acidic conditions. Some species of algae will actually grow better when faced with increasing levels of carbon dioxide, but the algae responsible for building coral reefs will fare less well. In acidifying conditions it was found that coralline algae covered 92 per cent less area than normal, making space for non-calcifying algae. Also, acidification may limit coral growth by corroding existing coral skeletons, and the weaker reefs that result will be more vulnerable to erosion. However, some species of coral can use bicarbonate instead of carbonate ions to build their skeletons. Other species can handle a wide pH range. In the next century some common species of coral will shift, even though we do not know for sure what the change will look like. However, these changes will also affect thousands of species that live on the reefs, in unpredictable ways.

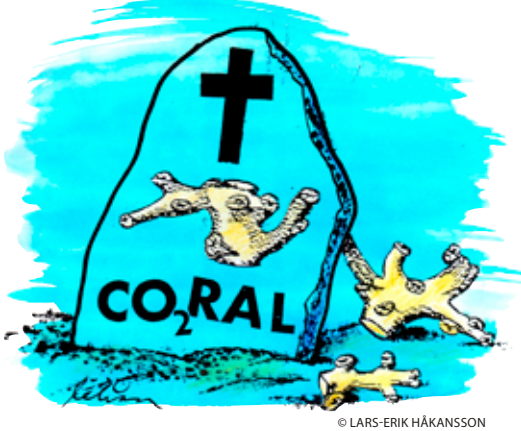
Sea grasses that serve as shallow-water nurseries for many species of fish in coastal ecosystems and support thousands of different species may reproduce better and grow taller under acidic lab conditions. On the other hand this ecosystem is in decline due to factors such as pollution, and it is unlikely that increased acidification will compensate for other stressors.

Two major types of zooplankton (and shelled phytoplankton like coccolithophores) build shells made of calcium carbonate – foraminifera and pteropods. They are extremely important in marine food webs, as almost all larger marine animals eat these zooplankton directly or indirectly. These zooplankton are also critical to the global carbon cycle, which describes how carbon moves between air, land and sea.

Foraminifera are sensitive to increased acidity, as it causes their shells to dissolve, and some species from tropical waters may become extinct by the end of this century.

The same fate seems to affect certain pteropods, the shells of which are already starting to dissolve in the Southern Ocean. Like the situation with foraminifera some species may actually become extinct by the end of this century.

Like corals, numerous benthic shelled animals, like mussels, clams, starfish and urchins, may have trouble building shells in more acidic water. Shell growth for some species of mussel and oyster will be reduced by 25 per cent and 10 per cent respectively by the end of this century. We know less about the fate of urchins and starfish, but they build their skeletons from a type of calcium carbonate that dissolves



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even more quickly in acidic water than the type corals use. Oyster larvae may fail to grow their shells in more acidic water, which has already caused a very high death rate among oysters off the Pacific Northwest of the USA.

The problems referred to above are not universal in all benthic invertebrates, however, because species groups such as shrimps, crabs and lobsters may grow even stronger shells under higher acidity.

Fish have no shells, but they feel the effects of acidification. Although fish are in balance with their environment, when the water surrounding fish has a lower pH, some chemical reactions change the pH of fish blood. This is called acidosis. Even though most marine fish are in harmony with their environment, certain chemical reactions that normally take place in their bodies are altered, and even small changes in pH can make a huge difference in survival. In humans a drop in blood pH of 0.2 to 0.3 can even cause death. Likewise, fish are also sensitive to pH and need to burn more energy to bring their bodies back to equilibrium. Even a slight change in pH reduces the energy a fish has to digest food, escape predators, reproduce and grow. Clownfish were found to have impaired hearing in water that was slightly more acidic than normal. This can seriously impact survival in the long run because it decreases their ability to react to the presence of prey and predators.

The worst problem for fish in future is however indirect, as ecosystem changes affect the availability of prey, and new plankton and benthic organisms may replace those present today with incalculable consequences.

Lennart Nyman

Lennart Nyman is a scientist and environmentalist from Sweden who has worked for some 50 years studying various aspects of marine, freshwater and terrestrial ecosystems worldwide.

Threats to coral reefs

The greenhouse effect, global warming, local pollution and implications for coral reefs described in a regional overview

The Great Barrier Reef off eastern Australia has lost more than half its coral cover in the past 30 years, and the Marine Park Authority sees climate change as the most serious threat to the reef. Almost half of this loss is attributed to foraging by the crown-of-thorns starfish, possibly triggered by nutrient-rich run-off from farms. New practices to reduce run-off and erosion and improve farm productivity are being tested. The cuts to pollution needed for the reef's survival need to be scaled up and include all catchments running into the reef's waters, encompassing millions of hectares. The major threat to this objective is the plan to build industrial developments along the entire coastline, which will allow some 100 million tonnes of dredge spoil to be dumped into the shallow coastal waters. However, public support has recently resulted in a ban on dumping the spoil, but increased shipping traffic, dredging, dumping for port maintenance and other causes of coastal habitat destruction are still significant problems.

The Mesoamerican Barrier Reef (Belize Coral Reef) is the second-largest coral reef system in the world and the largest in the northern hemisphere. It was listed as a World Heritage Site by UNESCO in 1996. It contains more than 100 species of corals. Its most widespread reef is the one off Belize, but both the coasts of the Greater and Lesser Antilles and the waters off Florida include coral reefs. Although less affected by the extreme weather conditions in 1997–98, some coral species were almost eradicated locally in 1998-99.

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The Florida Coral Reef is the third-largest barrier reef system in the world and the only coral barrier reef in the continental United States. This reef consists of two ridges separated by the Hawk Channel. More than 40 species of coral live on this reef and species diversity is comparable to that of the reefs in the Caribbean Sea, even though it extends close to the northern limit for tropical corals. The first recorded bleaching incident on the Florida reefs was in 1973, and in recent decades incidents of bleaching have become more frequent.

The so-called Coral Triangle covers an area of ocean including the states and islands of Indonesia, Malaysia, the Philippines, New Guinea, Solomon Islands and Timor. This area is probably the richest area in the world in marine resources. More than 120 million people depend on these resources for their income and livelihood, and fish is of course the major source of protein in local diets. Fisheries exports, including more than a fourth of the global tuna catch and coral reef fish, amount to some US$ 1 billion annually. In addition to this lucrative trade income some parts of the region attracts tens of millions of visitors annually, and this nature-based tourism is estimated to be worth at least ten times as much as the income from fisheries.

In 2009 the six coral triangle countries established an initiative of cooperation to sustainably manage their natural marine sources for future generations. To address all these factors ecosystem-based fisheries management will be applied, threatened marine species will be protected and climate change matters will be addressed. Some of the basic activities addressed will be to enlarge the small existing protected areas and stimulate development of community-based natural resource management, thus conserving and sustainably using marine resources.

The so-called cold-water stone corals that build deep-water reefs in temperate waters do not rely on symbiosis with zooxanthels, which is why they can be found at greater depths. Obviously, there is still no indication of coral bleaching among those corals. On the other hand, deep-water trawl fishing may cause mechanical damage to the cold-water reefs, so human activities are already affecting the reef structures in northern waters.

There are also biological threats to coral reefs. A starfish called the crown-of-thorns has recently been found to eat coral polyps leaving only the skeleton behind. It is not known why this aggressive behaviour has increased. Another human activity causing destruction of coral reefs is by dynamite fishing and collection of corals to sell to tourists, and tourism itself may also cause severe mechanical damage to the reefs.

Coastal agriculture, development and shipping, deforestation and increased unsustainable fishing are all important vectors in this degradation of the coral reefs.

Some 850 million people in the tropical regions around the globe benefit directly from the social and economic services provided by coral reefs. The projected degradation will obviously affect both the reefs and the communities they sustain.

Another way of measuring effects on coral reefs is by referring to the Living Planet Index database (WWF, 2015) which covers 930 fish species, 352 of which are classified as reef associated. This index has declined 34 per cent between 1979 and 2010. While overexploitation is listed as the primary threat, climate change is also identified as a significant threat.

It is fair to say that the Coral Triangle is the world's centre of marine life, but in the last few decades more than 40 per cent of the region's coral reefs and mangroves have been destroyed. The reasons for these threats are population growth, economic development, pollution and damage from agriculture, shipping installations and unsustainable fishing.

These basic threats are compounded by increasing ocean temperatures.

Lennart Nyman

Lennart Nyman is a scientist and environmentalist from Sweden who has worked for some 50 years studying various aspects of marine, freshwater and terrestrial ecosystems worldwide.

See also link: *http://www.airclim.org/acidnews/global-warming-and-its-implications-coral-reefs*

Electric vehicle capitals

In March, the International Council on Clean Transportation (ICCT) published a report titled "Electric Vehicle Capitals of the World – Demonstrating the Path to Electric Drive" assessing major cities around the world with high electric vehicle uptake and summarising their policies, charging infrastructure, and consumer awareness activities in place to help develop the electric vehicle market in those cities. The report also includes a comparison of vehicle life-cycle emissions data.

The top markets by electric vehicle share of new passenger vehicles are Oslo (27%), Utrecht (15%), Shanghai (11%), Shenzhen (10%), Amsterdam (10%), and San Jose (9.4%). In terms of total volume, the highest annual sales markets are Shanghai, Los Angeles, and Beijing, which recorded between 18,000 and 42,000 new electric vehicle registrations in 2015.

Source: AECC Newsletter, March 2017

Link: *www.theicct.org*

Barcelona to ban most dirty vehicles from 2019

On 6 March 2017 the Catalan government and Barcelona metropolitan, provincial and city administrations agreed to cut pollutant emission levels from traffic, particularly those of NO_2, by 10 per cent within five years and by 30 per cent within 15 years.

Barcelona bans Pre-Euro 1 cars on weekdays.

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Access restrictions will be introduced gradually within a low emission zone. As from January 2019 pre-Euro 1 vans and passenger cars will be banned on weekdays in Barcelona and 39 surrounding municipalities. The same restriction will apply from December 2017 during episodes of poor air quality. Individual municipalities may apply more stringent restrictions according to their needs.

In addition, end-of-life certificates for diesel vehicles built before 2005 and petrol vehicles built before 1996 will entitle owners to three years of free public transport within the metropolitan area, and incentives will be given for the purchase of low-emission vehicles.

The authorities will also investigate the creation of both a congestion charge in the metropolitan area and a surcharge on road fuels in order to finance the reduction in the price of public transport.

Source: AECC Newsletter, March 2017

Massive health gains with more cyclists

If everybody who takes their car to work in Stockholm County and has less than a 30-minute bike ride to work, cycled to work instead, the number of cars in rush hour traffic would be around 111,000 fewer.

This would mean significantly reduced emissions from traffic and lead to significant health benefits for the population. The research, which was recently published in Science of the Total Environment, shows that this could mean a reduction of 60 premature deaths per year for the population of the county, corresponding to 450 saved years of life. This is about twice as high as the calculated health gain due to reduced air pollution emissions when the congestion tax was introduced in Stockholm.

Lives could be saved if more people commuted by bike to work.

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With the help of detailed data on individuals' car ownership, age, gender, home address, workplace and shortest cycle route between home and work, the researchers were able to calculate how many people could cycle to work within 30 minutes depending on their expected physical capacity. Knowing the distribution and number of cars, lorries and buses on all roads, speeds, as well as the composition of the car fleet and how many cars are freed up per kilometre, the total emissions were calculated for the current situation and for the 30-minute scenario, which involves 111,000 fewer cars. The change in exposure to air pollution for the population and commuters was then calculated using meteorological air pollution dispersion models. The health effects were then estimated based on the so-called exposure-response relationship, which in turn is based on epidemiological studies published in scientific literature.

This is the first in a series of publications from this project on the effects of increased cycling. The study also includes the positive health effects of increased physical activity among new cyclists, altered pollutant exposure for commuters, as well as the effect on the number of people injured in traffic. What makes this study unique in comparison with other previously published studies is that the physical capacity of the commuters, the distance between home and work, the traffic situation, emissions, etc., could be examined in considerably higher detail than other studies, which are often based on very simplified assumptions that a certain percentage will take up bicycle commuting regardless of the basic conditions. Similarly, the exposure response is used, which reflects more accurately the effects of local emissions than in previous studies.

Source: Impacts on air pollution and health by changing commuting from car to bicycle *http://www.sciencedirect.com/science/article/pii/S0048969717301559*

Potential to step up global climate ambitions

Right now, several parallel evaluation processes are under way that could lead to higher ambitions in global climate negotiations.

In 2010 the UN Framework Convention on Climate Change (UNFCCC) agreed on a long-term global goal to reduce greenhouse gas emissions and limit the rise in global average temperature to below 2°C above pre-industrial levels. In addition, it was decided to periodically review two themes:

1. The adequacy of the long-term global goal in the light of the ultimate objective of the Convention, which is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.
2. Overall progress towards achieving the long-term global goal, including consideration of the implementation of the commitments under the Convention

The first periodic review was tasked to consider a strengthening of the long-term global goal. This process led to the decision to upgrade the long-term global goal: to hold the increase in global average temperature to well below 2°C and to pursue efforts to limit the temperature rise to 1.5°C. The decision recognises that this would significantly reduce the risks and impacts of climate change. In relation to theme 2, the UNFCCC decided that Parties should act urgently and ambitiously under the Convention while recognising the technological, economic and institutional challenges.

