NO.1, MARCH 2018

Acid News

Denmark to expose sulphur-cheating ships

Shipping companies not complying with fuel sulphur limits will be publicly named and shamed under new Danish government plans.

► Page 7

Courts require action to clear the air

Member states that fail to protect people's health will – eventually – end up in court, and persistent failure is likely to become very, very costly.

► Page 14

Europeans expect to cut back on meat

New policies, health concerns and innovative food businesses can all contribute to reducing the climate footprint of European dinner tables.

► Page 17

No climate impact from road traffic in 15 years

Taxes, regulations, fuel switches, electrification and social planning is the recipe if the Nordic-Baltic region is going to abolish GHG emissions from road traffic.

► Page 20

Nordic-Baltic Region can decarbonise by 2030

Zero carbon emissions by 2030 can be achieved in the electricity, heat and industrial sectors without nuclear power and without CCS, according to new report from AirClim.

► Page 21

Sustainably feeding the Nordic countries

It is possible to feed 37 million in the Nordic countries on food mostly produced within the region using organic practices.

► Page 24

Below 1.5 – to Stay Alive

"1.5 to Stay Alive" is the rallying call from the Caribbean region for the global community to take action now in the UN during 2018. A film with that message will be submitted to the Talanoa dialogue by AirClim.

The UN is conducting a facilitative dialogue which will evaluate and strengthen climate action during 2018. The dialogue is called Talanoa on the initiative of Fiji, which held the Presidency of the COP23 UN Climate Change Conference. It will culminate at the upcoming COP24 in Katowicze in December and the aim is to review the commitments made in the Paris agreement.

Talanoa is a traditional word used in Fiji and across the Pacific for a dialogue which has the purpose of sharing stories, building empathy and making wise decisions for the collective good. The intention is that countries and non-party stakeholders will be contributing ideas, recommendations and information that can assist the world in taking climate action to the next level

Page 4 ►

Acid News

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

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

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

Air Pollution & Climate Secretariat
Första Långgatan 18, 413 28 Göteborg, Sweden
Tel: +46 31 711 45 15
Fax: +46 31 711 46 20
E-mail: *info@airclim.org*
Internet: *www.airclim.org*

Editor: Kajsa Pira
Assistant editors: Christer Ågren, Reinhold Pape & Stefan Larsson

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

Most governments and civil society are aware that the national and international reduction commitments for greenhouse gases made so far are much too weak to avoid dangerous climate change, and that global decarbonisation is essential by 2050 at the latest. The clock is ticking fast [1] (page 9). But the economic interests of the fossil fuel sector are so strong that over the 30 years since the greenhouse effect was brought to public attention in the Brundtland Report, greenhouse gas emissions have continued to rise globally.

"Europe should decarbonise its economy by 2030"

Nevertheless, with the support of civil society, the negotiators of the UN Climate Convention have gradually managed to establish a global framework and agreements that could avert catastrophic climate change on a global level. The Paris Agreement is one such a step forward, but as we all know the commitments to emission reductions made in Paris are not yet adequate to avoid dangerous climate change. One of the key decisions reached in Paris was therefore to review the commitments in light of the latest climate science as soon as possible. So now, in 2018, two years after the Paris conference, the first review is to be held in the UN. The next review after that will start in 2019, when the UN will review the adequacy of the targets in the UN climate convention and the 1.5/2°C target of the Paris Agreement. Another review, known as the Global Stocktake, will be held in 2022–2023.

The wish of civil society is that governments will decide during these three reviews to sharpen their national emission reduction plans so that there is a very good chance that the 1.5°C target from the Paris Agreement can be achieved. The 2018 review, called the Talanoa Facilitative Dialogue, was launched at the COP23 UN Climate Change Conference in Bonn in November 2017 and will run throughout 2018.

"Talanoa is aiming for higher climate ambition," the UN says in a statement, adding that: "The Paris Agreement's central goal is keep the global average temperature rise to below 2°C and as close as possible to 1.5°C. Current global ambition to reduce greenhouse gas emissions and to prepare societies to resist increasing climate change is not enough to achieve this under the current national climate action plans, known as Nationally Determined Contributions (NDCs)."

It is vital that during the Talanoa Dialogue the rich industrialised countries acknowledge the decision from Paris that "this Agreement will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances". If developing countries are to ramp up their NDCs they will need strong financial support from rich industrialised nations. The wealthy nations must also greatly increase their own mitigation ambitions for the pre-2020 period, and for 2025 and 2030. The EU and all other European countries should lead this task in the Talanoa Dialogue and present a vision to considerably raise their climate targets for 2020 and 2030.

AirClim has published two studies [2,3] this month that describe a vision for reaching zero carbon in eight Nordic and Baltic countries by 2030 (page 20-21) and previously released a list of the 10 best climate measures for the Baltic region and Russia, Poland and Germany [4]. AirClim has also presented a sustainable agriculture vision for the region [5] (page 24). These visions and measures could also apply to the whole of Europe, for new climate targets and the development of National Energy and Climate Plans (NECPs). To help achieve the 1.5°C target, wealthy Europe should decarbonise its economy by 2030 and give poorer developing countries a better chance of decarbonising by 2040–2050.

Reinhold Pape

[1] *https://www.mcc-berlin.net/en/research/co2-budget.html*
[2] *http://airclim.org/publications/vision-zero-carbon-emissions-nordic-baltic-region-about-2030*
[3] *http://airclim.org/publications/what-will-it-take-phase-out-greenhouse-gas-emissions-road-traffic-nordic-baltic-region*
[4] *http://www.airclim.org/sites/default/files/documents/APC31-The-10-best-climate-mitigation-measures-in-Northern-Europe.pdf*
[5] *http://www.airclim.org/sites/default/files/documents/future_nordic_diets.pdf*

IMO moves to ban carriage of high-sulphur marine fuel

Implementing the global lower-sulphur fuel requirement will reduce ship emissions related to premature mortality and morbidity by 34 and 54 per cent, respectively.

The decision to introduce a global 0.5 per cent cap on the content of sulphur in marine fuel by 2020 was originally agreed by the United Nations International Maritime Organization (IMO) back in 2008. After having carried out a thorough assessment of whether sufficient compliant fuel oil would be available by 2020, the IMO decided in October 2016 by consensus to confirm 1 January 2020 as the implementation date for the 0.5 per cent global sulphur cap (see AN 4/16).

It has long been a major concern by many groups, including authorities, shipowners and environmentalists, that there is a risk that potential cheaters could benefit if the new sulphur requirement is not effectively enforced everywhere.

Shortly before a crucial meeting of the IMO's Pollution Prevention and Response sub-committee (PPR) in London in February, environmental and shipping industry organizations rather surprisingly jointly called for an explicit prohibition on the carriage of non-compliant marine fuels in 2020. According to their joint statement, such a ban will help ensure robust, simplified and consistent enforcement of the global sulphur cap.

On 9 February the PPR agreed to recommend a ban on ships carrying marine fuels that do not comply with the new global sulphur fuel limit. The ban would make it illegal after 2020 for ships to have fuel containing more than 0.5 per cent sulphur on board, unless the vessel has a scrubber installed that cleans the emissions. The PPR concluded that the issue is to be "considered as an urgent matter to be finalized as soon as possible". In practice this probably means that a proposed text is to be discussed in April, followed by approval and adoption in October 2018.

John Maggs, president of the Clean Shipping Coalition, said: "This is an important development that closes a serious loophole in the original agreement. Banning the carriage of non-compliant fuel will make it considerably more difficult for unscrupulous ship operators to ignore the rule, burn cheaper non-compliant fuel, and escape serious sanction. This decision, which must be confirmed by the IMO in April, will mean a cleaner environment and fewer premature deaths from ship air pollution."

To ensure that fuel suppliers, carriers and authorities have the right tools and guidelines to comply with the sulphur regulation, the IMO is also looking more widely at the implementation practice. For this purpose, a week-long meeting with special focus on the implementation of the sulphur requirements is scheduled for 9–13 July 2018.

FLICKR.COM / MICHAEL COGHLAN CC BY-SA

According to a new study, ship air pollution causes about 400,000 premature deaths from lung cancer and cardiovascular disease alone.

Meanwhile, a new scientific study was published in January, providing new estimates of the public health and climate impacts of implementing the global 0.5 per cent fuel standard.

According to the study, ship air pollution is responsible for approximately 400,000 premature deaths from lung cancer and cardiovascular disease alone, and around 14 million childhood asthma cases annually. The 0.5 per cent sulphur cap will reduce the number of deaths linked to ship air pollution by around a third and more than halve the number of ship pollution-related childhood asthma cases. This would mean 137,000 fewer deaths due to air pollution every year, and around eight million fewer cases of childhood asthma.

Despite these reductions, ship air pollution will still account for around 250,000 deaths and around 6.4 million childhood asthma cases annually, so "additional reductions beyond 2020 standards may prove beneficial", the authors noted. Moreover, they concluded that "many control technologies for harmful particulates and ozone precursor emissions perform better under low-sulphur combustion conditions", thereby improving the scope for additional emission reductions.

Regarding climate forcing, it was estimated that the net reduced cooling resulting from switching to lower-sulphur fuel amounts to over three per cent of total anthropogenic radiative forcing. This underlines the need for shipping to quickly start moving beyond fossil fuels in the sector altogether, thus reducing emissions of both greenhouse gases and air pollutants.

Christer Ågren

Sources:

Press releases by Clean Shipping Coalition and Transport & Environment, 22 January and 9 February 2018.

Study "Cleaner fuels for ships provide public health benefits with climate tradeoffs". By M. Sofiev et al. Published in Nature Communications (January 2018). DOI: 10.1038/s41467-017-02774-9.

Below 1.5 – to Stay Alive

Continued from front page

in order to meet the objectives of the Paris Agreement and support the UN Sustainable Development Goals. The Talanoa process involves the sharing of ideas, skills and experience through storytelling (see editorial).

The UN Climate Change secretariat launched an online platform to support the process. The portal aims to facilitate this important international conversation. Countries will be able to check progress and seek to increase global ambition to meet the goals of the Paris Climate Change Agreement. Through the portal, all countries and other stakeholders, including business, investors, cities, regions and civil society, are invited to make submissions into the Talanoa Dialogue around three central questions:

- Where are we?
- Where do we want to go?
- How do we get there?

Online submissions will be collated twice – after 2 April 2018, and 29 October 2018. The first set of submissions will inform a dialogue session in the May inter-sessional in Bonn that aims to answer the three questions and will be summarised in a synthesis report. This report will later feed into the "political phase" of Talanoa taking place at the COP24 in Katowice, Poland in December.