Subsequent reviews shall take place following the adoption of an assessment report of the Intergovernmental Panel on Climate Change (IPCC), or at least every seven years, as decided by the UNFCCC in 2010. In 2015, the UNFCCC decided to consider the scope of the next periodic review by no later than 2018 and that it should take into account the results of relevant work conducted under the Climate Convention and its Kyoto Protocol and the subsidiary bodies.

COP 21 decided to convene a facilitative dialogue in 2018 to consider progress towards the long-term global goal. This includes a review of whether the nationally determined contributions of all countries will deliver a global peak of greenhouse gas emissions fast enough, recognising that peaking will take longer for developing countries. COP 21 concluded that further rapid reductions will then be needed, in accordance with best available science, to achieve a balance between anthropogenic emissions from sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty in order to achieve the long-term global goal of well below 2°C or 1.5°C.

The Paris agreement has its own review mechanism called the global stocktake (GST). The GST is a process whereby progress towards implementing the Paris agreement is assessed based on achievement of its purpose and long-term goals. This must be done in a comprehensive and facilitative manner, considering mitigation, adaptation and the means of implementation and support, and in the light of equity and the best available science. The first GST is due in 2023 and it will be repeated every five years thereafter unless otherwise decided by the CMA[1]. Furthermore, the outcome of the GST shall inform countries on how they best can update and enhance their national action plans, in accordance with the provisions of the Paris Agreement, and should also enhance international cooperation for climate action.

Intended nationally determined contributions (INDCs) is the term used for the pledges countries have made under the Paris Agreement. The UNFCCC secretariat was requested to prepare a report on the aggregate effect of the INDCs. The analysis, which was updated in 2016, indicated that much greater emission reduction efforts than those associated with the INDCs will be required in the period after 2025 and 2030 to hold the temperature rise below 2°C above pre-industrial levels with a "likely" probability of 66 per cent.

In response to an invitation from the UNFCCC, a special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways will be produced by the IPCC. The final draft will be considered by the IPCC for approval at its plenary session in September 2018, three months prior to the facilitative dialogue.

Source: UNFCCC

[1] CMA = Conference of the Parties serving as the meeting of the Parties to the Paris Agreement

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Tighter emission limits for EU power plants

Large combustion plants will have to meet new mandatory standards for the release of toxic air pollutants under the EU's Industrial Emissions Directive from 2021.

On 28 April a qualified majority of member states agreed on new air pollution standards that will require EU countries to apply new tighter emission limits for sulphur dioxide (SO_2), nitrogen oxides (NOx) and particulate matter (PM) to all existing large combustion plants (LCP) in the EU, including all large coal-fired power plants. Emission limits for mercury have also been introduced for the first time.

The new standards, which are set out in a reference document for best available techniques (BREF) under the 2010 Industrial Emissions Directive (IED), will have to be complied with by 2021.

As updated versions of BREF documents should be published no later than eight years after the previous version, and the latest one was published in 2006, this document is in effect three years behind schedule. Talks to revise the LCP BREF started in 2011, and the European Environmental Bureau (EEB) has been actively engaged in the six years of negotiations leading to this new BREF document. According to the EEB, the three-year delay has led to excess air pollutant emissions causing more than 55,000 premature deaths and €150bn in associated health costs.

Environment groups welcomed the decision, which will significantly reduce toxic emissions from EU's dirtiest power plants. The new standards, which could save more than 20,000 lives every year by reducing pollution from coal-fired power plants alone, were narrowly voted through despite opposition from an "unholy alliance" of eight countries including Germany, Poland, the Czech Republic, Bulgaria, Finland, Hungary, Slovakia, and Romania.

Large coal-fired power plants in the EU produce one-quarter of all the electricity generated in the EU but are responsible for more than 70 per cent of the EU's sulphur dioxide emissions and more than 40 per cent of nitrogen oxide emissions from the industry sector.

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The new standards could save more than 20,000 lives every year by reducing pollution from coal-fired power plants alone.

EEB's policy manager Christian Schaible said: "This is finally some good news on tackling air pollution. Tried-and-tested techniques exist to filter out or reduce harmful fumes yet the decision as to whether to use them is too often left to plant operators, who simply do whatever is cheapest. Today's decision will now ensure that the dirtiest plants either clean up or close down."

"We call on EU leaders to continually tighten these air pollution standards over time in order to protect our health and our environment," said Darek Urbaniak at WWF Europe. "It is about time Europe quits its dirty coal addiction for good and invests in energy efficiency and renewables instead."

The European Power Plant Suppliers Association (EPPSA) also welcomed the decision, stating that "EPPSA believes that for most of the existing large combustion plants, the implementation of the conclusions are economically and technically feasible through the state-of-the-art technologies."

More than 125,000 citizens who signed a petition calling on the EU's health and environment ministers to clean up toxic air in Europe, will also welcome the decision on stricter emission standards.

The LCP BREF will be formally adopted and published after it has been cleared by the European Parliament and the EU Council.

Christer Ågren

More information:

1. 'Lifting Europe's Dark Cloud – How cutting coal saves lives'. Report by EEB, CAN-Europe, HEAL, Sandbag, and WWF. *http://env-health.org/IMG/pdf/_lifting_europe_s_dark_cloud_-_final_report.pdf*

2. 'LCP BREF Q&A'. *https://docs.google.com/document/d/1cZW_UXBAodf0QSP9ovkg_V2Z852IHGNm5qGO-plPXe6c/edit*

3. 'Clean up Europe's toxic air'. NGO petition to EU Health and Environment Ministers: *https://act.wemove.eu/campaigns/clean-up-air-pollution*

4. The EEB's 'Death ticker' shows a live figure for the cost of inaction on toxic coal pollution. *http://www.eeb.org/index.cfm/death-ticker/*

One-third of existing coal capacity must retrofit or close

More than 100 coal-fired plants, representing one-third of the EU's large-scale coal-fired power plant capacity, face costly air quality upgrades or closure as a result of the new EU emissions limits for large combustion plants, according to an analysis by the Institute for Energy Economics and Financial Analysis (IEEFA).

"The cost of compliance will be prohibitive for many of these installations, given the market outlook and other headwinds," said co-author of the report Gerard Wynn. "Owners will either have to make significant investment and technical changes in just four years, or decide to close the plants altogether or significantly restrict their operating hours."

The report found that 69 per cent of the nearly 600 large coal and lignite power plants covered by the analysis were exceeding the upper end (the least strict) of the new NOx limits, while 43 per cent of lignite and 61 per cent of coal-fired plants exceeded the upper end SO_2 limits.

Efficient NOx abatement would, according to the report, add €2–4 per megawatt-hour of electricity generation and efficient SO_2 abatement would add €6–7/MWh. This leads to the conclusion that "in the case of older power plants particularly, these costs are prohibitive, and that it would be more rational to close the installations."

The IEEFA concluded that the new LCP BREF "are in line with, or less ambitious than corresponding emissions limits in China and the US", and that stricter regulation is likely over time, reinforcing the case for older, more polluting coal plants to close now and cut their losses, rather than continue to retrofit.

69 per cent of the coal and lignite plants do not comply with the new NOx limits.

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Source: IEEFA press release, 8 May 2017.

Report: 'Europe's coal-fired power plants: Rough times ahead' (May 2017). By G. Wynn and P. Coghe. Published by IEEFA.

Global warming will thaw more permafrost than previously thought

The UK Met Office reports that "global warming will thaw about 20 per cent more permafrost than previously thought, scientists have warned – potentially releasing significant amounts of greenhouse gases into the Earth's atmosphere. A new international research study, including climate change experts from the University of Leeds, University of Exeter and the Met Office, reveals that permafrost is more sensitive to the effects of global warming than previously thought. The study, published in Nature Climate Change, suggests that nearly 4 million square kilometres of frozen soil – an area larger than India – could be lost for every additional degree of global warming experienced. Permafrost is frozen soil that has been at a temperature of below 0°C for at least two years. Large quantities of carbon are stored in organic matter trapped in the icy permafrost soils. When permafrost thaws the organic matter starts to decompose, releasing greenhouse gases such as carbon dioxide and methane which increase global temperatures. It is estimated that there is more carbon contained in the frozen permafrost than is currently in the atmosphere."

"Recent studies have shown that the Arctic is warming at around twice the rate as the rest of the world, with permafrost already starting to thaw across large areas. The researchers, from Sweden and Norway as well as the UK, suggest that the huge permafrost losses could be averted if ambitious global climate targets are met. Lead-author Dr Sarah Chadburn of the University of Leeds said: 'A lower stabilisation target of 1.5°C would save approximately two million square kilometres of permafrost. Achieving the ambitious Paris Agreement climate targets could limit permafrost loss. For the first time we have calculated how much could be saved.'"

"This allowed them to calculate the amount of permafrost that would be lost under proposed climate stabilisation targets. As co-author Professor Peter Cox of the University of Exeter explained: 'We found that the current pattern of permafrost reveals the sensitivity of permafrost to global warming.' The study suggests that permafrost is more susceptible to global warming than previously thought, as stabilising the climate at 2°C above pre-industrial levels would lead to thawing of more than 40 per cent of today's permafrost areas."

Source: *http://www.metoffice.gov.uk/news/releases/2017/climate-targets-to-constrain-permafrost-loss*

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Harebell (*Campanula rotundifolia*) is one of many plant species that are sensitive to nitrogen pollution.

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We need to talk about nitrogen

Nitrogen in the air is one of the greatest threats to our wild plants, lichens and fungi, yet few people have even heard about it.

Nearly two thirds of the UK's most sensitive wildlife habitats are affected by excessive nitrogen deposition, according to a new report by the British conservation charity Plantlife that raises the alarm about the devastating impacts of nitrogen pollution.

Emissions into the air of nitrogen oxides and ammonia increased sharply in the second half of the 20th century – the main sources being transport, power stations, industry, farm fertilisers and livestock manure. Between 1960 and 2000, global nitrogen emissions more than doubled and for ammonia emissions this trend is expected to continue up to 2050 due to continued use of artificial fertilisers and increasing meat consumption (Figure 1).

The term "reactive nitrogen" describes all forms of oxidised nitrogen (e.g. nitrogen dioxide) or reduced nitrogen (e.g. ammonia). In most natural or semi-natural ecosystems, naturally occurring forms of reactive nitrogen are usually scarce and limit growth.

Once released into the atmosphere, reactive nitrogen gases undergo chemical and physical transformation. After dispersion by winds, the nitrogen compounds may be deposited on vegetation, soils and waters, where it can cause acidification and/or over-fertilisation of sensitive ecosystems. Moreover, reactive nitrogen damages human health by contributing to increased levels of fine particulate matter ($PM_{2.5}$) in the air, ground-level ozone and nitrogen dioxide. It can also be re-emitted as nitrous oxide, which contributes to climate change and stratospheric ozone depletion.

The effects on ecosystems of nitrogen deposition are significant, with observable species loss, changes in soil chemistry and habitat degradation resulting from nutrient enrichment (eutrophication), acidification (lower pH), or direct damage (toxicity).

Increased concentrations of ammonia in the air can often be found in agricultural areas, especially in areas with intensive rearing of livestock. Critical levels of ammonia for sensitive species such as lichens and bryophytes are set at 1 microgram per cubic metre ($\mu g/m^3$) and for herbaceous species at 3 $\mu g/m^3$. In the UK, 64 per cent of the land area has ammonia concentrations above the critical level for lichen and bryophyte species, of which there are internationally important communities in the UK. The critical level for herbaceous species is exceeded on 3.9 per cent of the land area.

Scientific studies have demonstrated clear correlations between rates of nitrogen deposition and species richness in a range of ecosystems, both in the UK and western Europe (Figure 2). Low species richness is typically found at high levels of nitrogen deposition, but some ecosystems – those that are naturally rich in nutrients – do not show this correlation. In a characteristic nutrient-poor environment, enrichment with nitrogen provides a competitive advantage to those species most able to use the additional nutrients. This promotes some species, such as grasses, over slower growing species adapted to low nutrient conditions, thus reducing overall species richness and contributing towards the homogenisation of plant communities.

Vascular plants that are sensitive to elevated nitrogen input include harebell (*Campanula rotundifolia*), fairy flax (*Linum catharticum*) and bird's-foot trefoil (*Lotus corniculatus*). Certain fungal groups may also be very sensitive to increased nitrogen deposition, as has been seen in the decline

of grassland fungi in north-west Europe and major changes in ectomycorrhizal fungi in forests in central Europe. Some flowering plants, such as orchids, which are dependent on ectomycorrhizal fungal associations, may be particularly affected by such declines.

The sensitivity of an ecosystem to pollution input, in this case deposition of nutrient nitrogen, is called a "critical load". This represents a tolerance threshold for a specific type of ecosystem, above which species loss or other types of degradation is expected either immediately or in the long term. Some ecosystems are much more sensitive than others – i.e. they have a lower critical load.

Habitats such as woodlands, grasslands, heaths and bogs have all been affected by nitrogen deposition that exceeds their critical loads. In Special Areas of Conservation (SACs) in England and Wales, 90 per cent of the land was exposed to excessive levels of nitrogen in 2014, while for the UK as a whole it was 63 per cent.

Looking at policy initiatives, the report notes that the problem of reactive nitrogen is a complex one that requires co-ordinated approaches to address both its causes and consequences, and that effective solutions will need to be sufficiently integrated between different emitting sectors in order to drive reductions in overall emissions.

Protecting habitats from atmospheric nitrogen deposition will need action on three levels: international and national action to reduce long-range deposition; local action that reduces or intercepts emissions close to sensitive designated nature conservation sites; and on-site restoration to mitigate the impact of past or present deposition.

Plantlife is calling for:

- Nitrogen emissions to be tackled through government strategies on climate change, air quality, water quality and natural capital accounting.
- Nitrogen levels to be taken into account in monitoring and management of wildlife habitats – particularly on Areas and Sites of Special Scientific Interest.
- Statutory action plans in severely affected areas to reduce local emissions and restore damaged habitats.
- A coordinated UK framework providing effective regulation, incentives, advice and support to enable farmers to reduce nitrogen emissions.
- Greater public awareness of the impacts of air pollution on plants and ecosystems, putting pressure on governments and others to take urgent action.

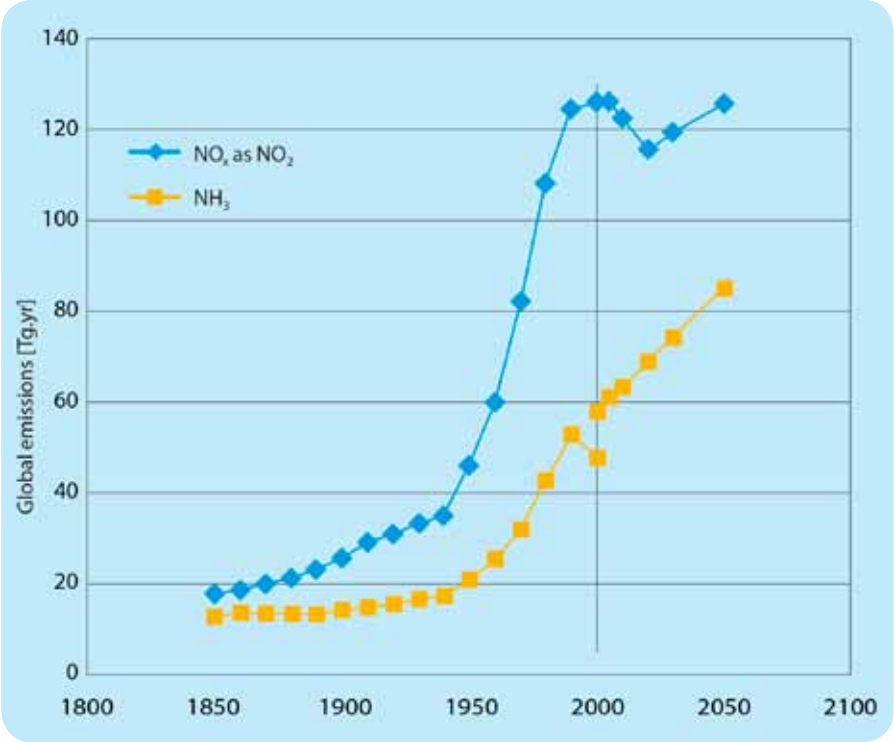


Figure 1. Trends and future projections of global emissions of nitrogen oxides and ammonia.

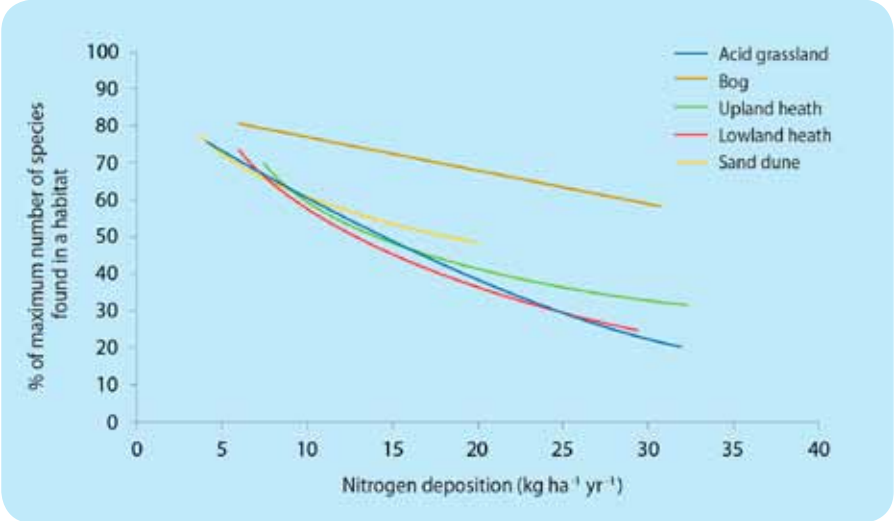


Figure 2. The role of nitrogen deposition on widespread plant community change across semi-natural habitats

Regarding recovery, the report concludes that a reduction in nitrogen deposition is necessary if habitats are to be protected but, even when this has been achieved, reversing the effects can be very slow. Over time, impacted habitats can sometimes, although not always, return to a state close to similar areas where no nitrogen has been added. However, this may take decades and lowering nitrogen deposition is often not enough – measures such as physically removing the accumulated nitrogen may also be required.

Christer Ågren

The report "We need to talk about nitrogen": *http://www.plantlife.org.uk/uk/our-work/policy/nitrogen*

Ammonia increasing over agricultural areas

The first global, long-term satellite study of airborne ammonia gas has revealed increasing levels of the pollutant over four of the world's most productive agricultural regions.

Using satellite data, new research has discovered steadily increasing ammonia concentrations from 2002 to 2016 over agricultural areas in the United States, Europe, China and India. The study "Increased atmospheric ammonia over the world's major agricultural areas detected from space" was published in March in the journal Geophysical Research Letters.

Excess ammonia is harmful to plants and reduces air and water quality. In the troposphere – the lowest part of the atmosphere – ammonia reacts with nitric and sulphuric acids to form tiny particles ($PM_{2.5}$) that contribute to aerosol pollution that is damaging to human health. Ammonia can also fall back to Earth as wet or dry deposition on vegetation, soils and surface waters, causing eutrophication.

The increases in ammonia are broadly tied to emissions from crop fertilisers and livestock waste, changes in atmospheric chemistry and warming soils that retain less ammonia.

Each major agricultural region highlighted in the study experienced a slightly different combination of factors that correlate with increased ammonia in the air from 2002 to 2016.

The United States, for example, has not experienced a dramatic increase in fertiliser use or major changes in fertiliser application practices. But legislation to reduce acid rain in the 1990s resulted in reductions in emissions of sulphur dioxide (SO_2) and nitrogen oxides (NOx) that most likely had the unintended effect of increasing levels of gaseous ammonia. The acids that cause acid rain also scrub ammonia gas from the atmosphere, so the sharp decrease in these acids in the atmosphere is a plausible explanation for the increase in ammonia over the same time frame.

Europe experienced the least dramatic increase in atmospheric ammonia of the four major agricultural areas highlighted by the study. The researchers suggest this is due in part to successful limits on ammonia-rich fertilisers and improved practices for treating animal waste. As in the United States, significant reductions in emissions of SO_2 and NOx and thus in atmospheric acids that would normally remove ammonia from the atmosphere help to explain the increased ammonia levels.

"The decrease in acid rain is a good thing. Aerosol loading has plummeted – a substantial benefit to us all," said Russell Dickerson, a professor at the University of Maryland and co-author of the study.

China has greatly expanded agricultural activities since 2002, widening its use of ammonia-containing fertilisers and increasing ammonia emissions from animal waste. The increase in ammonia has spiked aerosol loading in China, and is a major contributor to the thick haze seen in Beijing.

In India, a broad increase in fertiliser use coupled with large contributions from livestock waste have resulted in the world's highest concentrations of atmospheric ammonia. But the researchers note that ammonia concentrations have not increased as quickly as over other regions, most likely due to increased emissions of SO_2 and NOx and, consequently, some increased scrubbing of ammonia from the atmosphere.

In all regions, the researchers attributed some of the increase in atmospheric ammonia to climate change, reflected in warmer air and soil temperatures. Ammonia vaporises more readily from warmer soil, so as the soils in each region have warmed year by year, their contributions to atmospheric ammonia have also increased since 2002.

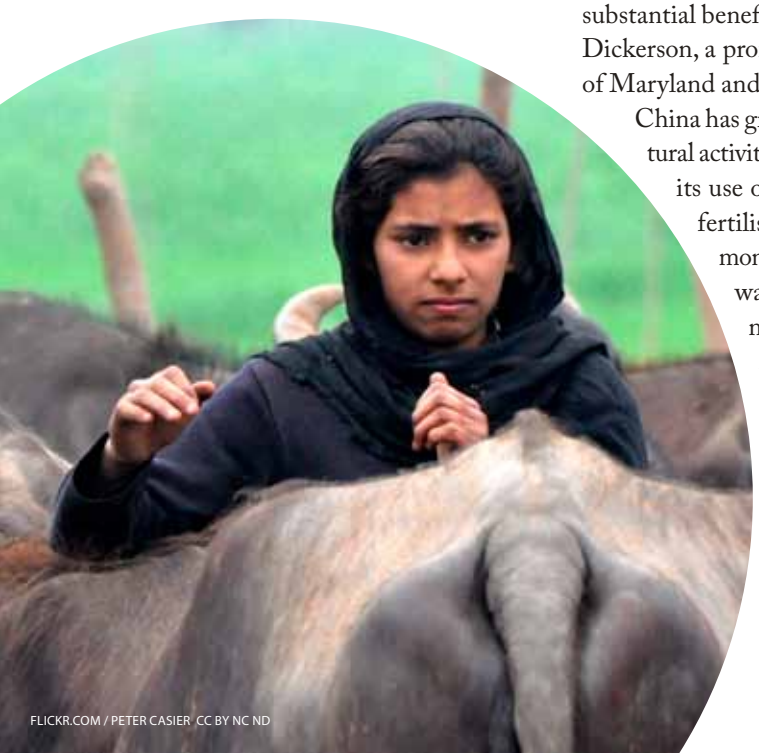
The authors hope that a better understanding of atmospheric ammonia will help policy makers craft approaches that better balance the high demand for agriculture with the need for environmental protection.

"As the world's population grows, so does the demand for food – especially meat," Dickerson said. "This means farmers and ranchers need more fertiliser, which makes it harder to maintain clean air and water. Wise agricultural practices and reduced greenhouse gas emissions can help avoid adverse effects."

Christer Ågren

Sources: Joint press release by the American Geophysical Union and the University of Maryland; Science Daily, 16 March 2017.

Link: *http://news.agu.org/press-release/study-finds-hotspots-airborne-ammonia-worlds-major-agricultural-areas/*



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Increases in fertiliser use and livestock waste have resulted in India having the world's highest atmospheric ammonia concentrations.

Potential to reduce agriculture emissions

A new study commissioned by Transport and Environment maps the climate mitigation potential for EU agriculture. It concludes that there is no evidence that reducing emissions in agriculture is more difficult or less cost effective than in other sectors. The actions calculated to have the largest abatement potential were biological nitrogen fixation in crop rotation and in grass mixes, use of cover and catch crops and the use of nitrification inhibitors.

The authors identify the Common Agriculture Policy (CAP) as the most important tool for influencing farmers' management decisions. They also find that the mitigation actions they propose can already be supported via the CAP if implemented in the right way by member states.

Carlos Calvo Ambel, transport and energy analyst at T&E, said: "There is a myth that agriculture cannot reduce emissions. Agri lobbyists are using that myth to undermine Europe's 2030 climate law which would also lead to less ambition on reducing transport emissions. This report shows there is no reason why agriculture should be given a free ride."

Transport & Environment press release 2 May 2017 *https://www.transportenvironment.org/press/agriculture-can-make-significant-emissions-cuts-study-finds-showing-need-strong-eu-climate-law*

Increasing biological nitrogen fixation is one of the suggested measures.

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MEPs agree to halve food waste by 2030

The resolution, which is based on a report by a Croatian social democrat, suggests over 300 changes and the EU environment committee chose to back up a lot of important suggestions, even if they rejected several of them. The report shows that about 88 million tonnes of food is thrown away every year across Europe. 53 per cent of all food waste comes from households and 19 per cent is lost in food processing.

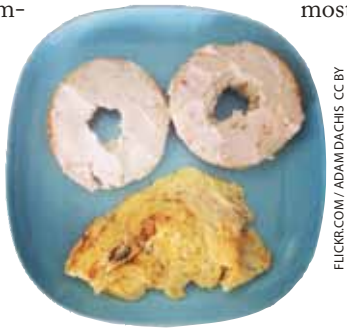
Members of the European Parliament (MEPs) want the EU executive to design a "common methodology, including minimum quality requirements, for the uniform measurement of the food waste levels" by the end of 2017.

MEPs also want the commission to find new ways of taking care of food that has reached the expiry date. Among other things, the resolution calls for a change in the value-added tax (VAT) directive that would mean almost zero VAT rate for food donations that are made close to the expiry date. MEPs also want the commission to determine if legally-binding food waste reduction targets should be set up.