To help answer the first question "Where are we?" AirClim will submit the film "1.5 Stay Alive" to the platform. The film describes the urgent situation for coral reefs in the Caribbean region. In the Caribbean waters just south of the United States of America the world's second- and third-largest coral reef ecosystems are very seriously threatened by climate change (see map). Millions of tourists visit the region every year and enjoy the sea and its rich biodiversity. But soon climate change could mean the end for the corals, as bleaching events occur more and more often. Science tells us that many corals do not survive at a global temperature increase above 1.5°C and increased ocean acidification.

Sea level rise is already affecting many coastal zones, including the south coast of the United States.

The Caribbean Community Climate Change Centre (5Cs) is a body of the Caribbean Community (Caricom) with 18 member states from the Caribbean region, is helping to coordinate the work on climate change issues for the Caricom countries.

The film "1.5-Stay Alive"

AirClim initiated and supported the low-budget film, which was produced in 2013–2014 and released in April 2015 to campaign for a 1.5°C target in the UN. It won first prize at the world's oldest environmental film festival in Barcelona in late 2016, in the category of short documentaries up to one hour. The 1.5 Stay Alive film is about climate change in the Caribbean region and explains why there is a need to stay below a 1.5°C global temperature increase to avoid dangerous climate change and protect vulnerable people. The film lets experts and musicians from the Caribbean region tell their own story and perform music about the threat of climate change to local people and the environment in the region, including more frequent and violent tropical storms, sea level rise and the death of coral reefs.

One of the key speakers in the film is the meteorologist and international liaison officer Carlos Fuller, from the Caribbean Community Climate Change Centre (5Cs) in Belize, who has for the last two years been chair of the scientific and technological body of the UN Climate Convention.

In the film, local people also speak about the loss of their homeland on the US coast of the Mexican Gulf in Louisiana, and about already having to abandon their communities.

Link to AirClim film 1.5 Stay Alive: *https://www.youtube.com/embed/vH1SwOLFH_w*

© LARS-ERIK HÅKANSSON

At the beginning of 2018, 5Cs made a statement about the situation caused by climate change in the Caribbean (see box). The statement concludes: "The emerging science message is clear: Urgent global action taken now, and which goes well beyond what has already been committed to, is needed to delay the onset of more adverse Caribbean climate states. This is what is implied in the region's stance that 1.5°C must be an end-of-century global goal. '1.5 to Stay Alive', the central message anchoring the Caribbean's position, is more than a just a catchy slogan. It is a rallying call for the global community to take action now, from those most vulnerable to climate change."

AirClim's submission of the film is a way to affirm the "1.5 – to Stay Alive" call from the Caribbean countries (see box). It is clear from the experiences of climate change in the Caribbean that the zone of "dangerous climate change" has already been entered. Every ton of greenhouse gases emitted from now on is contributing to further dangerous climate change. The UN Talanoa Dialogue must implement the 1.5°C target from the Paris Agreement by strengthening climate action plans for 2020, 2025 and 2030 right now.

Reinhold Pape

Link to APC report 37 The Greenhouse Effect, Global Warming and Implications for Coral Reefs and Factsheet on Ecological effects of ocean acidification

Link to 5 Cs: *http://www.caribbeanclimate.bz/*

Link to 1.5 Reader: *http://climatenetwork.org/sites/default/files/can_reader_review_2013-2015.pdf*

Link to UNFCCC: *https://cop23.unfccc.int/news/un-opens-talanoa-dialogue-portal-aiming-for-higher-climate-ambition*

Statement by the Caribbean Community Climate Change Centre (5Cs)

"Ongoing analysis of the Caribbean's historical climate data is painting a picture of what an approximate 1°C of global warming since preindustrial times has meant for the region. One degree has contributed to:

- a warming of both air and ocean surface temperatures in the Caribbean
- an increase in the number of very hot days and nights
- longer and more frequent periods of droughts
- an increase in very heavy rainfall events
- higher sea levels
- more intense hurricanes with stronger winds and lots more rain.

Since the region is very sensitive to climate variations, many things are impacted. These include agriculture and food production, population health, marine and terrestrial ecosystems, tourism, fresh water systems, energy systems, livelihoods, worker and student productivity, coastal infrastructure and ultimately the economies of Caribbean countries. With further increasing temperatures the Caribbean will be significantly warmer and drier (especially during times of the year it expects to get rain), face much higher sea levels, and experience more intense hurricanes of the likes of Irma and Maria in 2017.

By providing these comparative pictures, the science is making a strong case that the climate change already experienced is a challenge for the Caribbean, and the change to come may likely prove 'too much'. It stands to reason then, that a stringent global target that limits further warming to levels marginally higher than already experienced is more than just a logical option. These impacts will be more severe at higher global warming targets (e.g. 2°C), but still very challenging even if warming is limited to 1.5°C. Even though the Caribbean has argued for 1.5°C as the global limit for further warming, the emerging message from science is that it does not represent a 'safe' climate for the region. This level may only offer a less risky climate state than occurs at even higher global warming levels.

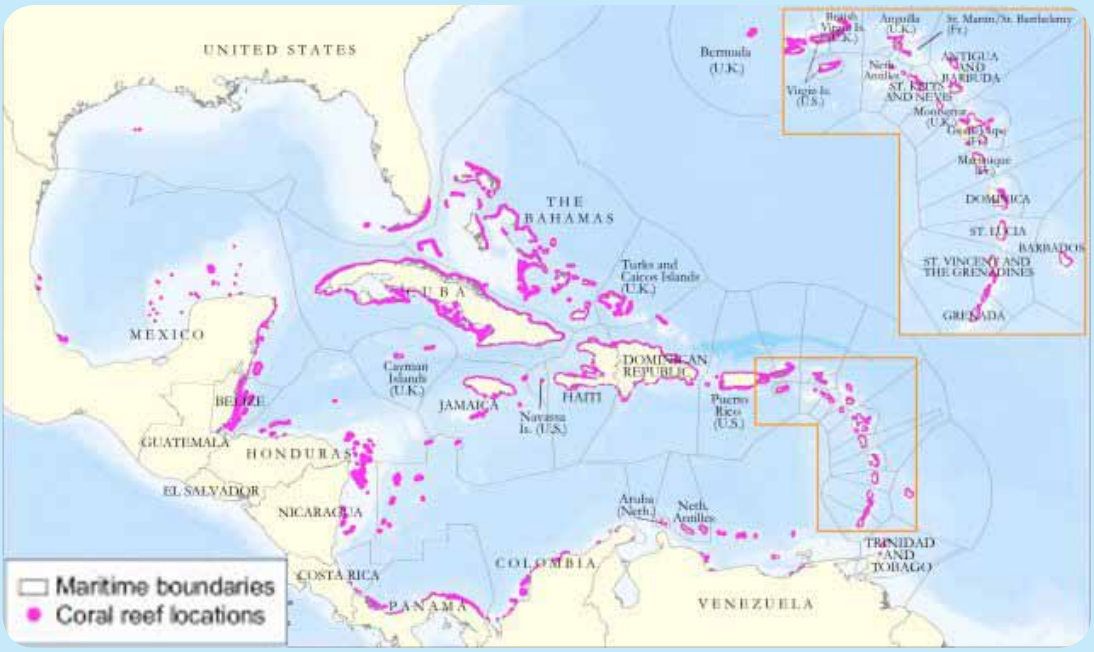
The emerging science message is clear: Urgent global action taken now, and which goes well beyond what has already been committed to, is needed to delay the onset of more adverse Caribbean climate states. This is what is implied in the region's stance that 1.5°C must be an end-of century global goal. "1.5 to Stay Alive", the central message anchoring the Caribbean's position, is more than a just a catchy slogan. It is a rallying call for the global community to take action now, from those most vulnerable to climate change.

The science being undertaken in the Caribbean is also offering a clearer picture of the region in a world that is 1.5°C warmer. Even if global warming beyond the 1°C already experienced were limited to only a further half a degree, there would still be consequences for the Caribbean region.

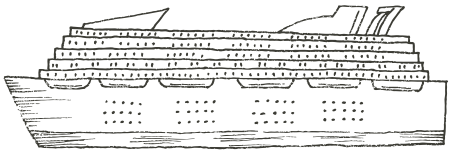
The most noticeable differences will be related to mean temperature and temperature extremes. When compared to the climate of the present, the region will be significantly warmer, with many more very hot days in any given year, and longer spells of hot and dry conditions. Although there may also be more instances of moderate to extreme droughts, an increase in the intensity of some rain events may partially offset the lack of rainfall during some times of the year and for some parts of the region. The picture is, however, one of generally harsher climatic conditions in the Caribbean than present when the mean global surface temperature is 1.5°C above pre-industrial levels.

The picture only gets worse when we project what the Caribbean could experience in a world that is 2°C warmer. Just another half degree of global warming will result in almost year-round hot conditions, the transition to a mean drier Caribbean compared to the present, and an increase in the frequency of extreme drought occurrences.

On December 21, 2015 at the 21st Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, 195 nations agreed to hold 'the increase in the global average temperature to well below 2°C above pre-industrial levels and [to pursue] efforts to limit the temperature increase to 1.5°C' (the Paris Agreement). The Caribbean Community (CARICOM) in alliance with other small island developing states galvanized the world around the idea of a 1.5°C target."



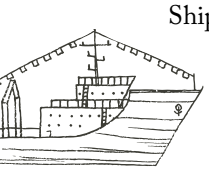
Map of coral reefs in the Caribbean. Source: World Resource Institute.
http://www.wri.org/sites/default/files/map_rrcaribe_01_region_300dpi.jpg



Evolution of ship emissions in China

Ship emissions contribute significantly to air pollution and pose health risks to residents of coastal areas in China. A new study has estimated ship emissions in China from 2004 to 2013 and also made projections up to 2040 under different control scenarios.

For the area within 200 nautical miles of the Chinese coast, emissions of SO_2, NOx, CO, PM_{10}, $PM_{2.5}$, and hydrocarbons in 2013 were estimated to amount respectively to 1010, 1443, 118, 107, 87 and 67 kilotonnes per year. Ship emissions have doubled over the last ten years, and now contribute around 10 per cent of the total SO_2 and NOx emissions in the coastal provinces of the country.



Ship emissions in ports accounted for about one quarter of the total emissions within the 200-nautical-mile zone, and nearly 80 per cent of the emissions were concentrated to the top ten busiest ports of China.

The authors concluded that the IMO's 0.5-per-cent global sulphur cap would reduce ship SO_2 emissions by 80 per cent from 2020, but that a similar reduction in NOx emissions would require significant technological change and likely take several decades.