Source: ENDS Europe, 11 April 2017

People want more information about climate change and food systems

A recent public survey commissioned by the Global Food Security (GFS) programme, shows that the majority of British adults tend to agree that a key contributor to climate change is our current food system. The participants agreed that we could reduce the impact of climate change significantly if we changed our diets.



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Health, cost and convenience trump ethics and climate change, when Brits decide to change diet.

According to the study, young adults, aged 18–24, are the group that agrees most with the statement that changes in our diets could reduce the impact of food on climate change. Young adults are most likely to change their diets to vegetarian or vegan, while adults aged 65+ would rather buy more seasonal food than change their entire diets.

British adults are more likely to change their diets in terms of health, cost and convenience rather than ethics or climate change. The participants tend to know less about the relationship between food system and climate change and more about rising temperatures and weather conditions. A majority of the British adults in the study think that more information is needed and that it would help people to make the right choices.

Public attitudes to climate shocks and their interaction with the food system, February 2017

http://www.foodsecurity.ac.uk/assets/pdfs/public-attitudes-climatic-shocks-interaction-food-system.pdf

A mere 7.7 per cent of all agricultural land in the EU is projected to be under management contracts that aim to reduce greenhouse and/or ammonia emissions by 2020.

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CAP delivers meagre climate action

Climate action is one of three overarching objectives of the Common Agricultural Policy (CAP), though only a small fraction of the funding goes to climate measures on the ground.

A new report by the Institute for European Environmental Policy (IEEP), commissioned by the European Parliament's Committee on Agriculture and Rural Development, examines how the EU agriculture sector has been treated and affected by climate policy so far, and the implications of the current climate regime. It also considers what role the CAP can play in supporting climate action within the agriculture sector and provides thoughts on the future role of the CAP in this regard.

Climate was first highlighted as one of the priorities for agricultural and land management payments under the rural development policy in the CAP in 2007. In the health check in 2008/2009 it was addressed further and climate was one of five priorities that received additional funding. Since 2014, climate action has been one of three cross-cutting priorities for the whole CAP. There is also a commitment under the Multiannual Financial Framework (MFF) for the period 2014–2020 to devote at least 20 per cent of the Union budget to support for climate change objectives.

CAP is divided into two pillars. The first pillar consists of direct payments to farmers, and 30 per cent of these payments are conditional on three "greening" measures. The first one, crop diversification, has little or no climate implications. The other two, ecological focus areas (EFAs) and permanent grasslands, have slightly more potential.

The EFA requirement means that farms with more than 15 hectares of arable land must ensure that an area equivalent to 5 per cent of their arable land is an EFA. Member states can choose from a list of 10 types of land use that can be compiled to the national list of EFAs, including fallow land, landscape features (hedges, trees, ponds, etc.), buffer strips, short rotation coppice, agro-forestry and nitrogen-fixing crops. Several of them can lead to increased carbon sequestration, while nitrogen-fixing crops can reduce the need for mineral nitrogen fertilisers and thus reduce emissions of nitrous oxide.

The permanent grasslands obligation is probably the one with most potential and implies that member states must protect and keep their ratio of Natura 2000 grassland. This contributes to continued storage of coal in the ground and, until a possible equilibrium is reached, continued carbon sequestration.

The first pillar also contains voluntary coupled support, a remnant from the previous payment system. This gives member states the opportunity to give extra support to specific types of farming because of "environmental, social or economic reasons". Today, the largest part goes to farming involving ruminants, including: beef, dairy, sheep and goat farming. It is difficult to draw any other conclusions than that this support leads to larger herds and consequently to increased methane emissions from enteric fermentation.

In the second pillar, there are more measures that explicitly target climate action, but also a great deal of flexibility for member states on how and what meas-

ures to implement. Member states design their own Rural Development Programs (RDPs) on the basis of a given framework, and the results vary considerably.

The regulation offers a total of 19 measures and numerous sub-measures. The measures must work towards six priorities of which member states must address at least four. The most relevant from a climate perspective is Priority 5, which promotes resource efficiency and the shift towards a low-carbon and climate-resilient economy, has five focus areas:

- increasing efficiency in water use in agriculture;
- increasing efficiency in energy use in agriculture and food processing;
- facilitating the supply and use of renewable sources of energy;
- reducing greenhouse gas and ammonia emissions from agriculture; and
- fostering carbon conservation and sequestration in agriculture and forestry.

However only 8 per cent of the total public expenditure allocated to RDPs has been allocated to this priority. About a quarter of this funding went to efficiency in water use, leaving even less for pure climate mitigation. The "investments in physical assets" measure was most widely used, except in the focus area of carbon sequestration, where a group of forest measures were most common; these could be for planting woodland on farmland, creating new agro-forestry systems, and even for afforestation of agricultural land.

Of significance is also the "agri-environment-climate measure" that provides payments to farmers who subscribe, on a voluntary basis, to a number of environmental commitments set by the member state. The proportion of land projected to be under management contracts targeting a reduction of greenhouse gases and/or ammonia emissions by 2020 is 7.7 per cent and the corresponding figure for land being managed under contracts targeting carbon sequestration and conservation is 1.8 per cent.

The main conclusion is that though climate is one of the three cross-cutting priorities for the CAP, only a small fraction of the funding goes to climate action related measures. This is because the mandatory elements, mainly allocated in the first pillar of the CAP, only consist of measures with zero or marginal effects on greenhouse gas emissions and carbon storage. The second pillar, where there is a greater potential to target climate action, contains a high degree of flexibility for member states in the way it is implemented. However, since there are no explicit climate targets for agriculture and it is possible for most countries to fulfil their climate commitments under effort sharing without making further efforts in agriculture, there are no real incentives for member states to prioritise climate measures under the CAP.

The authors call for a low-carbon and resilience roadmap for the sectors involved to 2050 and also list six priorities on how to enhance climate action through the CAP:

1. Protect carbon-rich soils, prevent ploughing on all carbon-rich permanent grassland; put in place conservation measures for those carbon-rich soils under cultivation; and maintain woody features (such as hedges, trees, etc.).
2. Minimising losses of and increasing soil organic matter in all soils.
3. Encourage the more efficient management of nutrients on agricultural land.
4. Information via the Farm Advisory Service on climate mitigation and adaptation issues are now optional, but could be made compulsory.
5. Ensure that the role policy plays in encouraging climate mitigation efforts is recognised and that climate impacts are better reported.
6. Direct payments and coupled support provided to the livestock sector, continue to favour higher yield areas. From a climate perspective, there needs to be a more rapid change in the orientation of the CAP so that it becomes truly production neutral in nature.

Discussions on the shape of the next CAP for the period post-2020 are currently underway. In a recent speech, commissioner Phil Hogan said: "the CAP needs to step up to the plate and help to deliver on our ambitious international agreements, such as the SDGs and the Paris agreement on climate change". How serious he is on that issue will hopefully show in the communication on "modernising and simplifying the CAP", that the commission is expected to present before the end of this year.

Kajsa Pira

The report: Research for Agri committee – the consequences of climate change for EU agriculture. Follow-up to the COP21 – UN Paris Climate Change Conference *http://www.europarl.europa.eu/RegData/etudes/STUD/2017/585914/IPOL_STU(2017)585914_EN.pdf*

Emissions from agriculture in the EU

Agriculture, counting only non-CO_2 emissions, is the fifth-largest contributor to greenhouse gas emissions in the EU, contributing to 11.3 per cent of the emissions. Non-CO_2 emissions being enteric fermentation (43%), the management of agricultural soils (38%) and manure management (15%). Non-CO_2 emissions from the agricultural sector fell by 21 per cent between 1990 and 2014. However, these figures are largely not the result of an active climate policy but because the number of animals fell sharply during the 1990s, due to the collapsing agriculture in eastern Europe. Emissions also fell due to reductions in fertiliser inputs, as a result of the Nitrogen Directive that was put in place to protect water resources. By 2030 EU agricultural emissions are projected to decrease by only 2.3 per cent compared to 2005.

There are also CO_2 emissions from energy and transport used in agriculture and emissions from land use, land use change and forestry (LULUCF) that are reported under other headings to the UNFCCC. The non-CO_2 emissions from agriculture and CO_2 emissions from transport and heating in agriculture are included in the Effort Sharing Decision (ESD) for 2013–2020 and in the draft of the subsequent Effort Sharing Regulation (ESR) 2020–2030. Emissions from LULUCF are covered by a separate regulation and have no common EU targets. However, in the proposal for ESR, emissions from LULUCF will be introduced as a possible flexibility to compensate emission reductions by as much as 5 per cent.

Average CO_2 emissions from new passenger cars dropped by only 1.2 per cent in 2016.

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Madrid to halve traffic emissions by 2030

In a bid to crackdown on air pollution, Madrid's city government has announced a plan that includes the creation in 2018 of a "zero emissions zone" in the entire city centre open only to residents' vehicles, taxis and deliveries.

The speed limit on Madrid's peripheral motorways will be reduced to 70 km/h, and the major arteries in the area inside the peripheral motorways will be redesigned by 2019 to give priority to pedestrians, bikes and public transport. Madrid's bus fleet will be 100% low-emission by 2020, all new taxis will be electric or low-emission from 2018 and fiscal, access and parking incentives will gradually be introduced for electric and low-emission vehicles from 2018 to 2025.

Further measures to tackle emissions from the residential and office sector include a ban on coal-fired heating systems from 2020, the regulation of biomass heating, and fiscal and other incentives to promote energy-efficient boilers and solar and geothermal electricity production. The plan has a budget of €544 million from 2017 to 2020.

Source: Ends Europe Daily, 15 March 2017.

Madrid plans the creation of a "zero emissions zone"

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EU must step up car fuel efficiency

The improvement of car fuel efficiency must be speeded up in order to meet the EU target for 2021, according to the European Environment Agency (EEA). Provisional figures released by the EEA put average CO_2 emissions of new passenger cars sold in the EU in 2016 at 118.1 grams of CO_2 per km, a drop of only 1.2 per cent compared to 2015. This reduction is the smallest annual improvement recorded since 2006 for new cars sold in the EU.

Although the EU remains well below its target of 130 g CO_2/km set for 2015, it is clear that compared to 2016, annual improvements in efficiency need to significantly increase in each of the coming five years in order to achieve the emissions target of 95 g CO_2/km by 2021.

While the share of diesel vehicle sales fell, they still remain the most sold vehicle type in the EU, representing 49.4 per cent of new car sales, followed by petrol vehicles (47%), and alternatively fuelled vehicles (3.3%, including electric vehicles). The average diesel vehicle sold was 302 kg heavier than the average petrol vehicle.

Portugal (105 g CO_2/km) together with Denmark, Greece and the Netherlands (106 g CO_2/km) are the countries having the most fuel-efficient new cars sold. The least fuel-efficient cars continue to be bought in Estonia (134 g CO_2/km).

Source: EEA press release, 20 April 2017 (*www.eea.europa.eu*)

Parliament wants to strengthen checks on cars

In a vote on 4 April, the European Parliament approved tighter controls on vehicle emissions, but rejected a proposal for an EU Vehicle Surveillance Agency which would have ended the current discredited system in which national regulators have been strongly influenced by their carmaker clients.

Julia Poliscanova, clean vehicles and air quality manager at T&E said: "The parliament's Dieselgate inquiry has shown that the emissions scandal is largely a consequence of national regulators being unwilling or unable to enforce the rules because of the influence of carmakers. Member states should now accept the MEPs' proposals to strengthen oversight of their work and ensure legislation is enforced uniformly. The economic interests of carmakers cannot be given priority over public health or the law any more."

The parliament's Dieselgate inquiry (EMIS) report highlighted national regulators' failure to enforce existing defeat device rules and check cars rigorously, allowing cars onto the road thus breaking EU laws. The result of this failure is 29 million excessively polluting diesel cars and vans driving on Europe's roads today.

Source: T&E press release, 4 April 2017 (*www.transportenvironment.org*)

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Member states' failure to enforce existing rules has resulted in 29 million excessively polluting diesel cars and vans on our roads today.

Fossil-fuelled cars should pay their health bill

Environmental group Bellona has estimated that if the heavy human health costs caused by exhaust emissions from internal combustion engine (ICE) cars in the EU were to be borne by car makers, an average conventionally fuelled car would have to pay back €2,371 per year to correctly compensate the public. In other words, the unaccounted for human health cost of a fossil vehicle during its lifetime would be roughly €23,715, which in turn would result in the doubling of the average ICE car's sticker price to €50,150.

In its new brief "Rethinking the cost of conventionally fuelled road transport – Getting the car industry to pay the human health bill", Bellona concludes that electro-mobility is the only viable cost-effective approach to drastically reduce damaging air pollution and safeguard human health. In contrast to ICE cars and plug-in hybrid vehicles (PHEVs), pure battery electric vehicles (EVs) produce no exhaust emissions and consequently cause less pollution in general.

Source: Euractiv.com, 6 April 2017

Link to the policy brief: *http://bellona.org*

Global free-fall in coal plant development

Work has frozen at over 100 projects in China and India, in addition there is a 62 per cent decline in global construction starts and a 48 per cent drop in pre-construction activity.

The number of coal-fired power plants under development worldwide saw a dramatic drop in 2016, mainly due to shifting policies in Asia, according to a new report released by Greenpeace, the Sierra Club and CoalSwarm. The report, Boom and Bust 2017: Tracking The Global Coal Plant Pipeline, is the third annual survey of the global coal plant pipeline. Its findings include a 48 per cent decline in overall pre-construction activity, a 62 per cent drop in new construction starts, and an 85 per cent decline in new Chinese coal plant permits.

Reasons for the rapid fall-off include a dramatic clampdown on new coal plant projects by Chinese central authorities and financial retrenchment by coal plant backers in India. In China and India, construction is now frozen at over 100 project sites. In addition to the decline in new plant development, the survey also found a record-breaking 64 gigawatts of coal plant retirements in the past two years, mainly in the European Union and the US – the equivalent of nearly 120 large coal-fired units.

According to the report, the combination of a slowed new coal plant pipeline and an increase in outdated coal plant retirements brings the possibility of holding global temperature increase to below 2°C above pre-industrial levels "within feasible reach," provided countries continue to step up action. "This has been a messy year, and an unusual one," said Ted Nace, director of CoalSwarm. "It's not normal to see construction frozen at scores of locations, but central authorities in China and bankers in India have come to recognize overbuilding of coal plants as a major waste of resources. However abrupt, the shift from fossil fuels to clean sources in the power sector is a positive one for health, climate security, and jobs. And by all indications, the shift is unstoppable."

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Down tools! Chinese authorities and Indian bankers have just come to realize that new coal plants are a major waste of resources.

"The staggering uptick in clean energy and reduction in the new coal plant pipeline is even more proof that coal isn't just bad for public health and the environment – it's bad for the bottom line," said Nicole Ghio, senior campaigner for the Sierra Club's International Climate and Energy Campaign. "Markets are demanding clean energy, and no amount of rhetoric from Donald Trump will be able to stop the fall of coal in the US and across the globe."

"2016 marked a veritable turning point," said Lauri Myllyvirta, senior global campaigner on Coal and Air Pollution at Greenpeace. "China all but stopped new coal projects after astonishing clean energy growth has made new coal-fired power plants redundant, with all additional power needs covered from non-fossil sources since 2013. Closures of old coal plants drove major emission reductions especially in the US and UK, while Belgium and Ontario became entirely coal-free and three G8 countries announced deadlines for coal phase-outs."

The report singles out Japan, South Korea, Indonesia, Vietnam, and Turkey as countries that have failed to develop their renewable energy sectors in step with their peers and continue to build and plan new highly polluting coal plants.

Sources: Report: Global Coal Plant Development Freefall Sparks Renewed Hope On Climate Goals *http://endcoal.org/2017/03/new-report-global-coal-plant-development-freefall-sparks-renewed-hope-on-climate-goals/*

Boom and Bust 2017: *http://endcoal.org/global-coal-plant-tracker/reports/boom-bust-2017/*

CCS – from power plants to industrial plants

As the change from fossil fuels to renewable energy is gradually gaining wider acceptance, CCS is now seen more and more as a method mainly applicable to industrial processes.

Carbon Capture and Storage (CCS) has been at the centre of the Norwegian climate debate for several decades, since it was first introduced in the early 1990s. This has also made Norway interesting for other countries in the international debate about climate change mitigation measures. CCS has been one of two central pillars of the government's climate policy. CO_2 certificates bought in other countries to offset Norwegian emissions have been the other pillar. Both policies have been criticized by environmental organizations because they are seen to detract from the government's efforts to reduce domestic emissions, for example in the transport sector.

There is much less focus on CCS in the Norwegian debate these days. The reason is that in 2013 the project to build a full-scale demonstration CCS plant was shelved. The CCS plant was to be built in conjunction with a gas-fired power plant at Mongstad on the west coast of Norway. The official reason was that the cost would be too high. Therefore it would not bring down the cost of building CCS plants, and would not encourage others to build more plants. The CCS project at Mongstad was the "moon landing" announced by Jens Stoltenberg in 2007, when he was prime minister. The red-green government resigned in 2013 after suffering an election defeat, and one of its last acts was to shut down the CCS project. Newspaper headlines said that "the moon landing had crashed".

The right-wing government of Erna Solberg has not shelved the plan to build a full-scale CCS plant. For some time it has been looking more actively for opportunities to finance projects in the EU rather than in Norway. In early February 2015 the Norwegian government announced its ambition to become a full member of the "EU bubble" of collective responsibility for emission reduction targets. Norway is not member of the EU, but the oil sector and some of the industrial sector is already part of the ETS – the EU Emission Trading System. This was made possible by Norway's membership in an association treaty called the European Economic Area – EEA. Full membership may, if it succeeds, make investments in CCS projects in the EU easier. However, there are not any CCS projects in the EU to invest in at the time being.

Three small pilot projects connected to CO_2 emissions from a waste incineration plant in the capital Oslo and two industrial operations in Porsgrunn, southwest of Oslo, have been the most prominent initiatives recently. All three have been concluded. What the supporters of CCS are hoping for now is a decision by the government to finance a full-scale demonstration plant at one of the three sites.

The decision to build a full-scale CCS plant in Norway will not be made by the present government. Instead, it has ordered three more so-called "conceptual studies" of all three alternative sites. These will be concluded in the fall of 2017, after the parliamentary elections. So the present government will not have to make the decision. It can leave it to a new social-democratic government, if that is the result of the elections. According to the polls, this is a highly likely scenario.

The shifting focus from CCS for power plants to CCS for industrial processes and other non-energy activities is symptomatic of a broader, international trend. There is a growing understanding that CCS as a means of reducing CO_2 emissions from power plants is not a viable solution. The change from fossil fuels to renewable energy sources is gradually gaining wider acceptance as the main mitigation measure for power production. The focus has also changed in the international debate, and CCS is now seen as a method mainly applicable to industrial processes that at present lead to CO_2 emissions. However, critics point out that many of the industrial products that at present cause CO_2 emissions can be replaced with other products (wood instead of cement, for example), and industrial processes can be substituted with other processes that do not emit CO_2. It would be a costly mistake to do both: first install a CCS plant, and then change the industrial process so it does not emit CO_2.

In a feasibility study published in the summer of 2016, the conclusion was that it is technically feasible to realize a CCS chain (capture, transport and storage) in Norway. This would be based on transport by ship, and not by pipeline. Establishing a CO_2 storage installation offshore is feasible, but increases the technical risks. The use of ships will make the system more flexible and increases the ability to take in smaller amounts of CO_2 from different sources.

In a separate economic report from outside consultants the economic feasibility of the investment in a full-scale CCS plant has been evaluated. The report concluded that given certain conditions, the investment in a full-scale CCS plant in Norway would not be economically profitable from a societal point of view. Continued low prices on avoided CO_2 emissions will mean that no further CCS plants will be built. The consultants therefore recommend that the project should not be carried out now. The government should instead wait until such projects can demonstrate the advantages to a greater degree. The conditions stipulated that the project's contribution to CO_2 removal will be small. This means it will have a low value in the analysis. This also means there will be no efficiency gains from the subsequent project, which would build on experience from the demonstration

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Several so-called CCS projects miss the storage part. When the carbon dioxide is used for industrial purposes or in enhanced oil recovery it will sooner or later be realesed into the atmosphere like the carbon dioxide in a fizzy drink.

project, and because of this could be carried out at a lower cost. In a comment, the Norwegian oil and energy minister, Tord Lien, says that the consultants point to an important fact: "This is not a project mainly to reduce Norwegian emissions of CO_2, but a contribution to the global development of a necessary climate technology. A Norwegian demonstration project must be carried out in a way so that it contributes to this development as much as possible."

Taking into account that a previous project, the Mongstad CCS plant, was cancelled with the argument that the cost was too high and therefore not likely to inspire others to follow up with new projects; this comment may be a preparation for a later cancellation of the plans.

Maybe the most widely reported results from the Norwegian CCS experience are from the Sleipner project in the North Sea. Proponents of CCS point to Sleipner as proof that CCS is feasible on a large scale. Among the arguments used is that it has pumped a million cubic metres per year of CO_2 down into a sandstone formation called the Utsira formation since 1996, with no sign of leakage. According to professor Peter M. Haugan at the Institute for Geophysics, University of Bergen, this may be just pure coincidence (or luck, in layman's terms). A careful study of the reservoir and the cap rocks above the reservoir was not carried out prior to the start of pumping in 1996. A later study of the CO_2 storage reservoir carried out in 2014 showed numerous cracks and so-called chimneys through the cap rock, some of them reaching all the way down to the sandstone, where the CO_2 is stored. A huge crack was found 25 kilometres north of the storage area. This might just as well have turned out to have been above the storage area, but nobody knew that back in 1996.

Professor Haugan`s conclusion was that it is very costly to research a possible storage area in order to be sure that it will not leak. The process may take between three years at the best and ten years at the worst, before one can draw a conclusion. This conclusion is not guaranteed to be positive. A long and costly process may end with a "No", that the area is not suitable for storage. This also means that CO_2 storage areas are a resource with a limited supply, and must be treated as such. They should not be used for storage of CO_2 that may be otherwise removed by other measures.

Statoil, which is the oil company with most experience in the North Sea, and the operator of Sleipner and the CCS project there, is optimistic about the long-term prospects of CO_2 storage in the North Sea. However, at the time being, there are no large commercial CO_2 storage facilities anywhere in the world. The term "commercial" refers here to a facility which accepts CO_2 from several customers for storage. Nor are there any large-scale CCS plants anywhere in Europe that may need a place to store CO_2. The price of CO_2 is also far too low to make a commercial CO_2 storage facility economically viable. The CO_2 price must be at least USD 50/ton, while at present the price is just USD 6/ton of CO_2.

The Sleipner project is only meant for the CO_2 separated from the natural gas that is extracted from the reservoir deep under the seabed, and does not accept

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Anti-coal activist in the UK, where emissions from coal dropped by 58% in 2016.

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CO_2 emissions from EU coal power fell in 2016

ENDS reports that carbon dioxide emissions from power stations and other major combustion plants, which account for 65 per cent of the European Union total, fell by four per cent in 2016 compared to the preceding year. Emissions from coal power generation fell by 11 per cent in 2016 with over half of the drop attributable to the rapid decline of coal power in the UK. Power sector emissions in Germany and Poland – the two largest polluters – fell by only four per cent and one per cent respectively.

Source: ENDS Europe Daily, 3 April 2017

CO_2 emissions dropped 1.7 % in the US in 2016

Energy-related carbon dioxide emissions in the US dropped 1.7 per cent in 2016 due largely to significant decreases in coal use, according to the Energy Information Administration.

That 1.7 per cent is less than the 2.7 per cent drop seen over 2015, the agency said. Domestic consumption of, and emissions from, natural gas and oil each rose about 1 percent last year, while coal use dropped 8.6 per cent, the EIA reported.

The CO_2 emissions reductions were primarily realised in the electric sector, which lowered its emissions last year by 4.9 per cent. A simultaneous 1.9 per cent increase in emissions from transportation meant that sector overtook electricity production as the top emitter for the first time. Overall the US economy's carbon intensity, a comparison of emissions and gross domestic product, decreased 3.3 per cent in 2016, compared with a 5.3 per cent decrease in 2015, according to EIA.

Source: Politico, April 2017
https://www.eia.gov/todayinenergy/detail.php?id=30712

CCS – from power plants to ...

Continued from previous page

CO_2 from other sources. An important reason for this is that the CO_2 at Sleipner has very different properties from CO_2 captured from exhaust gases at a power plant. The equipment that handles the CO_2 is designed to suit these properties, and cannot handle CO_2 with other properties. The CO_2 at the Sleipner field arrives at the surface together with natural gas under very high pressure and at very low temperature, and the separation of the CO_2 from the natural gas is tailored for this. The pressure makes it easier to return the CO_2 down into the storage area.

These are the main reasons why the Sleipner project has only limited value as an example of what is possible regarding commercial storage of CO_2 underground, especially in underground formations in the North Sea.

Quite often other types of CC projects are also lumped together with real CCS projects such as the Sleipner projects. This is causing confusion, and creates a false impression that there are many real CCS projects around the world. This impression is of course useful for the supporters of CCS, so they do not try to clear up the misunderstanding, and may even actively contribute to the confusion. The problem lies with projects that separate CO_2 from exhaust gases, mainly from coal-fired power stations. These projects are examples of Carbon Capture – CC – but the Storage part is missing. The CO_2 from many Carbon Capture plants is not stored underground with the express intention that it should remain there for a very long period of time. Instead, the CO_2 is often used for industrial purposes, and eventually it is released back into the atmosphere. (Whenever you open a bottle of fizzy sugar drink, the CO_2 in the bottle is released into the atmosphere.) Another use, which is quite common, is in Enhanced Oil Recovery – EOR. Here, the CO_2 is pumped down into oil and gas reservoirs. This increases the pressure in the reservoir, and pushes out more oil and gas. The CO_2 will also find its way back into the atmosphere from the oil and gas reservoirs, even if it may be delayed for some time. To call this "storage" is confusing, since the CO_2 captured is not stored underground; it is only delayed on its way to the atmosphere. Lumping together CC and CCS projects and calling them all CCS is therefore dishonest, and does not reflect the real situation.