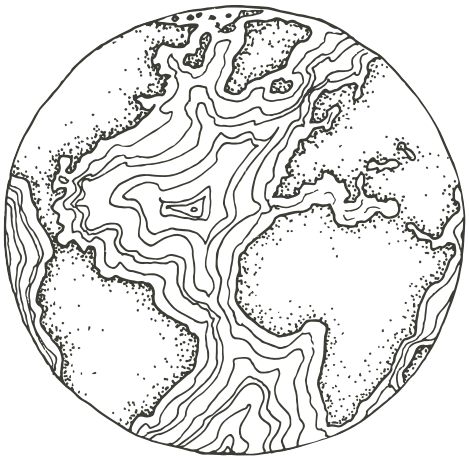
The article: "Decadal evolution of ship emissions in China from 2004 to 2013 by using an integrated AIS-based approach and projection to 2040" (2017). Atmospheric Chemistry and Physics Discussions: 1-36. DOI:10.5194/acp-2017-743. Link: *http://pure.iiasa.ac.at/14939/*

Cruise ships pollute Copenhagen's summer air

Measurements of ultrafine particles from cruise ships in the Danish port of Copenhagen have shown that emissions from cruise ships contribute significantly to air pollution in the port area and in the connected city areas during periods of onshore wind. Throughout May to September, there are on average two cruise ships in the port every day, and onshore winds occur 25–30 per cent of the time.

The Danish Ecological Council concludes that if no action is taken, increasing cruise tourism risks exposing even more people to harmful air pollution, and it therefore recommends to the municipality of Copenhagen and the port of Copenhagen that they should cooperate to:

- Build shore power supply facilities at the most attractive cruise berths.
- Charge higher port fees to cruise ships that are unable to (or do not) connect to shore power.
- Gradually expand the number of shore power supply facilities and exclude cruise ships from entering the port three years after installing shore power supplies at all cruise berths; unless the cruise ships run on gas or have an effective flue gas cleaning system installed.
- Coordinate similar actions with the region's other cruise ports and port authorities.

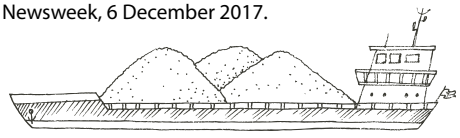


The report: "Air pollution with ultrafine particles from cruise ships in Copenhagen, Denmark" (November 2017). Published by the Danish Ecological Council. Link: *www.ecocouncil.dk*

World's biggest electric cargo ship

China has launched its first all-electric cargo ship. The 230-foot-long ship can carry over 2,000 tons of goods. It has a battery capacity of 2,400 kilowatt hours – enough lithium batteries to power 40 cars. After two hours of charging, the ship can run for 50 miles. As it is powered purely by electricity, it has zero emissions of exhaust gas pollutants. The irony, however, is that the ship is being used for hauling coal on the inland section of the Pearl River.

Source: Newsweek, 6 December 2017.



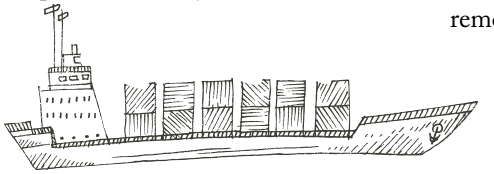
World's first electric container barges

The world's first electric container barges will soon sail from European ports according to the Guardian.

The world's first fully electric, emission-free and potentially crewless container barges are to operate from the ports of Antwerp, Amsterdam, and Rotterdam from summer 2018. The vessels, designed to fit beneath bridges as they transport their goods around the inland waterways of Belgium and the Netherlands, are expected to vastly reduce the use of diesel-powered trucks for moving freight. Dubbed the "Tesla of the canals", their electric motors will be driven by 20-foot batteries, charged on shore by the carbon-free energy provider Eneco.

The barges are designed to operate without any crew, although the vessels will be manned in their first period of operation as new infrastructure is erected around some of the busiest inland waterways in Europe. About 23,000 trucks, mainly running on diesel, are expected to be removed from the roads as a result. The barges are being developed by Port Liner, which believes it could produce about 500 barges a year to revolutionise the freight industry, although the electric motors and batteries could also be retrofitted into older boats. The barges would be the first in the world to sail on carbon-neutral batteries and only the low bridges in the low countries prevent them from being loaded with more goods.

Source: *https://www.theguardian.com/environment/2018/jan/24/worlds-first-electric-container-barges-to-sail-from-european-ports-this-summer*



Denmark to expose sulphur-cheating ships

Shipping companies not complying with fuel sulphur limits will be publicly named and shamed under new Danish government plans.

Danish environment and food minister Esben Lunde Larsen has asked the Danish Environmental Protection Agency to prepare a bill to make it possible to publish the names of those carriers which violate the sulphur regulation.

The sea areas surrounding Denmark – the North Sea and the Baltic Sea – are designated sulphur emission control areas (SECAs) in which ship fuel sulphur requirements were strengthened to a maximum of 0.1 per cent as from 2015.

"The limits on sulphur content in fuel must be maintained by everyone. It is good for the environment and for people's health, and it creates fair competition within shipping. It is important to send a strong signal to those who violate the law, that sulphur cheating is not acceptable," said Lunde Larsen.

Since 2015, the Danish EPA has reported 21 companies to the police for the violation of the sulphur requirements, and so far, seven of these have been fined. Three of them have paid a fine of between 30,000 and 375,000 Danish kroner (€4,000–50,000).

Monitoring of ships' sulphur emissions indicates that the majority of ships, between 92 and 97 per cent, follow the rules, and monitoring of air quality shows that since this law was introduced, the amount of sulphur pollution in the air in Demark has more than halved.

Lunde Larsen said: "It is gratifying that the stricter sulphur requirements have resulted in cleaner air, and this is because most ships actually comply with the rules. Therefore, it must be possible to publish the names of the offending shipping companies, so that as a customer it is possible to opt out of shipping companies that do not comply with the rules. It can hopefully have a deterrent effect on the few shipping companies that still violate the rules."

While ships using illegal fuel risk being fined in several northern European countries, this has not been the case in Sweden, a full three years after the entry into force of the stricter sulphur standards.

Even though the Swedish authorities have over the last few years checked more than 500 ships in Swedish ports, several of which have registered excessive sulphur levels, no charges have been filed.

But this will soon change, according to Swedish environment minister Karolina Skog, Starting this spring, there will be a financial price to pay for violating the sulphur regulation in Swedish waters, said Karolina Skog in an interview with ShippingWatch in December. A proposed new legislation introducing administrative sanctions instead of relying on criminal law, represents the key step.

Christer Ågren

Sources:

Press release by the Danish Ministry of Environment, 26 January 2018 (in Danish).

ShippingWatch, 19 December 2017.

Danish coast card at work.

Black carbon emissions from global shipping

New studies show how much ships contribute to emissions of soot particles and the measures available to cut those emissions.

A new report by the International Council on Clean Transportation (ICCT) presents an updated global inventory of black carbon emissions from ships. It also contains an analysis of the effectiveness of several emission control measures, including switching to cleaner-burning fuels and using diesel particulate filters (DPFs).

It was estimated that in 2015, ships emitted about 67,000 tonnes of black carbon, equivalent to 0.7–1.1 per cent of total global anthropogenic black carbon emissions. After carbon dioxide (CO_2), black carbon contributes most to the climate impacts of shipping, representing 7 per cent of total shipping CO_2-eq emissions on a 100-year timescale and 21 per cent of CO_2-eq emissions on a 20-year time scale.

Looking at the different ship types, it was found that container ships, bulk carriers, and oil tankers together were responsible for 60 per cent of the emissions, while accounting for 30 per cent of the ships in the global fleet and 81 per cent of its deadweight tonnage (dwt). Container ships alone accounted for 26 per cent of the emissions while making up only 7 per cent of ships and 14 per cent of dwt in the global fleet.

Cruise ships were found to be responsible for disproportionately large amounts of black carbon, producing 6 per cent of total ships' emissions despite accounting for only 1 per cent of the number of ships and less than 1 per cent of dwt. Moreover, cruise ships had the highest emissions per ship and per unit of fuel consumption.

The ICCT recommends several ways to reduce black carbon emissions from ships, including:

- prohibiting the use of residual fuels;
- installing diesel particulate filters (DPF);
- establishing new Emission Control Areas (ECAs);
- establishing a black carbon emission standard for ships;
- plugging into shore power at port; and,
- including black carbon in the shipping sector's greenhouse gas emissions reduction strategy.

The International Maritime Organization (IMO) decided back in 2010 that ships' emissions of black carbon and other particulate matter affecting the Arctic region needed to be addressed as an integral part of the IMO's work on prevention of air pollution from ships and combatting climate change. Following this decision, some years were spent on discussing the matter, resulting among other things in an agreed definition of black carbon in 2015; work to identify appropriate methods for measurement of black carbon; and investigation of emission control measures.

A first study on emission control measures for black carbon was produced in 2012, and an update of that study was recently published and submitted by Canada to the IMO. The summary results of this update are shown in the Table.

Compared to the 2012 data, abatement potentials were changed for three options: diesel particulate filters, scrubbers, and switching from heavy fuel oil (HFO) to distillate fuel.

According to the update, new studies provide more certainty that a switch from residual fuel to distillate fuel reduces black carbon emissions by at least 33 per cent, but that using low-sulphur fuel blends will likely not lead to black carbon reductions. DPFs show high black carbon removal rates for distillate fuel, and as DPF technology for higher sulphur fuels advances it is expected that removal efficiencies will approach the upper limit of that reported for distillate fuels, i.e. over 99 per cent.

Table: Summary of black carbon abatement technologies

Reduction measure/strategy	Reduction
Liquefied natural gas (LNG)	93.5%
DPF – low-sulphur fuel	>99%
DPF – high-sulphur fuel	85%
Water-in-fuel emulsion (WiFE)	70%
Scrubbers – high sulphur fuel	45%
Scrubbers – low sulphur fuel	37.5%
Switch HFO to distillate fuel	33%
Slow steaming with de-rating	15%
Biodiesel – 100%	50–75%
Biodiesel blend – 20%	10–30%
Methanol – DME	97%
Nuclear	95%
Slide valves	10–50%
Electrostatic precipitators	10–90%
Selective catalytic reduction (SCR)	0–30%

Both reports were submitted to and discussed at the IMO's subcommittee on Pollution Prevention and Response (PPR) that met in February, and the issue is also likely to be brought up at the forthcoming meeting of the IMO's Marine Environment Protection Committee in April.

Christer Ågren

Sources:

The ICCT report "Black Carbon emissions and fuel use in global shipping 2015" is available at: *https://www.theicct.org/publications/black-carbon-emissions-global-shipping-2015*

IMO document PPR 5/INF.7, 29 November 2017 "An update to the investigation of appropriate control measures (abatement technologies) to reduce Black Carbon emissions from international shipping", submitted by Canada.