In recent years three such CC projects have been hailed as the next big CCS projects, although they are not. The most recent example has been touted as America's first "clean coal" plant, as it captures CO_2 from a coal combustion plant outside Houston, Texas. However, it is not a CCS plant, since the CO_2 captured is piped 80 miles to the West Ranch oil field. There the CO_2 is used to force additional oil from the ground. The same article also describes the Kemper Plant, located further east, in the state of Mississippi. This is a plant that gasifies lignite, a type of coal, into something called syngas, and removes some of the CO_2 in the process. The syngas is burned for electricity generation, and CO_2 from the exhaust gas is also stripped away. Together, the CO_2 from both stages is then shipped to an oil field for EOR – to aid additional oil recovery. In the article, both plants are lumped together and called examples of CCS, although this is patently wrong. There is no permanent storage of the CO_2; it will escape to the atmosphere after being used in EOR.

The Boundary Dam CC plant in Canada is a third example of a plant that captures CO_2, and 90 per cent is used for EOR in an oil field not far away. A small part, 10 per cent, is used in an experimental storage facility.

A review of most of the plants that CCS supporters are lumping together and calling CCS plants would probably reveal the same facts: carbon capture is mainly done in order to get CO_2 for use in EOR – pushing more oil out of the ground. This is not doing anything to reduce the CO_2 in the atmosphere, and so cannot be called a climate mitigation measure. Rather the opposite, in fact, since it can be argued that these plants increase the amount of oil available for burning. That is not helpful for the atmosphere, or for humanity and the ecosystems on this planet.

Tore Braend

Air pollution health impacts shifted by global trade

International trade has moved more than 750,000 air pollution-related deaths from regions that import goods to those that produce them.

An international study led by atmospheric chemist Qiang Zhang of Tsinghua University in Beijing has investigated the effects of international trade on air pollutant emissions, air quality and resulting health damage by combining four global models to estimate premature mortality caused by fine particulate matter ($PM_{2.5}$) pollution as a result of atmospheric transport and the production and consumption of goods and services in different world regions.

$PM_{2.5}$ in ambient air originates both from primary particles emitted directly into the air and from secondary particles produced as a result of chemical reactions of $PM_{2.5}$ precursor pollutants, namely sulphur dioxide, nitrogen oxides, ammonia and volatile organic compounds. $PM_{2.5}$ can cause or aggravate cardiovascular and lung diseases, heart attacks and arrhythmias. It can also cause cancer.

It was found that of the 3.5 million premature deaths related to $PM_{2.5}$ pollution in 2007 worldwide, about 12 per cent (411,000 deaths) were related to air pollutants emitted in a region of the world other than that in which the death occurred, i.e. resulted from cross-border transport of air pollution.

For example, air pollution produced in China in 2007 was linked to more than 64,800 premature deaths in regions other than China, including more than 3,100 premature deaths in western Europe and the USA.

But 22 per cent – or 762,000 – of the total number of premature deaths were associated with goods and services produced in one region for consumption in another, meaning that international trade in effect shifts the health damage of production from countries that import goods to those that produce them.

According to the study, consumption in western Europe and the United States was linked to more than 108,600 premature deaths in China. The results show that the transboundary health impacts of $PM_{2.5}$ pollution associated with international trade are greater than those associated with long-distance atmospheric pollutant transport.

One of the conclusions of the study is that if the cost of imported products is lower because of less stringent air pollution controls in the regions where they are produced, then the consumer savings may come at the expense of lives lost elsewhere.

The authors also conclude that improving pollution control technologies in China, India and elsewhere in Asia would have disproportionately large health benefits in those regions and worldwide, and that international cooperation to support such pollution abatement efforts and to reduce "leakage" of emissions via international trade is in the global interest.

Christer Ågren

Source: Science, 29 March 2017.

The study: "Transboundary health impacts of transported global air pollution and international trade." By Qiang Zhang et. al., Nature, Vol 543, 30 March 2017.

It is a simple equation: importing goods results in exports of emissions and vice versa.

"A game changer"

The first autonomous electric container ship

Norwegian fertilizer producer Yara and maritime technology firm Kongsberg are teaming up to build what they say will be the world's first fully electric and autonomous container feeder ship. The vessel, to be named Yara Birkeland, is planned to start operation in 2018 as a manned vessel before moving to remote operation in 2019, and later to fully autonomous operation from 2020 onwards. It will cut emissions and boost road safety by removing up to 40,000 diesel-powered truck journeys per year.

"The new zero-emission vessel will be a game-changer for global maritime transport, contributing to meet the United Nations' sustainability goals," the companies said.

Source: *globenewswire.com*, 10 May 2017

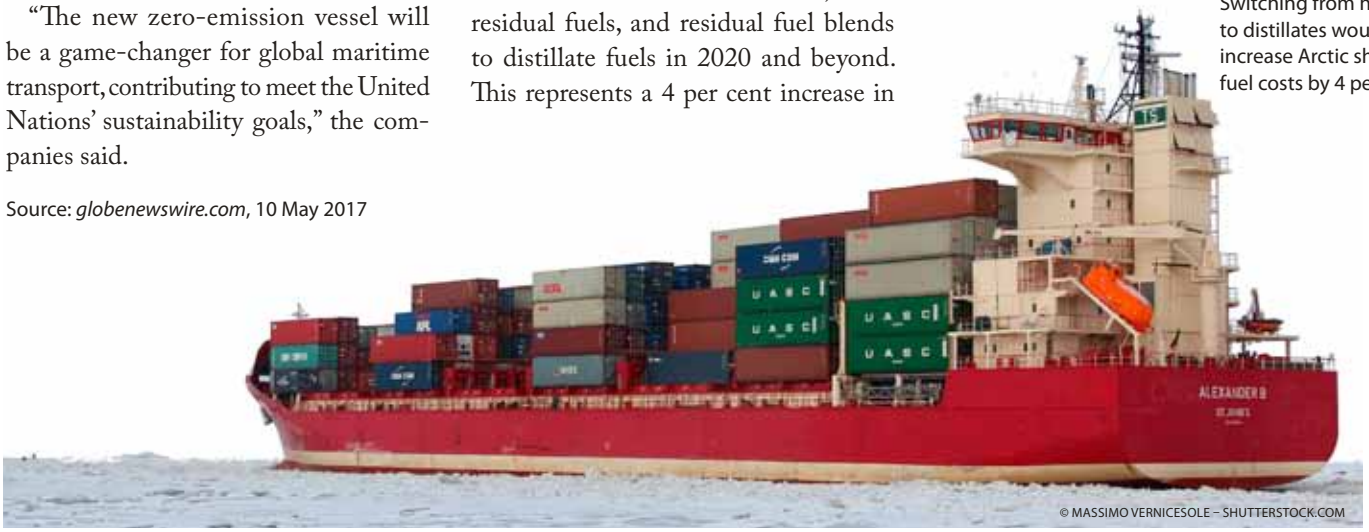
Ban dirty residual fuels in the Arctic

A new study by the International Council on Clean Transport (ICCT) compares the economic and environmental trade-offs of switching from heavy residual fuel oil (HFO) to two alternative fuels, distillate fuel and liquefied natural gas (LNG), in the Arctic. Switching from HFO to LNG is said to be challenging, because most ships in the Arctic fleet would need to be converted to operate on LNG, which is a potentially expensive undertaking in the short term.

Switching to cleaner distillate fuels is more feasible – it is estimated to cost US$9 to 11 million to switch all of the ships in the Arctic fleet that use HFO, other residual fuels, and residual fuel blends to distillate fuels in 2020 and beyond. This represents a 4 per cent increase in fleet-wide fuel costs for Arctic ships and avoids the potential costs of cleaning up an HFO spill – costs that have routinely exceeded $100 million per incident.

The study concludes that prohibiting any petroleum-based fuel oil in the region provides the greatest long-term protection from the environmental and economic risks. In the meantime, the short-term solution would be to prohibit the use and carriage of HFO, desulphurised residual fuel, or residual fuel blends, as this could immediately reduce the risks.

Source: The ICCT, 18 April 2017 (*www.theicct.org*)



Switching from heavy oil to distillates would only increase Arctic ship's fuel costs by 4 per cent.

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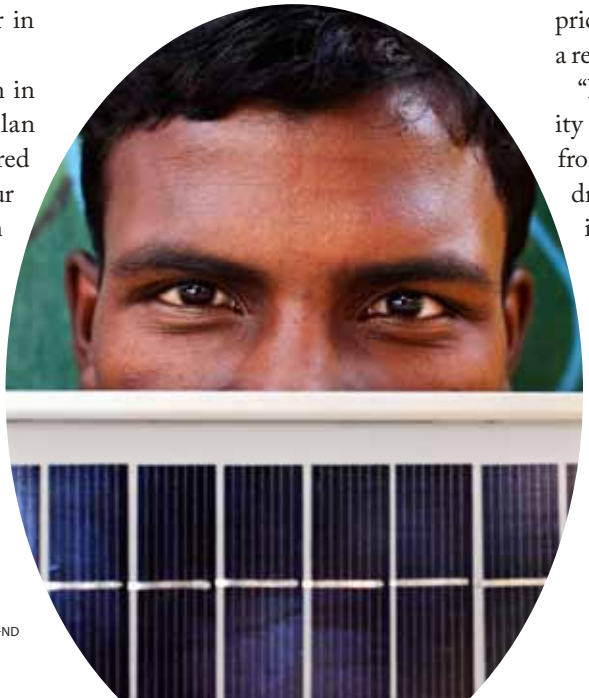
Indian solar power prices hit record low

The Guardian reports that "wholesale solar power prices have reached another record low in India, faster than analysts predicted and further undercutting the price of fossil fuel-generated power in the country."

"At a reverse auction in Rajasthan in May 2017, power companies Phelan Energy and Avaada Power each offered to charge 2.62 rupees per kilowatt-hour (kWh) of electricity generated from solar panels they hope to build at an energy park in the desert state. Last year's previous record lowest bid was 4.34 rupees per kWh.

Analysts called the 40 per cent price drop 'world historic' and said it was driven by cheaper finance and growing investor confidence in India's pledge to dramatically increase its renewable energy capacity.



A 40 per cent price drop for solar in the last year outcompetes coal.

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It reduces the market price of solar tariffs well past the average charged by India's largest thermal coal conglomerate, currently around 3.20 rupees per kWh. Wholesale price bids for wind energy also reached a record low of 3.46 rupees in February."

"By 2022, India aims to have the capacity to generate 175 gigawatts of power from solar, biomass and wind energy. A draft report by the country's electricity agency in December predicted that capacity would increase to 275 gigawatts by 2027."

Source: *https://www.theguardian.com/environment/2017/may/10/indian-solar-power-prices-hit-record-low-undercutting-fossil-fuels*

Renewables to be subsidy free

Almost 90 per cent of new power in Europe came from renewable sources in 2016. For the first time windfarms accounted for more than half of the capacity installed.

Bloomberg reports[1] that Danish renewable energy is set to be subsidy free in a few years.

"After more than four decades of relying on subsidies, Denmark's renewable energy industry is ready to survive on its own much sooner than anyone expected. The Danish energy minister, Lars Christian Lilleholt, says that 'in just a few years,' renewable energy providers won't need state support anymore. He says it's a development he couldn't have imagined as recently as last year."

"Lilleholt says the experience in Denmark ...demonstrates that coal is no longer cheaper to produce than renewable energy. What's more, the development is set to become more pronounced, Lilleholt says. 'Everything suggests that technology will help make renewable energy more and more competitive,' he said. And as green energy becomes more efficient, the minister warns that 'already today, it's impossible to build a new coal power plant without support.'"

Bloomberg further reports[2] that "Germany's electricity grid regulator approved bids to build what will be the first offshore wind farms that depend entirely on market prices instead of government support and subsidy. The decision by Bundesnetzagentur, or BNetzA, grants power purchase agreements for 1,490 megawatts of wind farms to be built in the North Sea. Developers promised to supply power from the facilities at a record-low weighted average of 4.40 euros ($4.67) a megawatt-hour, less than a tenth of the previous offshore wind deal, the regulator said.

The bids were 'far below any expectations,' said BNetzA President Jochen Homann. They're well beneath the market price for power in Germany, which has fallen 3.8 per cent this year to 30.10 euros a megawatt-hour, according to broker data compiled by Bloomberg."

The Guardian reports[3] that the Netherlands just "opened what is being billed as one of the world's largest offshore wind farms, with 150 turbines spinning far out in the North Sea. Over the next 15 years the Gemini windpark, which lies some 85 km (53 miles) off the northern coast of the Netherlands, will meet the energy needs of about 1.5 million people. At full tilt the windpark has a generating capacity of 600 megawatts and will help supply 785,000 Dutch households with renewable energy, according to the company.

Danish wind power is soon ready to survive on its own.

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"Gemini would contribute about 13 per cent of the country's total renewable energy supply and about 25 per cent of its wind power", said the company's managing director, Matthias Haag to the Guardian. "It would help reduce emissions of carbon-dioxide emissions, among the greenhouse gases blamed for global warming, by 1.25m tonnes, the company says."