There are signs of relief, or at least a halt to the increase in ambient air pollution levels.

Air pollution in China

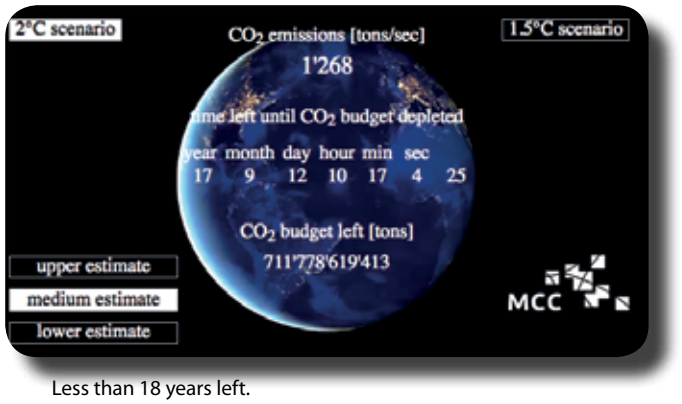
A new study provides an overview and analysis of key scientific data regarding air pollution in China and helps understand how policymakers, media and the population in China make sense of and deal with air pollution. The major trends regarding air pollution in China are summarised, including its main sources and composition, levels of population exposure across the country, attributable mortality, and mitigation efforts.

While the situation remains dire in many regions, particularly the northeast, the authors conclude that there are signs of relief, or at least a halt to the increase in ambient air pollution levels. But unequal levels of exposure remain, and harmful levels of air pollution in cities will undoubtedly remain high for a long time to come. The rural population residing in areas close to industry and polluted cities and still depending on solid household fuels will likely be the worst off when it comes to air pollution exposure.

"Introduction: Air Pollution in China" (December 2017). By K. Aunan, M. Halskov Hansen and S. Wang. *https://doi.org/10.1017/S0305741017001369*

Remaining carbon budget – that's how fast the carbon clock is ticking

The clock is ticking. The carbon clock of the Mercator Research Institute on Global Commons and Climate Change (MCC) shows just how little time is left for political decision-makers. Visitors to the MCC website can find out how much time is left to implement effective action based on various policy objectives and scientific assumptions.



Less than 18 years left.

The MCC carbon clock demonstrates just how much carbon can be released into the atmosphere if global warming is to be limited to 1.5°C, or 2°C with high probability. By selecting a choice of temperature targets and estimates, you can see how much time remains in each scenario.

Disclaimer: The numbers are based on the latest Assessment Report (AR5) of the IPCC. It is very likely that these numbers will be updated after the release of the IPCC's Special Report on 1.5 Degrees. This will then be considered here accordingly.

The calculation is based on the assumption that annual emissions remain at the level of 2014; while between 2000 and 2010, an annual growth of greenhouse gas emissions of 2.2% has been observed.

https://www.mcc-berlin.net/en/research/co2-budget.html

Electric cars cheaper than combustion cars

In countries such as the UK, USA, Japan and China, electric vehicles are already a cheaper alternative than internal combustion vehicles when you look at the total costs of buying fuel, insurance and maintenance over four years. At present this is partially due to the fact that many countries subsidise purchases of electric vehicles, but within a few years electric vehicles will be cheaper even without these subsidies, forecast the researchers. Because subsidies for hybrid vehicles are often lower, these vehicles are usually more expensive than fully electric and diesel vehicles. The new study is published in the journal Applied Energy.

Link:*https://www.sciencedirect.com/science/article/pii/S030626191731526X?via%3Dihub%E2%80%99*

FLICKR.COM / ANDREW BONE CC BY

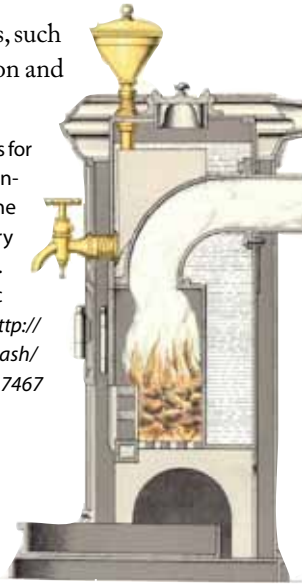
Emissions from residential wood combustion

A Nordic research project has made emission measurements on residential wood burning appliances, boilers and stoves, representative for the Nordic countries. It was found that the older technologies generally exhibited higher emission levels than more modern types of equipment. For example, the traditional log-burning wood boilers had emission levels that were around 5–10 times higher (depending on pollutant) than for modern log-burning wood boilers or pellet boilers. In the case of stoves the difference was not as large, with up to two times higher emission levels from the traditional tiled and masonry stoves, and an older type of iron stove, compared to the modern wood stoves.

When comparing currently used national emission factors in the Nordic countries with those developed from the project's measurement programme, large differences were sometimes found, both between countries and in relation to the measurement results.

The project investigated emission factors for the pollutants $PM_{2.5}$, elemental carbon (EC), organic carbon (OC), methane (CH_4), NMVOCs and carbon monoxide (CO) from residential wood combustion, including ratios for increased emissions under poor combustion conditions, such as part-load combustion and burning of moist fuel.

The report: "Emission factors for SLCP emissions from residential wood combustion in the Nordic countries" (January 2018). By K. Kindbom et. al. Published by the Nordic Council of Ministers. Link: *http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A1174670&dswid=9630*



FLICKR.COM / CLIVE HURST CC BY-NC

Development of Kyoto GHG emissions in Europe 1990 to 2015

Greenhouse gas emissions in Europe are falling rapidly in some countries and not at all in others. The great variation geographically and over time show that much more can be done.

"There is a crack in everything, that's how the light gets in," sang Leonard Cohen.

Those words apply to many things, including data on greenhouse gases supplied by the Climate Convention. The overall trend is that emissions are dropping, though not very fast and not very much. If you zoom in you will find that emissions vary widely between nations and over time. Some countries have increased emissions considerably over many years. Some have not done a thing. Some have cut their emissions steadily over a long period, while still others have cut emissions dramatically in some years.

In a recent published briefing[1] we present emissions data for European nations in 1990, which is the base year for the Climate Convention and the Kyoto Protocol, and forms the Paris Agreement baseline for many countries. Data is also presented for the two latest years available, 2014 and 2015. Figures are given for greenhouse gases as a whole, and for each of the six gases separately, provided by the UNFCC.

There are many kinds of emission cuts in the period 1990–2015, and many causes, but three are among the most important. The first is a result of the collapse of industry in the Eastern European countries, giving a decrease of roughly 40 percent. The second is from non-CO_2 greenhouse gases in all countries due mainly to factors other than climate policy. These were also low-hanging fruit. Methane from landfills has been cut because it is a fire hazard and old landfills were a general nuisance. Modernization of the aluminium industry, long overdue, has led to a dramatic decrease in PFCs. The phasing out of ozone-depleting CFCs (not in the Kyoto Protocol) first led to an increase in the substitute HFCs (a Kyoto gas), then to a decrease in HFCs, within the same legal structure. Some of the methane and N_2O cuts were the result of modernization (shrinking) of agriculture and a small number of other industries.

The third is from real climate policy and took place after 2005, in some nations. CO_2 is by far the most important greenhouse gas, and has been in political focus since the Brundtland UN report in 1987, which started the IPCC and the 1992 Climate Convention.

From 1990 to 2015 very little was done about CO_2. The EU-15 nations, which negotiated the Kyoto treaty in 1997, actually increased their emissions. This included Germany, which did cut its emissions, but mainly due to the reunification process that deleted most of East German industry. Sweden, Denmark and the UK showed some modest improvements, but that was it.

In the next ten years, 2005–15, the picture is different. The EU-15 cut their CO_2 emissions by 20 per cent. Some of the cuts are too easy to explain: in Greece, Spain and Portugal the economies imploded after the 2008 financial crisis. But that does not really explain the following cuts:

Belgium	-17 %
Denmark	-31 %
Finland	-22 %
France	-15 %
Germany	-9 %
Sweden	-20 %
UK	-26 %

Germany is still not very impressive, but during this time it shut down nine nuclear

FLICKR.COM / BILL DICKINSON CC BY

power stations and greatly increased its electricity exports. This provides at least some excuse. The Netherlands has no such excuse. Its emissions in 2015 were seven percent below those of 2005, but still above the 1990 level. Norway has no excuse for increasing its emissions between 2005 and 2015.

As for the level of CO_2 emissions, no European country is anywhere near a sustainable level, which is somewhere below two tons per capita. Per capita emissions differed from less than 5 tons in some countries to more than 10 in others. It is hard to discern any pattern. Do rich countries emit more? Sweden and Switzerland are much richer, per capita, than Russia, but Russia emits far more. Does geography matter much? No, Norway and Iceland have the most per capita hydro, but both emit more than Denmark, which has no hydro. The big difference is in politics.

This becomes very clear if one looks at the flip side of climate policy, especially CO_2 policy, i.e. efforts for wind and solar. In the case of wind power, Denmark got 2496 kWh, while Russia had 1 (one) and Slovakia none at all. Their climates are not so different, but obviously the political climate for wind power differs greatly.

The solar leader in 2015 was Germany with 469 kWh/capita. Neighbouring Poland had only 1 and Russia 0. South of Poland is the Czech Republic, which had 210 kWh/capita. France and Denmark may differ in insolation, but they produce the same amount of solar power. Sweden gets about as much sunshine as Denmark, but Denmark produced 10 times as much solar energy. All these differences are the result of policies such as subsidies and net metering.

These figures demonstrate a huge amount of sloppy climate policy. But it is also easy to see that the potential for improvement is very big in most, or all, countries. Especially for those in the bottom league for renewables and in the top league for emissions. The differences carry a message.

There is a crack, that's how the light gets in.

Fredrik Lundberg

Table: Greenhouse gas emissions, without LULUCF, in kilotons CO_2 equivalent, for six Kyoto gases in Europe 1990-2015

Party	1990	2005	2014	2015	2015/1990 change %	2015/2014 change %
Austria	78,805	92,642	76,381	78,851	0.1	3.2
Belarus	136,915	88,259	93,661	89,608	-34.6	-4.3
Belgium	146,294	145,096	114,079	117,443	-19.7	2.9
Bulgaria	103,654	63,690	57,505	61,483	-40.7	6.9
Croatia	31,154	29,312	23,049	23,502	-24.6	2.0
Cyprus	5,622	9,306	8,432	8,467	50.6	0.4
Czech Republic	195,827	146,530	125,839	127,127	-35.1	1.0
Denmark	70,493	67,136	51,801	49,321	-30.0	-4.8
Estonia	40,403	19,157	21,081	18,040	-55.3	-14.4
European Union	5,642,685	5,211,180	4,284,831	4,307,968	-23.7	0.5
Finland	71,125	69,493	59,072	55,507	-22.0	-6.0
France	550,068	557,931	460,077	463,650	-15.7	0.8
Germany	1,250,915	991,933	904,262	901,932	-27.9	-0.3
Greece	103,081	136,259	99,353	95,715	-7.1	-3.7
Hungary	93,896	75,842	57,937	61,171	-34.9	5.6
Iceland	3,556	3,854	4,472	4,557	28.2	1.9
Ireland	56,103	69,982	57,758	59,878	6.7	3.7
Italy	519,917	579,449	423,324	433,025	-16.7	2.3
Latvia	26,141	11,291	11,190	11,303	-56.8	1.0
Liechtenstein	229	266	202	199	-13.0	-1.2
Lithuania	48,041	23,068	19,869	20,096	-58.2	1.1
Luxembourg	12,730	12,961	10,756	10 269	-19.3	-4.5
Malta	2,382	3,019	2,930	2,227	-6.5	-24.0
Monaco	99	98	80	82	-17.7	2.4
Netherlands	220,751	214,100	187,373	195 039	-11.6	4.1
Norway	51,729	55,106	53,331	53,908	4.2	1.1
Poland	467,881	398,943	382,969	385,843	-17.5	0.8
Portugal	59,403	86,134	64,196	68,741	15.7	7.1
Romania	246,272	146,454	115,413	116,427	-52.7	0.9
Russian Fed.	3,767,792	2,499,755	2,645,819	2 651 212	-29.6	0.2
Slovakia	74,460	51,396	40,678	41,269	-44.6	1.5
Slovenia	18,594	20,498	16,610	16,831	-9.5	1.3
Spain	287,828	439,556	324,215	335,662	16.6	3.5
Sweden	71,637	66,855	53,836	53,690	-25.	-0.3
Switzerland	53,357	54,856	48,620	48 038	-10.0	-1.2
Turkey	213,972	337,153	455,615	475,056	122.0	4.3
Ukraine	962,502	450,229	368,506	323,365	-66.4	-12.2
United Kingdom	796,816	692,942	526,370	506,765	-36.4	-3.7
Sum All Europe	10,840,444	8,710,550	7,966,663	7,965,299	-26.5	-0.0

[1] Climate forcers: development of Kyoto greenhouse gas emissions in Europe 1990 to 2015. *http://airclim.org/publications/climate-forcers-development-kyoto-greenhouse-gas-emissions-europe-1990-2015*

FLICKR.COM/ BRENDA GOTTSABEND CC BY-NC

Black carbon has decreased by 40 per cent in the EU since 1990.

Climate forcers that increase or decrease warming

The net effect of climate forcers not covered by the Kyoto Protocol is global cooling. Emissions of those climate forcers decreased between 1990 and 2015 in Europe.

Outside the six greenhouse gases from the Kyoto Protocol, there are other anthropogenic climate forcers, which either tend to increase warming or decrease it, in a complex manner (see graph: components of radiative forcing). For example: contrails reflect heat back to the Earth at night and then have a warming effect, but they also reflect some sunshine back into space during the day, and then have a cooling effect.

The IPCC's fifth assessment report sums up estimates for some such forcers, in mean watts per m^2 for the years 1750–2011. + means warming, - cooling. The uncertainties are considerable (see table and figure).

As can be seen, the net effect of the non-Kyoto climate forcers is cooling. This is not very comforting, as efforts to cut CO_2 and other Kyoto gases will on average also cut other cooling forcers.

There are data for some such forcers in the European Union emission inventory report 1990–2015 under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP) , from 1990 to 2015:

NOx, which has both warming and cooling effects, decreased by 56 percent in the EU-28.

Non-methane volatile organic compounds, which have a warming effect, have decreased by 61 percent in the EU-28 and in almost all countries, except Poland where they have increased.

SO_2 has a cooling effect and has decreased by 89 percent in the EU-28.

Ammonia, NH_3, which has a cooling effect, decreased by 23 percent in the EU-28 and by 65 percent in the Netherlands, and many Eastern European countries also had large decreases. The decrease was however only 4 percent in Germany. Ireland, Austria and Spain all showed increases.

Black carbon has a warming effect when on snow, and a cooling effect when it screens out the sunshine. It decreased by 40 percent in the EU-28, with larger decreases in Germany, the Netherlands, and big increases in many Eastern European countries.

Carbon monoxide has a warming effect. It decreased by 68 percent in the EU-28. France, Germany and Poland were the biggest emitters in 2015.

Other climate forcers are organic carbon, mineral dust, aerosols in clouds, contrails from aeroplanes, and land use change of albedo from darker to lighter or vice versa, and changes in solar radiation, but data are hard to find and attribute.

Fredrik Lundberg

More information can be found in Briefing: Climate forcers which increase or decrease warming and emissions in Europe 1990–2015 *http://airclim.org/sites/default/files/documents/briefing-12-4.pdf*

	mean	span
Well-mixed GHGs (~Kyoto gases)	+2.83	+2.54 to +3.12
Tropospheric ozone	+0.4	+0.20 to +0.60
Stratospheric ozone	-0.05	-0.15 to +0.05
Stratospheric water vapour from methane	+0.07	+0.02-+0.12
Aerosol-radiation interactions	-0.35	-0.85 to +0.15
Aerosol-cloud interactions	ne	
Surface albedo (land use)	-0.15	-0.25 to -0.05
Surface albedo (black carbon on snow, ice)	+0.04	+0.02 to +0.09
Contrails	+0.01	+0.005 to +0.03
Total anthropogenic (effective radiation forcing)	+2.3	1.1 to 3.3

Source: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, chapter 8, p 696
Note: The total anthropogenic figure from the IPCC does not include all climate forcers, so the range is still larger than 1.1–3.3

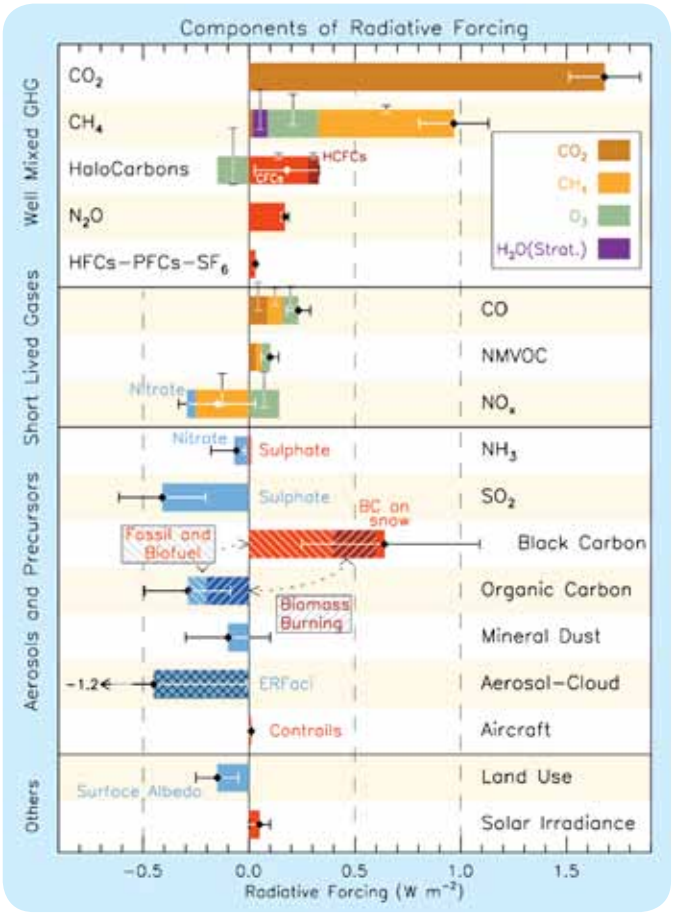


Figure. Components of radioactive forcings IPCC 5AR WG 1

Climate change and air pollution top environmental concerns in EU

EU citizens consider climate change as one of the most important environmental issues, closely followed by air pollution, according to the results of a new Eurobarometer survey.

Around half of the respondents think air quality has deteriorated in the last ten years, and stricter pollution controls on industrial and energy production activities are considered to be the most effective way to tackle problems of air quality. Nearly half think that the issue of air pollution can best be addressed at the EU level, while a third think that it is better addressed at the national level and 14 per cent favour action at the regional or local level.

The latest Special Eurobarometer survey on "Attitudes of European citizens towards the environment" was carried out in the 28 EU member states in September–October 2017. It follows three previous surveys on the environment carried out in 2007, 2011 and 2014.

Source: European Commission news release 18 December 2017. The survey, and national factsheets in all languages can be found here: *http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/Survey/getSurveyDetail/instruments/SPECIAL/surveyKy/2156*

© ARTHIMEDES / SHUTTERSTOCK.COM

Covered in wood smoke

A new study has investigated the health impacts and costs of using biomass for power and heat production, concluding that tens of thousands of EU citizens are dying prematurely every year as a result of exposure to air pollution from burning solid biomass. Other health impacts include cancers, cardiac and respiratory disease, asthma attacks and working days lost due to ill health.

One focus was on 27 biomass burning power plants in the EU, ten of which were former coal power stations converted to run on biomass or to be co-fired with a mixture of biomass and coal. The former coal plants accounted for the bulk of the negative health impacts, due for example to their much greater size and higher levels of sulphur dioxide emissions, which were largely linked to continued coal burning at co-fired sites. More than 1300 people are dying prematurely each year as a result of exposure to air pollution from the 27 facilities considered.

Expressed in financial terms, the health costs linked to biomass burning for power generation run into billions of euros each year, with health costs associated with emissions from former coal and co-fired plants amounting to 137,000 euros per year on average for every megawatt of electrical capacity installed.

Evidence of the health impact of air pollution from the use of biomass in small-scale domestic heating in the EU was also reviewed. According to one study, exposure to smoke from domestic biomass burning led to 40,000 deaths across the EU in 2014. In addition to these premature deaths, there were more than 130,000 cases of bronchitis, more than 20,000 respiratory and cardiac hospital admissions, a million asthma symptom days for children aged 5–19, 43 million restricted activity days and 10 million working days lost. All because of exposure to fine particles from domestic biomass emissions.

The report "Covered in smoke – Why burning wood threatens the health of Europeans" (January 2018), by M. Holland. Published by FERN. Link: *http://www.fern.org/report/biomass-sandhealth*

© SPAXIAX / SHUTTERSTOCK.COM

Towards a pollution-free planet

In early December, world governments committed to a pollution-free planet at the third United Nations Environment Assembly (UNEA-3) in Nairobi, Kenya, with resolutions and pledges promising to improve the lives of billions across the globe by cleaning up our air, land and water.