In another article the Guardian reports[4] "Renewable energy sources made up nearly nine-tenths of new power added to Europe's electricity grids last year, in a sign of the continent's rapid shift away from fossil fuels. But industry leaders said they were worried about the lack of political support beyond 2020, when binding EU renewable energy targets end. Of the 24.5GW of new capacity built across the EU in 2016, 21.1GW – or 86% – was from wind, solar, biomass and hydro, eclipsing the previous high-water mark of 79% in 2014.

For the first time windfarms accounted for more than half of the capacity installed, the data from trade body WindEurope showed. Wind power overtook coal to become the EU's second largest form of power capacity after gas...Germany installed the most new wind capacity in 2016, while France, the Netherlands, Finland, Ireland and Lithuania all set new records for windfarm installations."

Compiled by Reinhold Pape

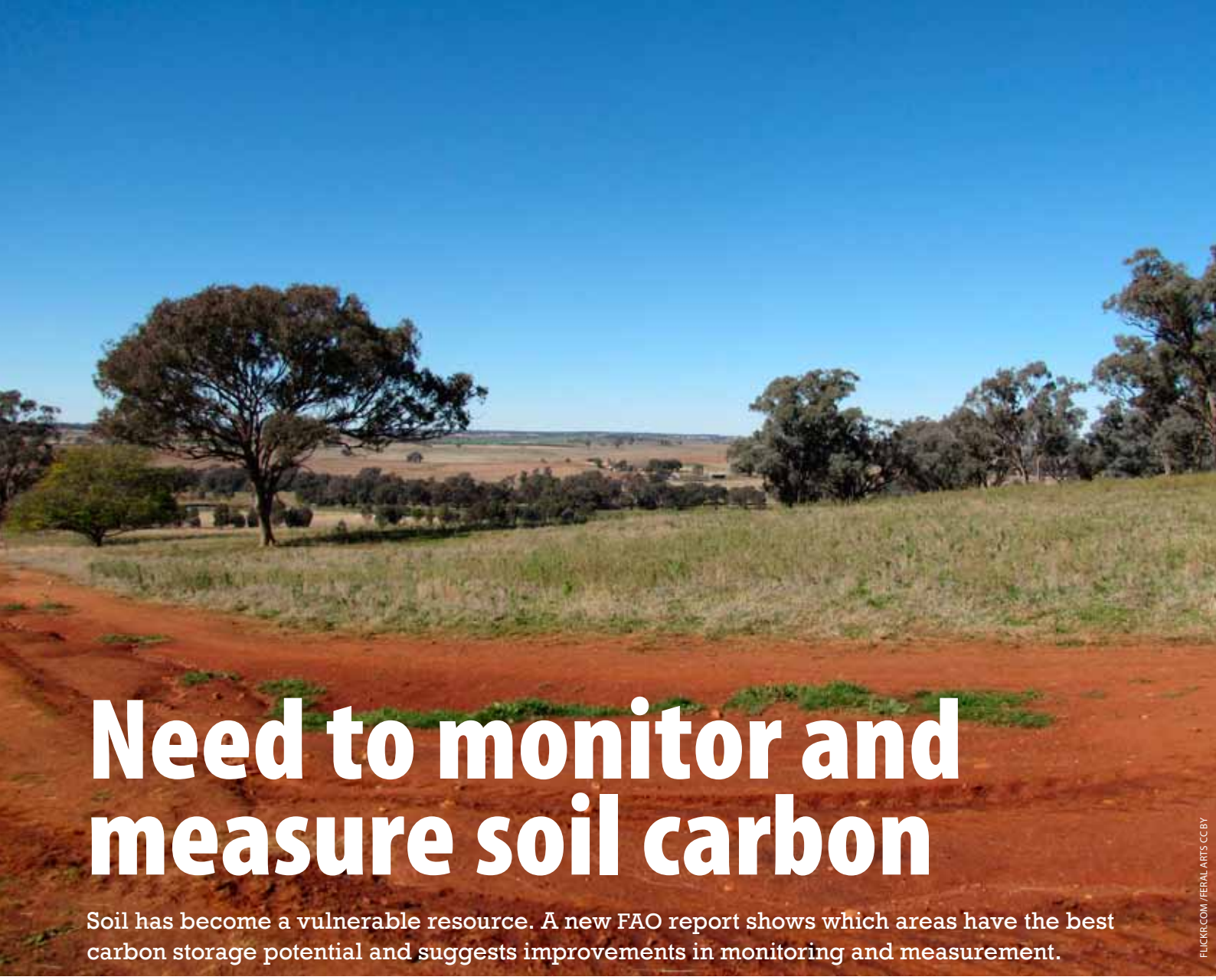
Sources:

[1] Blomberg.com, 24 April 2017: *https://www.bloomberg.com/politics/articles/2017-04-24/surprising-profits-and-how-an-energy-trail-was-blazed-in-denmark*

[2] Blomberg.com, 13 April 2017: *https://www.bloomberg.com/news/articles/2017-04-13/germany-gets-bids-for-first-subsidy-free-offshore-wind-farms*

[3] The Guardian, 9 February 2017: *https://www.theguardian.com/environment/2017/feb/09/new-energy-europe-renewable-sources-2016*

[4] The Guardian, 9 May 2017: *https://www.theguardian.com/environment/2017/may/09/full-tilt-giant-offshore-wind-farm-opens-in-north-sea*



Need to monitor and measure soil carbon

Soil has become a vulnerable resource. A new FAO report shows which areas have the best carbon storage potential and suggests improvements in monitoring and measurement.

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Soil works as a carbon reservoir and contains more carbon than the atmosphere and terrestrial vegetation combined. The report "Soil organic carbon – the hidden potential" from the Food and Agriculture Organization (FAO), highlights the importance of shifting focus on how to best capture the carbon dioxide from the atmosphere and instead focus on how to find ways to keep carbon in the soil. The targets that have been set in the Kyoto protocol and Paris agreement include regular reporting of anthropogenic greenhouse gas emissions, which among other things include making inventories of emissions caused by soil organic carbon.

The removal of carbon dioxide from the air takes place through plant photosynthesis, in which plant biomass converts carbon dioxide into carbon in the soil in the form of soil organic carbon. The soil organic carbon reservoir constantly moves between different global carbon pools, in different molecular forms. Various components in the soil, such as the macrofauna which include fly larvae, snails and spiders etc., have the potential to move soil organic carbon to greater depths, where the carbon has the best potential to be stored.

Soil organic carbon is the main component of soil organic matter, which describes the soil in its various stages of decomposition. Soil organic carbon is important for the structure and stability of the soil, and therefore its capacity for aeration and water filtration. Decomposition affects the microbial activity in the soil that controls the soil's potential for carbon storage. Soil organic carbon is dynamic and different anthropogenic impacts on the soil turn it into either a net sink or a net source of greenhouse gases. The carbon-based greenhouse gases emitted by soil are mainly carbon dioxide CO_2 and methane CH_4. Nitrous oxide N_2O can also be emitted and has become increasingly anthropogenically driven, largely from agricultural soils and livestock facilities.

Soil organic carbon plays an important role in food security by increasing soil productivity and its contribution to high yields. Soil organic carbon increases the water and nutrient retaining capacity that contributes to improved soil structure, which in turn is good for plant growth. If this retaining capacity is not supported, the soil organic carbon may be emitted back into the atmosphere, the soil may become eroded, or dissolved organic carbon may be washed into rivers and oceans.

Storage of soil organic carbon is more effective in some places than others, and these so-called hot spots are areas such as peatlands and temperature-vulnerable permafrost zones. These areas act as a major carbon sink but they can become a big problem in the future if they are managed in an unsustainable way. Hot

Some of the improvements that the FAO report proposes are:

- More precise measurement and mapping the carbon cycle and soil organic carbon dynamics to understand their mutual dependency.
- Use new types of soil management and systems that are custom-specific to certain areas to promote long-term soil organic sequestration.
- Improve knowledge and create immediate measures for the management and understanding of soil organic carbon to promote sustainable food production.
- Increase the understanding and importance of how human activity affects climate change, including soil respiration and microbial contribution to carbon feedback.
- Identify all soil organic carbon hot spots and increase understanding of their value in mitigating climate change.
- New compilation of country-specific soil organic carbon stock instead of using global and historical data.
- Specific field protocols and efficient, cost-effective sampling systems for assessing soil organic carbon dynamics. A standardised method for determining soil depth for soil organic carbon pool estimates is also needed.
- Research-based recommendations for maintaining or increasing soil organic carbon stocks for all types of areas, but especially in hot spots and bright spots.
- Create a general agreement on the soil organic carbon stabilisation process. A universal metric specifically designed for soil organic carbon monitoring is required.
- Scientific and political decisions about future measurement of soil organic carbon.

spots like these need more attention in the measurement and management of soils. Large land-areas, called bright spots, that currently have low soil organic carbon content, can also become long-term carbon sinks in the future.

Environmental change and unsustainable agricultural management, such as monocultures and the use of chemicals, damage the soil's biodiversity and affect several ecosystem functions, including the decomposition of soil organic carbon. Rising temperatures and more frequent occurrence of extreme weather events will lead to increased losses of soil organic carbon to the atmosphere, although the overall impact varies depending on factors such as soil type, climate conditions and region. It is difficult to predict the impact of climate change on the activity of soil due to those varying influences. Estimates still indicate that the carbon response of soil can go from small losses to moderate profits and it is therefore important to find a way of understanding the relationship between the soil's biodiversity and the carbon cycle.

To model carbon dynamics, soil organic carbon is divided into three pools depending on its physical and chemical stability: the fast pool, intermediate pool and slow pool. The fast pool is the most labile and sensitive one and the process of preserving carbon can take time, from days to several years. At deeper depth, where the soil has a higher capacity to store carbon, is the slow pool. The global stock of soil organic carbon has been estimated at 1,500 gigatonnes of carbon in the top one-metre layer. The data that was used in previous measurements was collected over long periods using different calculations and methods, which makes the estimates inaccurate.

Each country that has signed the Paris Agreement must regularly report its greenhouse gas emissions. All countries follow the same estimation methods for soil organic matter and soil organic carbon changes, provided by the International panel on climate change (IPCC) guidelines for national greenhouse gases.

The FAO report raises several challenges in soil organic carbon sequestration and its preservation. Some are affected by human practices, such as shortcomings in sustainable soil management and lack of knowledge. Other factors that are mentioned are beyond human control, such as soil structure, and are also important to consider. Some scientific progress has been achieved in understanding and explaining soil organic carbon dynamics but there is much more to do.

Malin Larsson

Source: FAO report: Soil organic carbon – the hidden potential. Link: *http://www.fao.org/3/a-i6937e.pdf*

Paris launches urban air pollution watchdog

In March, Paris Mayor Anne Hidalgo presented the Global Urban Air Pollution Observatory (GUAPO) to the Paris city council, and Abidjan, London, Mexico and Rotterdam have already committed to joining, while Athens, Montréal, New York City, Peking and Tokyo are in discussions to join.

The new observatory will operate under an estimated €500,000 annual budget and is intended to serve as a clearing house for best practices around air quality in cities, including techniques for accurately measuring air pollutants and public policies to improve air quality. The aim is to help cities across the globe to assess and solve the problem of dangerous air.

The observatory is expected to commence its work following a June public unveiling in Rotterdam.

Source: Citiscope, 20 April 2017.

Link: *http://citiscope.org/story/2017/paris-launches-global-urban-air-pollution-watchdog*

France adopts national air pollution plan

A plan adopted in early May by the outgoing French environment minister, Ségolène Royal, sets new legal limits on air pollutant emissions up to 2030, in line with the emission reduction commitments under the EU's National Emission Ceilings (NEC) directive.

The decree requires the country to cut sulphur dioxide emissions by 77 per cent by 2030, compared to 2005 values. Emissions of nitrogen oxides will need to fall by 69 per cent, particulate matter by 57 per cent, volatile organic compounds by 52 per cent and ammonia by 13 per cent. The 2030 targets will be preceded by interim goals for 2020 and 2025.

Source: Ends Europe Daily, 10 May 2017

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Ruling against Bulgaria opens door for air pollution action

The recent decision from the EU Court of Justice opens the door for the Commission to take more robust action in relation to air quality infringements and will facilitate legal actions before national courts by individuals and NGOs.