A new resolution on preventing and reducing air pollution to improve air quality globally recognises that air pollution is "the single greatest environmental risk to health", linked to an estimated 6.5 million premature deaths across the world, and says that "in the absence of aggressive intervention, the number of premature deaths due to ambient air pollution are estimated to be on track to increase by more than 50% by 2050". It urges countries to take action across sectors to reduce all forms of air pollution.

Source: United Nations Environment, 6 December 2017.

The resolutions: *https://papersmart.unon.org/resolution/index*

Low levels of PM linked with premature death

Short-term exposures to tiny particles ($PM_{2.5}$) and ozone — even at levels well below current United States national safety standards — were linked to higher risk of premature death among the elderly in the US, according to a new study from Harvard T.H. Chan School of Public Health. The risk was even higher among elderly who were low-income, female, or black.

"This is the most comprehensive study of short-term exposure to pollution and mortality to date," said Francesca Dominici, a senior author of the study. "We found that the mortality rate increases almost linearly as air pollution increases. Any level of air pollution, no matter how low, is harmful to human health."

The study "Association of Short-Term Exposure to Air Pollution with Mortality in Older Adults" (December 2017). Published in the Journal of the American Medical Association (JAMA): *https://www.hsph.harvard.edu/news/press-releases/air-pollution-premature-death-u-s-seniors/*

Courts require action to clear the air

Member states that fail to protect people's health will – eventually – end up in court, and persistent failure is likely to become very, very costly.

Binding air quality standards that are set to protect peoples' health – most of which were agreed and adopted by EU member countries nearly 20 years ago – are frequently being exceeded. The Commission is currently pursuing infringement actions for excessive levels of particulate matter (PM_{10}) against 16 member states. Legal action has also been initiated on nitrogen dioxide (NO_2), so far involving 12 member states.

Two of the cases, for persistent exceedance of the limit values for PM_{10} in Bulgaria and Poland, have been brought before the European Court of Justice (ECJ). In a landmark ruling in April 2017, Bulgaria was the first country to be ordered by the ECJ to take action to improve air quality (see AN 2/17, p. 26–27).

The ruling against Poland followed on 22 February 2018. Here, the court pointed out that between 2007 and 2015 the country regularly exceeded the daily limits for toxic PM_{10} in the air in 35 zones and the annual limit values in nine zones.

It should be noted that PM_{10} limits are still being broken across most of the country. According to an air quality assessment published by Poland's General Inspectorate for Environmental Protection, 35 out of 46 zones recorded breaches in 2016. One of the main causes of air pollution in Poland is the burning of coal for heating and electricity production.

ClientEarth lawyer Agnieszka Warso-Buchanan said that the Polish authorities have been aware of the scale of the problem for years but have not taken the action required to reduce air pollution and protect citizens' health. "Their actions can be described in three words: ineffective, inadequate and negligent as Air Quality Plans are too vague, quality requirements for solid fuels are still missing and the standards for stoves only apply to new devices," she said.

If Poland continues to breach air pollution limits, the country risks hefty fines. However, penalties can only be imposed after yet another court process.

Based on the guidelines of the European Commission, ClientEarth estimates that in the case of Poland, financial penalties may range between €5000 and €300,000 for each day of the infringement plus a lump sum penalty of between €4.3 million and €50 million.

Warso-Buchanan concluded: "Fines are a definitive measure. Instead, we hope that the Polish government will decide to adopt the regulations necessary to improve air quality as soon as possible."

Several other countries are now also facing court action. The Czech Republic, Germany, Spain, France, Italy, Hungary, Romania, Slovakia and the United Kingdom could all be sent to court next month. Environment ministers from these nine countries were all summoned to Brussels for a special meeting with Environment Commissioner Karmenu Vella on 30 January, where they had to try to explain and justify their failures to meet the air quality standards.

In a statement after the ministerial meeting, commissioner Vella said: "The deadlines for meeting the legal obligations have long elapsed, and some say we have waited already too long, but we can delay no more, and I have made that very clear to ministers this morning."

Despite this, the countries were given an opportunity to come back with new measures, and in mid-February the Commission confirmed that all nine countries had submitted additional information, which should be evaluated by the Commission within the following month.

Commenting on the ministerial meeting and the court ruling on Poland, Margherita Tolotto of the European Environmental Bureau (EEB) said: "There's a toxic bloc of EU countries that are consistently

breaching air quality laws and have been far too slow to clean up their air. This ruling is not just about Poland; it serves as a warning to other governments that there are consequences for inaction on air pollution. We expect other governments will be sent to court in March."

One day before the ECJ ruling on Poland, on 21 February, the Royal Court of Justice in London ruled that the UK government's air quality plans for England were insufficient and unlawful. This was an embarrassing third defeat in successive cases brought by environmental lawyers ClientEarth. The judge ordered ministers to require local authorities to investigate and identify measures to tackle illegal levels of pollution in 33 towns and cities as soon as possible.

The ruling means, for the first time ever, that ClientEarth can immediately bring the government back to court if it prepares a plan which is unlawful, a move that was described by the judge as "wholly exceptional".

ClientEarth lawyer Anna Heslop said: "The judge ruled that the government's plans were seriously lacking and has ordered urgent and additional measures. In addition to the government substantially losing this case, the court has made an exceptional ruling which will allow us to return immediately to court if the government's next plan is not good enough, to protect people's health."

The Welsh government conceded the case against it and will have to produce a draft plan, to bring pollution within legal limits, by 30 April 2018 and a final plan by 31 July 2018. The UK government must finalise new plans for England by 5 October 2018.

On 27 February, Germany's highest federal administrative court ruled that German cities can introduce diesel restrictions with immediate effect. The court said national-level laws could be bypassed to allow regional authorities to protect people's health in areas where air pollution exceeds legal limits. The decision is final.

The ruling came after German states had appealed against bans imposed by local courts in Stuttgart and Düsseldorf in cases brought by Environmental Action Germany (DUH) and ClientEarth over poor air quality.

ClientEarth's lead clean air lawyer Ugo Taddei said: "The win is a tremendous result for people's health in Germany and may have an impact even further afield. This ruling gives long-awaited legal clarity that diesel restrictions are legally permissible and will unavoidably start a domino effect across the country, with implications for our other legal cases. Putting traffic restrictions on the most polluting vehicles is the quickest and most effective way to protect people from harmful air pollution."

The court recognised that immediate bans on all diesels would not be a proportionate solution. It has said all diesels up to and including Euro 4 can be restricted. From September 2019, bans will also apply to Euro 5 diesel vehicles.

So far, the car industry has only offered updates to engine control software to reduce NOx emissions from diesel cars, but the court decision in favour of diesel bans could up the pressure on them to provide significantly more efficient – and more costly – hardware fixes to heavily polluting diesels.

Christer Ågren

Sources: EEB media briefings on air quality (*www.eeb.org*); ClientEarth News (*www.clientearth.org*); European Commission press release 19 and 30 January; Guardian 21 February; EurActiv 22 February.

Paints and perfumes source of air pollution

Volatile organic compounds (VOCs) from household cleaners, paints, perfumes and other consumer products have become a substantial source of urban air pollution as stricter controls on vehicles have gradually reduced road traffic emissions, according to a new study.

VOCs react with other air pollutants to create ground-level ozone and they also contribute to the formation of fine particulate matter ($PM_{2.5}$). Both of these air pollutants are significant health hazards, particularly in urban areas where emissions tend to be highest.

The researchers found that emission inventories in the United States underestimate non-methane VOC emissions from these products by a factor of two to three, and say that the "use of volatile chemical products – including pesticides, coatings, printing inks, adhesives, cleaning agents, and personal care products – now constitutes half of fossil fuel VOC emissions in industrialised cities."

The article "Volatile chemical products emerging as largest petrochemical source of urban organic emissions." Published in Science on 16 February 2018. Link:

http://science.sciencemag.org/content/359/6377/760

© SLAVA_KOVTUN / SHUTTERSTOCK.COM

French incentives for less-polluting cars and heating systems

From 1 January 2018 the bonus scheme for the purchase of new less-polluting vehicles, which was previously available only to low-income families, has been extended to all citizens and to second-hand cars. For poorer families, the premium has doubled to €2,000. For buying an electric car, the incentive amounts to €2,500, on top of a €6,000 subsidy.

Measures also include bonuses and tax credits for domestic energy savings, and they specifically target low-income households. Up to €3,000 is available for households with very modest incomes to switch from old heating systems to new renewable ones. Tax credits on insulation improvement are maintained and extended to energy audits. From 2019, these will be turned into a premium to be paid directly after completion of the work.

Source: Ends Europe, 3 January 2018.

French Ministry: *https://www.ecologique-solidaire.gouv.fr/entree-en-vigueur-des-quatre-mesures-du-paquet-solidarite-climatique-au-1er-janvier-2018*

Poland and Bulgaria challenge EU air pollution law

Threat to annul new emission limits for coal-fired power plants that could save more than 20,000 lives every year.

In October last year, Poland launched legal action against the European Commission aimed at overturning newly adopted EU-wide air pollution standards for large power stations, and in early January Bulgaria announced its support for the Polish appeal.

In addition, in November the umbrella organisation of the European coal industry (EURACOAL) together with German lignite industries filed a case with a similar aim, namely to annul the new emission standards.

The legislation under attack is a reference document for best available techniques (BAT) for large combustion plants under the 2010 Industrial Emissions Directive (IED), which was adopted with a qualified majority by EU member states on 28 April 2017 and published in the EU's Official Journal on 17 August (see AN 2/17, pp 8–9).

The BAT document contains 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 emission limits will have to be complied with by 2021 and could save more than 20,000 lives every year by reducing pollution from coal-fired power plants alone.

Commenting on the legal challenge by Poland and Bulgaria, ClientEarth lawyer Sam Bright said: "This is irresponsible use of the law. Poland is clutching at legal straws for political and economic reasons, instead of supporting measures that will protect the health of millions. These entirely reasonable standards don't just apply to Poland – they are designed to clean up plants all over the EU. Knocking them down has implications for every country."

She continued: "Bulgaria has a terrible track record on emissions from energy production. The government is currently fighting several legal battles relating to the national coal industry. That includes unlawfully allocating public money to coal plants, and failing even to stick to the former, lower pollution limits. The legal case against the Commission is weak and Bulgaria's intervention sends a terrible political signal. The Bulgarian government should be showing true leadership during its EU presidency, not trying to undo rules designed to protect our health and the climate."

The Polish state-owned Bełchatów lignite plant is the biggest emitter of carbon dioxide (CO_2) and NOx in the EU, and the second-worst SO_2 emitter. The Bulgarian lignite plant Maritsa is also one of the EU's most polluting point sources for all three pollutants (see AN 3/17, p.3).

A study prepared by consultants DNV-GL on behalf of the European Climate Foundation shows that 82 per cent of coal capacity expected to be online in 2021 is currently failing to meet the minimum air pollution BAT standards. To achieve EU-wide compliance with the new rules could require capital investments of €14.6 billion, resulting in annual incremental costs of €2.3 billion in 2021. These are significant additional costs for an industry that is already under great economic pressure.

Actually, more than half of all the EU's coal-fired stations are already loss-making, according to a recent report by Carbon Tracker. Stricter air pollution standards and higher carbon prices will increase the operating costs, pushing even more plants into unprofitability, and resulting in 97 per cent of coal plants losing money by 2030. By phasing out coal power by 2030, losses of €22 billion could be avoided.

"The changing economics of renewables, as well as air pollution policy and rising carbon prices, has put EU coal power in a death spiral," said Matt Gray, Carbon Tracker analyst and co-author of the report. "Utilities can't do much to stop this other than drop coal or lobby governments and hope they will bail them out."

When considering the urgent need to drastically cut not only air pollution but also CO_2 emissions, as well as the deteriorating economics of coal power, it appears logical and rational that these old polluting plants should quickly be closed down.

Christer Ågren

Sources:

ClientEarth news 27 October 2017 and 10 January 2018. Link: *https://www.clientearth.org*

Hard coal/lignite fired power plants in EU28. By DNV-GL (June 2017). Link: *https://europeanclimate.org/hard-coallignite-fired-power-plants-in-eu28-fact-based-scenario-to-meet-commitments-under-the-lcp-bref/*

Lignite of the living dead. By Carbon Tracker (December 2017). Link: *https://www.carbontracker.org/54-eu-coal-power-loss-making/*

In the fight against EU supremacy, our lungs are a small thing to sacrifice.

Europeans expect to cut back on meat

New policies, health concerns and innovative food businesses can all contribute to reducing the climate footprint of European dinner tables.

One out of four Europeans plan to reduce their meat consumption in the next five years. Only one out of twenty-five plan an increase. These were the findings when the economic and financial analysis consultancy ING Think recently surveyed 13,000 Europeans in 13 countries about their attitudes towards a shift in diet. The results are published in the report "The protein shift: will Europeans change their diet?".

The negative impacts of livestock production, as a major source of greenhouse gas and nitrogen emissions, has increasingly appeared on the agenda. However, the potential for technical improvements to reduce emissions is limited. As stated in the report, livestock farming in Europe is already very efficient and "many cost-effective measures to improve efficiency on the production side have already been taken".

A dietary shift from animal-based proteins towards plant-based proteins would have several environmental benefits. However, according to the survey, environmental concerns come only fourth on the list of reasons to reduce meat consumption. The main motivation is health, followed by animal welfare and believing meat to be too expensive.

Getting people to eat differently is more complicated than a shift from old mobile phones to smart phones, the authors conclude. But they also see that there is great untapped potential to use policy as a tool for a protein shift, and suggest:

1. Direct and indirect subsidies – animal and plant products already receive some direct and indirect subsidies. Support for innovation and marketing are also examples.
2. Differentiating tax regimes ¬– in general animal- and plant-based products fall under the same tax regimes, but this could change.
3. Using legislation to set production standards – standards governing the production of animal protein have been widely adopted, but the bar could be raised even further.
4. Creating awareness through education, media campaigns and/or food guidelines ¬– dietary guidelines that propose a more even balance between animal and plant-based products is influential, but so is the marketing of food producers, retailers and restaurants.

However, there are several factors that discourage politicians from proposing taxes and increased environmental requirements on livestock production. Not least is the economic importance of the animal food industry. Animal foods represent the largest share of the EU food market, which is dominated by some of the biggest food companies and provides the highest number of jobs in the food industry. Public opinion is another undeniable factor. Only a minority, 14 per cent, of the respondents in the study thought that governments should be leading a reduction in meat consumption. Even fewer, 13 per cent, would advise their governments to introduce a meat tax.

Even though politicians are hesitant, it does not prevent big food companies from investing in a growing market for alternative proteins. The report cites Paul Grimwood, Chairman and CEO of Nestlé USA, "we're experiencing a consumer shift toward plant-based proteins. One of Nestlé's strategic priorities is to build out our portfolio of vegetarian and flexitarian choices in line with modern health trends".

Some meat-free alternatives, based for example on soy, wheat and mycoprotein, are already widely available and accepted by a large group of consumers. Novel proteins based on lab meat, insects and algae are still in the development phase. A majority, 75 per cent, of the respondents say they would not eat food from those sources on a regular basis.

FLICKR.COM / RACHEL DOCHERTY CC BY

Environmental concerns come only fourth on the list of reasons to reduce meat consumption.

But although the vegetarian market is gaining ground, it is still the norm among Europeans to eat meat for dinner. According to the survey, 74 per cent of the respondents identify themselves as regular meat eaters. A small group, 4 per cent, state that they never eat meat, and another 22 per cent indicate more flexitarian habits, eating meat once a week or less.

The team behind the report also asked Europeans what animal food they would miss the most if they couldn't have it any more. It turns out that Europeans love cheese, with 20 per cent identifying it as their favourite product. It was followed by chicken, 17 per cent, and milk, 14 per cent.

Kajsa Pira

Source: The protein shift: will Europeans change their diet? *https://www.ingwb.com/insights/research/the-protein-shift-will-europeans-change-their-diet*

Ecosystems hit by air pollutant fallout

Three-quarters of EU ecosystems are currently exposed to more nitrogen deposition than they can cope with and nearly one-tenth is still receiving too much acid fallout.

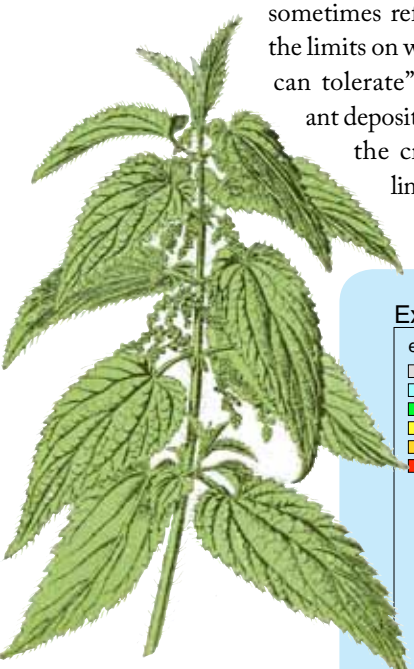
The concept of critical loads was introduced in the 1980s and has been used in Europe for developing cost-effective air pollution abatement strategies. Critical loads are scientific estimates of the amounts of pollutants that various ecosystems can tolerate without being harmed. They are sometimes referred to as the limits on what "nature can tolerate". If pollutant depositions exceed the critical load limits, damage to sensitive ecosystems will by definition occur sooner or later.

The sensitivity of various ecosystems to exposure to acidifying and eutrophying air pollutants has been monitored and mapped for more than 25 years, and European countries have coordinated this work through the Coordination Centre for Effects (CCE) of the Convention on Long-range Transboundary Air Pollution (CLRTAP).

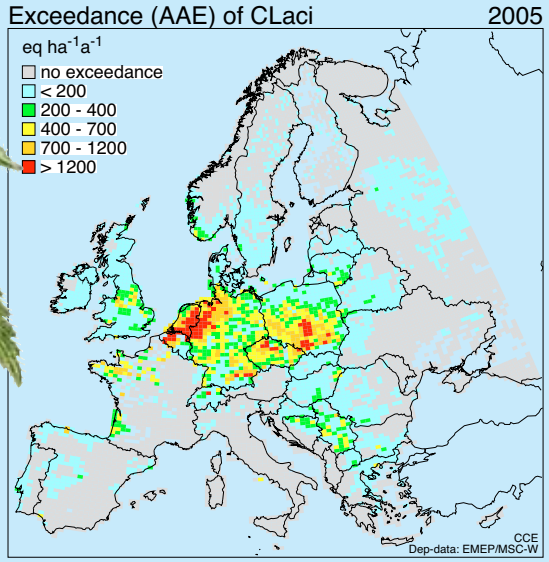
By comparing the critical load maps with data on air pollutant deposition, the CCE has also produced maps that show the extent to which European ecosystems are exposed to more air pollutant depositions than they can tolerate in the long term without damage, i.e. where the critical load limits for acidification and eutrophication are exceeded.

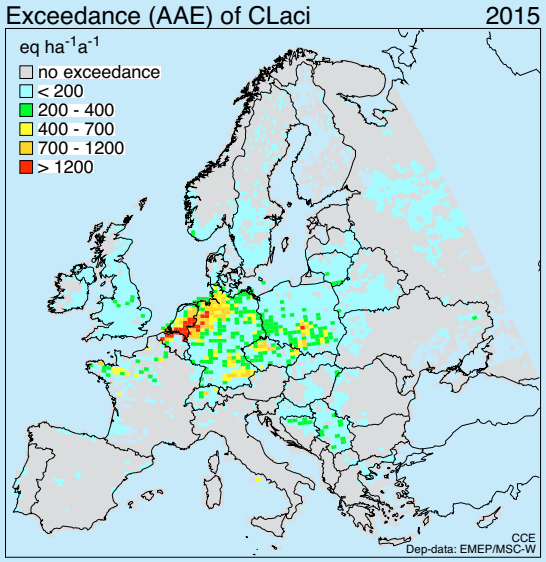
This information has, together with data on people's exposure to air pollutants, been used as input for the development of fundamentally important air pollution policies, such as the CLRTAP's Gothenburg Protocol and the EU's National Emission Ceilings (NEC) directive.

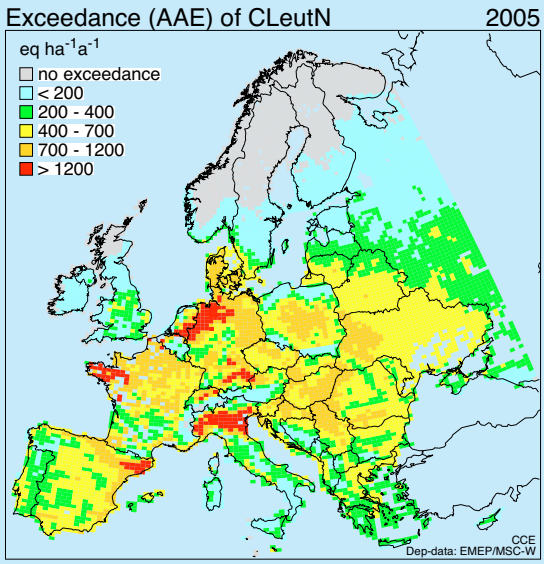
Located at the Dutch National Institute



Nettles are favoured by nitrogen deposition.