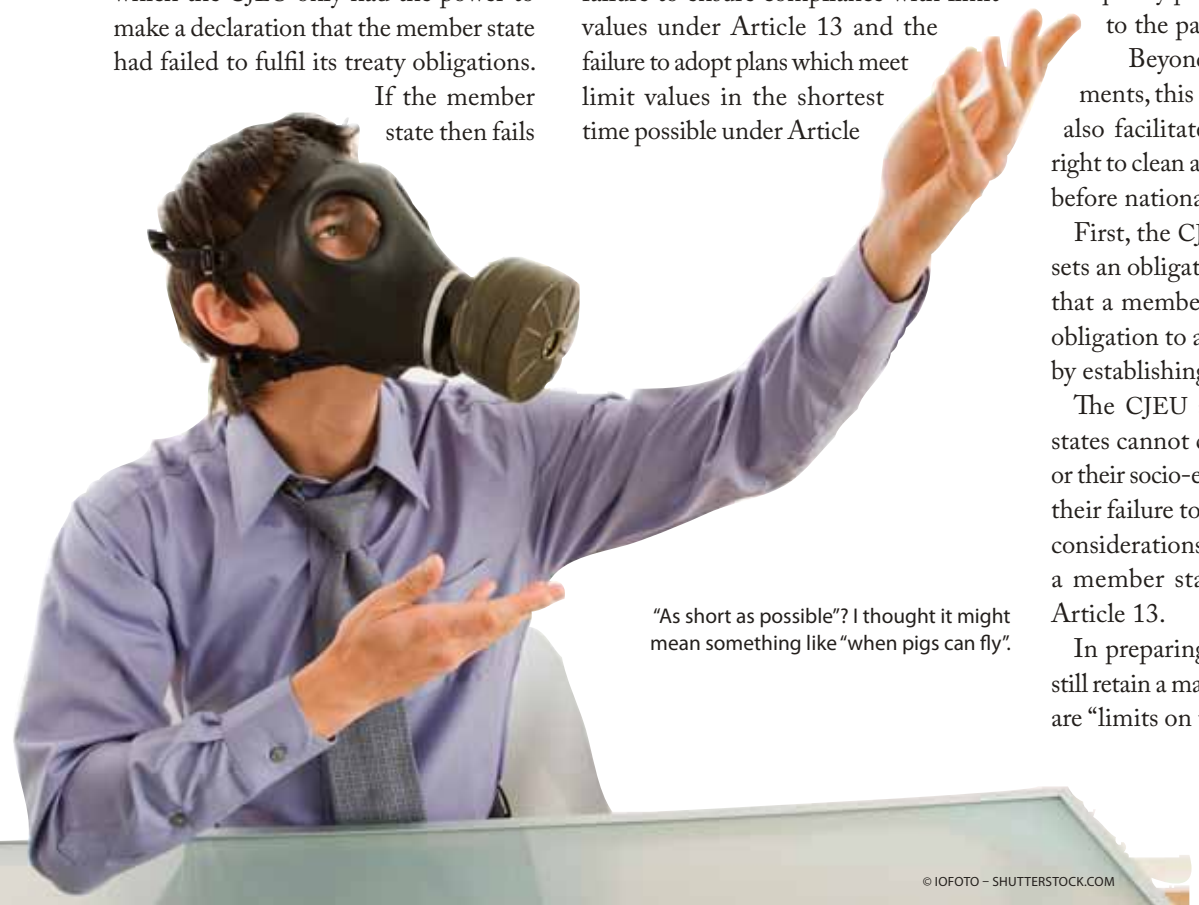
On 5 April 2017, the Court of Justice of the European Union (CJEU) found the Bulgarian government to be in breach of Directive 2008/50/EC (the Air Quality Directive) for having systematically and continuously exceeded PM_{10} limit values throughout its territory and for having failed to prepare air quality plans, which would keep the duration of the breach as short as possible (Case C-488/15). This case marks a fundamental step forward in the enforcement of the right to clean air, as the Commission will now be able to seek financial sanctions against member states in breach of the Air Quality Directive.

Historically, air quality infringements have been problematic. Limit values for PM have been in place since 1 January 2005. The Commission started infringement actions against member states in 2008 and eventually obtained CJEU judgments against four member states: Slovenia, Sweden, Portugal and Italy.

These were "round one" actions, in which the CJEU only had the power to make a declaration that the member state had failed to fulfil its treaty obligations. If the member state then fails to comply with the judgment, the Commission can start "round two" actions and request the CJEU to apply fines. In particular, the CJEU found that these four member states had breached the PM_{10} limit values during a specific period of time in the past, but did not force them to take any measures to comply with the limits in the future, and therefore gave no opportunity to the Commission to bring "round two" proceedings.

The decisions were, therefore, useless as no follow-up enforcement proceedings could be started by the Commission to ensure compliance. The result of these setbacks is that more than 10 years after the PM_{10} limit values came into force, not a single fine has been issued, despite the fact that 21 member states were still in breach as of 2014.

Since the previous approach was ineffective, the Commission adopted a fresh approach to air quality infringement proceedings in 2013. Based on both the failure to ensure compliance with limit values under Article 13 and the failure to adopt plans which meet limit values in the shortest time possible under Article 23, such an approach would empower the Commission to bring round two proceedings and seek the application of fines against member states that continuously fail to adopt adequate air quality plans.



"As short as possible"? I thought it might mean something like "when pigs can fly".

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The action against Bulgaria was particularly important, as it was the first case under the fresh approach to reach CJEU judgment. The decision of 5 April 2017 supports the Commission's approach. The CJEU found not only that PM_{10} concentrations were systematically and continuously exceeded between 2007 and 2014. A direct link between the breach of limit values and the drawing up of air quality plans was also expressly identified. Bulgaria failed to fulfil its obligations under Article 23(1) to keep the duration of the breach "as short as possible" from 11 June 2010 until 2014, by adopting appropriate measures in an air quality plan. Failure to comply with this judgment and, therefore, to improve the existing, inadequate, air quality plans would expose Bulgaria to the payment of fines.

Beyond the issue of EU infringements, this latest CJEU judgment will also facilitate the enforcement of the right to clean air by individuals and NGOs before national courts.

First, the CJEU found that Article 13 sets an obligation for results. This means that a member state does not satisfy its obligation to achieve limit values simply by establishing an air quality plan.

The CJEU also stated that member states cannot claim technical difficulties or their socio-economic situation to justify their failure to achieve limit values. Such considerations are irrelevant in light of a member state's persisting breach of Article 13.

In preparing plans, member states do still retain a margin of discretion, but there are "limits on the exercise of that discre-

tion". The court stated that in exercising this discretion, account must be taken of the balance between protecting human health and opposing public and private interests. However, this statement – taken from the Janecek case C-237/07 – needs to be understood in light of the fact that member states can no longer rely on using socio-economic reasoning as an excuse. Moreover, the Janecek case was a ruling on obligations laid down by an earlier version of the Directive (96/62/EC).

Article 23 of the Air Quality Directive introduced the new concept of an "air quality plan", which was much more demanding than the equivalent requirements for "plans or programmes" under the 1996 Directive. In particular, it required air quality plans to keep the exceedance period "as short as possible". In this regard, the reasoning of the CJEU becomes clearer when read in conjunction with paragraph 96 of the opinion of the Advocate General Kokott. The Advocate General's opinion qualifies the need to strike a balance with the requirement to carry out a strict review of the balancing exercise. Member states' discretion is clearly reduced even where a balance must be struck, simply because of the impact ambient air quality has on human health and life. Such overriding importance placed on ambient air quality "leaves little room for any other consideration".

Finally, the CJEU decision dealt with the "as short as possible" requirement. According to the Court, this can only be assessed on a case by case basis. It therefore remains that "as short as possible" means "as short as possible".

In conclusion, this latest decision from the CJEU, on the one hand, opens the door for the Commission to take more robust action in relation to air quality infringements and, on the other, will facilitate legal actions before national courts by individuals and NGOs to claim the protection of our right to breathe clean air.

Nabeeha Uddin
ClientEarth

Italy must take action on air quality

On 27 April, Italy received a final warning from the European Commission because of failure to address persistently high levels of particulate matter (PM_{10}). More than 66,000 people die prematurely in Italy each year as a result of PM pollution, making it the most affected of all EU countries, according to estimates by the European Environment Agency.

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In Italy, air pollution causes 66,000 premature deaths, which is more than in any other EU country.

The final warning applies to 30 air quality zones across Italy, where the daily limit values for PM_{10} have been exceeded since they came into force in 2005. In addition, the warning also refers to exceedances of the annual limit value in nine zones. If Italy fails to act within two months, the case may be referred to the EU Court of Justice (ECJ).

The Commission is currently pursuing infringement actions for excessive levels of PM_{10} against 16 member states, and two of these cases (against Bulgaria and Poland) have been brought before the ECJ. Legal action has also been initiated on nitrogen dioxide (NO_2), so far involving twelve member states.

Source: European Commission press release, 27 April 2017

Information: *http://ec.europa.eu/environment/air/quality/legislation/index.htm*

New UK air quality plan dismissed as inadequate

Following a court order, the UK government published on 5 May a new plan to control nitrogen dioxide (NO_2). Levels of NO_2 have been above legal limits in almost 90 per cent of urban areas in the UK since 2010 and are estimated to cause 23,500 early deaths a year.

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Nitrogen dioxide causes 23,500 early deaths in the UK.

"The court ordered the government to take this public health issue seriously and while the government says that pollution is the largest environmental risk to public health, we will still be faced with illegal air quality for years to come under these proposals," said James Thornton, chief executive of ClientEarth, the environmental lawyers that forced the government to deliver the proposals.

According to ClientEarth, the new air quality plan is weak and incoherent, and lacks the ambition and detail to tackle Britain's illegal levels of air pollution. "There needs to be a national network of clean air zones which prevent the most polluting vehicles from entering the most illegally polluted streets in our towns and cities," Thornton added.

Consultation on the new plan is due to close on 15 June, with results not expected until 31 July.

Sources: ClientEarth press release and the Guardian, 5 May 2017

The UK government's plan: *https://uk-air.defra.gov.uk/library/no2ten/*

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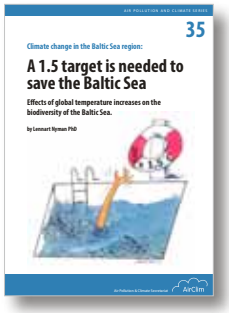
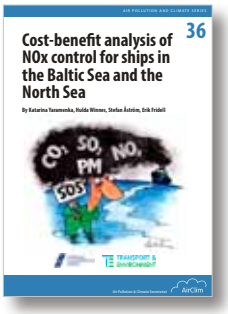
Recent publications from the Secretariat

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



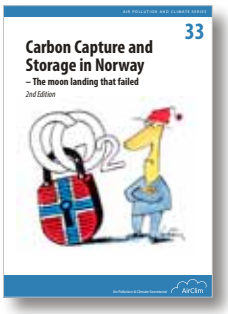
A 1.5 target is needed to save the Baltic Sea (March 2016). By Lennart Nyman. Effects of global temperatures increases on the biodiversity of the Baltic Sea.



Cost-benefit analysis of NOx control for ships in the Baltic Sea and the North Sea (April 2017). By Katarina Yaramenka, Hulda Winnes, Stefan Åström, Erik Fridell.

Phasing out fossil gas in Europe (March 2016). By Fredrik Lundberg. The natural gas industry faces strategic choices.

Paths to a sustainable agricultural system (March 2016). By Kajsa Pira et al. An agriculture and food system with reduced emissions.



Carbon Capture and Storage in Norway (2nd edition, March 2016). By Tore Braend. The Norwegian interest in CCS depends on the oil and gas sector.

Clearing the air (Feb 2017).A critical guide to the new National Emissions Ceilings directive.

1.5 Stay Alive (April 2015). Short doucumentary about climate change in the coastal zones of the Carribean region. Winner of the Golden Sun award 2016. *Contact info@airclim.org for access.*

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Coming events

European Biomass Conference and Exhibition (EUBCE). Stockholm, Sweden, 12 - 15 June 2017. Information: *http://www.eubce.com/home.html*

EU Environment Council. Luxembourg, 19 June 2017. Information: *www.consilium.europa.eu/en/press/calendar/*

Innovative solutions for sustainable management of nitrogen. Aarhus, Denmark, 26 - 28 June, 2017. Information: *http://sustainablenconference.dnmark.org*

IMO MEPC 71 (Marine Environment Protection Committee). London, UK, 3 - 7 July 2017. Information: *www.imo.org*

CLRTAP EMEP Steering Body & Working Group on Effects. Geneva, Switzerland, 11 - 15 September 2017. Information: *www.unece.org/env/lrtap/welcome.html*

Emissions science for a healthy environment: 18th GEIA Conference. Hamburg, Germany, 11 - 15 September 2017. Information: *http://www.geiacenter.org/community/geia-conferences/2017-conference*

First meeting of the Conference of the Parties to the Minamata Convention on Mercury (COP 1). Geneva, Switzerland, 24 - 29 September 2017. Information: *http://mercuryconvention.org/Negotiations/COP1/tabid/5544/language/en-US/Default.aspx*

Green Port Conference. Amsterdam, Netherlands, 11 - 13 October 2017. Information: *http://www.greenport.com/congress*

Shipping and the environment - from regional to global perspectives. 2nd BONUS Symposium. Göteborg, Sweden, 24 - 25 October 2017. Information: *http://shipping-and-the-environment-2017.ivl.se*

UNFCCC Second sessional period in 2017. Bonn, Germany, 6 - 17 November 2017. Information: *http://unfccc.int/*

22nd International Transport and Air Pollution Conference (TAP). Zürich, Switzerland, 15 - 16 November 2017. Information: *http://tapconference.org*

CLRTAP Executive Body. Geneva, Switzerland, 11 - 14 December 2017. Information: *www.unece.org/env/lrtap/welcome.html*

Air Quality – Science and Application: 11th International Conference. Barcelona, Spain, 12 - 16 March 2018. Information: *http://www.airqualityconference.org*