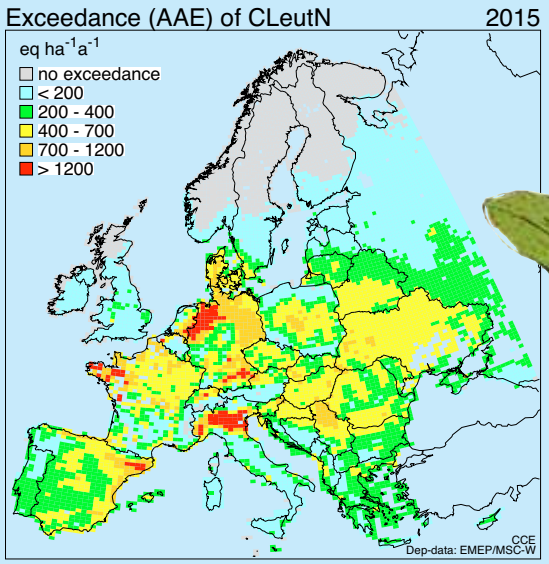


Figure: Areas where critical loads for acidification are exceeded by acid depositions (top) and areas where critical loads for eutrophication are exceeded (bottom) at 2005 (left) and 2015 (right) emission levels.

for Public Health and the Environment (RIVM) in Bilthoven, the CCE has since 1990 been supported by the Netherlands. But due to lack of continued financial support this has now come to an end. Responsibility for the European ecosystem mapping activities will instead be taken over by Germany and its Environmental Protection Agency.

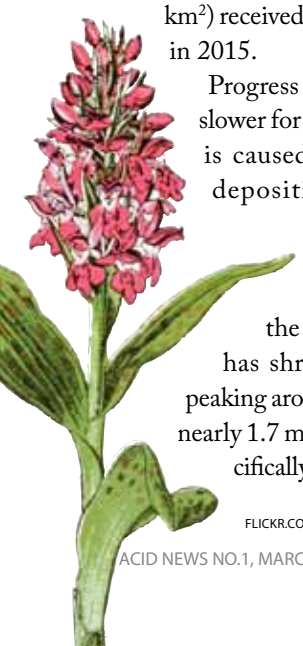
Late last year the CCE published its final critical loads mapping report, providing maps and country-by-country data on exceedance of critical loads for acidification and eutrophication as well as more preliminary information on biodiversity-critical loads.

Looking at the situation in 2005 – which is the base year applied in the 2012 Gothenburg Protocol and the 2016 NEC directive – the highest levels of exceedance of acidification critical loads were found in the Czech Republic, the Netherlands, Germany, Poland and Switzerland. For eutrophication, the countries exposed to the highest exceedance levels were the Netherlands, Luxembourg and Germany.

In that same year, acidity critical loads were being exceeded in 14 per cent of the ecosystems in the EU (11% in the whole of Europe). The area exposed to nitrogen overload, i.e. at risk of eutrophication, extended over 81 per cent of EU ecosystems (67% in Europe). For biodiversity, the figures were 29 and 27 per cent, respectively. See table and maps.

Following emission cuts over the last 40 years in the main acidifying air pollutants, especially sulphur dioxide (SO_2), the area of sensitive ecosystems at risk of acidification in Europe has now shrunk significantly, to seven per cent, or 205,000 square kilometres (km^2). For the EU, eight per cent of the ecosystem area (137,000 km^2) received excess acid deposition in 2015.

Progress is however markedly slower for eutrophication, which is caused by excess nitrogen deposition resulting from emissions of nitrogen oxides (NOx) and ammonia (NH_3). While the area at risk in Europe has shrunk somewhat since peaking around 1990, it still covers nearly 1.7 million km^2 (63%). Specifically for the EU, 1.1 million km^2 of the ecosystem area (77%) was exposed to excess nitrogen fallout in 2015.



FLICKR.COM / BIODIVERSITY HERITAGE LIBRARY CC BY

Meadow species such as orchids and birdsfoot trefoil are disadvantaged by nitrogen deposition.

It should be noted that these figures and maps give a snapshot of deposition versus ability to resist at a given point in time – they do not really reflect the true environmental situation right now. Environmental monitoring, experiments and calculations show that there may be considerable time lags in response (damage) to excess deposition exposure as well as in recovery once pollution levels come down. This means that the damage that has already been caused by excess air pollutant inputs may persist for decades, in some places even for centuries.

Clearly there is still a long way to go to actually achieve the long-term environmental objectives of the EU's 7th Environmental Action Programme, one of which is that there should be no exceedance of the critical loads for acidification and eutrophication. The same objective is also enshrined in the CLRTAP Gothenburg Protocol and in the EU's NEC directive.

Christer Ågren

Sources:

European critical loads: database, biodiversity and ecosystems at risk. CCE Final Report 2017. By J-P Hettelingh, M. Posch, and J. Slootweg.

Modelling and mapping of the impacts of atmospheric deposition of nitrogen and sulphur: CCE Status Report 2015. By J. Slootweg, M. Posch, and J-P Hettelingh.

Link: *http://wge-cce.org*

Table: Percentage area of ecosystems exposed to excess deposition of eutrophying and acidifying air pollutants in 2005 and 2015.

	% of the ecosystem area where critical loads are exceeded					
	Acidification		Eutrophication		Biodiversity	
	2005	2015	2005	2015	2005	2015
Austria	1	<1	75	65	19	12
Belgium	25	6	11	4	55	49
Bulgaria	3	<1	100	100	69	16
Croatia	5	4	97	90	42	27
Cyprus	<1	<1	100	100	<1	<1
Czech Rep.	90	65	100	100	56	43
Denmark	31	10	100	100	27	19
Estonia	<1	<1	83	76	13	11
Finland	1	1	10	3	9	6
France	10	8	89	87	9	6
Germany	63	49	82	78	45	35
Greece	3	1	100	98	42	15
Hungary	13	6	100	100	72	40
Ireland	4	<1	8	6	84	81
Italy	1	<1	78	63	77	77
Latvia	13	5	97	94	6	4
Lithuania	32	28	100	99	19	7
Luxembourg	15	13	100	100	64	46
Malta	<1	<1	100	100	<1	<1
Netherlands	90	88	76	73	98	96
Poland	60	32	77	68	36	28
Portugal	4	<1	100	100	26	15
Romania	3	1	100	99	49	16
Slovakia	9	5	100	99	47	34
Slovenia	<1	<1	100	100	21	12
Spain	2	<1	100	99	33	17
Sweden	8	5	14	13	2	2
UK	15	6	22	15	31	22
Sum EU28	**14**	**8**	**81**	**77**	**29**	**16**
Albania	<1	<1	92	82	25	18
Belarus	13	8	100	100	64	49
Bosnia & Herz.	14	11	79	72	24	21
Macedonia	12	2	92	76	46	30
Moldova	1	<1	100	100	47	34
Montenegro	1	<1	72	56	14	10
Norway	11	7	9	4	2	1
Russia	4	2	52	40	18	17
Serbia	34	23	95	94	63	58
Switzerland	20	15	60	53	8	3
Ukraine	3	1	100	100	54	50
Sum Europe	**11**	**7**	**67**	**58**	**27**	**18**

Note: There are some minor differences between the figures for 2005 in this table and those in CCE Final Report 2017, as the figures presented here are based on the most recently available updated emission data.

Personal communication with J-P Hettelingh and M. Posch (February 2018).

Possible to phase out the climate impact of road traffic in 15 years

Taxes, regulations, fuel switches, electrification and climate-conscious social planning is the recipe if the Nordic and Baltic states is going to abolish GHG emissions from road traffic.

Environmental groups and developing countries often argue that wealthy countries have the biggest responsibility for switching to fossil-free economies if we are to stay within the 1.5°C target. The industrialised countries caused the problem and they have the resources needed to achieve a transition.

According to this reasoning, wealthy countries should phase out their climate impact in the next two decades. Poorer countries should be given longer, and they need the help of technological development in the wealthier countries.

IVL Swedish Environmental Institute has analysed what it would take to phase out climate impact from road traffic in the Nordic and Baltic countries by 2030–2035. It will be very difficult to reduce emissions this quickly, but it can be done with the right mix of measures.

At present, reduction obligations are an effective tool for an individual country. The reduction obligation is a law that forces fuel suppliers to gradually reduce the climate impact of fuels. This is done by replacing fossil fuels with fuels with lower climate impact, usually biofuels.

Many vehicles will still use internal combustion engines for a long time. A gradually increasing reduction obligation, if properly designed, will ensure that the fuels they use will have low climate impact by the date set in each country.

FLICKR.COM / NICOLA SZNAJDER CC BY-NC

Sweden is introducing a reduction obligation this year. The climate impact of diesel and petrol sold by fuel suppliers in 2020 must be about 10 percent lower than that of fuels made entirely from fossil resources.

As more countries introduce a reduction obligation, fuel suppliers will have to invest more in developing new fuels. However, there is a shortage of sustainably produced raw materials. This means there is a risk that a high level of biofuel use in some countries will compete with use in other countries.

Electrofuels are one alternative to biofuels. These fuels are produced from carbon dioxide using renewable electricity. The technology is new and more expensive, but has potential in the long term. However, it is unlikely that electrofuels could play a major role within the next decade.

The countries therefore need to incentivise electric propulsion, not least to minimise demand for liquid fuels. An effective model for individual countries is to set differentiated vehicle taxes, so that fuel-efficient and electric vehicles cost less, while inefficient, fossil-fuel-driven alternatives cost more.

Electric vehicles are becoming more popular and their cost is falling. But electric cars still make up less than 5 percent of new sales in most European countries. And even if sales grow to the point where electric cars make up around half of all new cars within 10–15 years, it still means that only about 20 percent of the total mileage driven would be electric. Heavy vehicles also take longer to switch to electric drive. Growth in renewable electricity generation will naturally also be needed over the same period.

Even if new fuels and electricity can be promoted on a large scale, it is unlikely that emissions could be phased out within 15–20 years solely through fuel switches and electric vehicles. Few commentators believe this could be achieved internationally in such a short time.

The countries therefore also need to change taxation and travel allowances to slow the growth in commuting by car. Local authorities need to improve public transport and introduce transport plans for freight traffic. Cities need to apply environmentally-friendly parking fees. Creating zero-emission zones for vehicles could lead to cleaner, quieter city centres while accelerating the switch to electricity. Building regulations could reduce the focus on car parking and encourage more sustainable travel.

Individual countries do not have all the necessary tools, however. EU-wide rules are needed to assist the transition. The EU needs to stiffen requirements for lower fuel consumption and CO2 emissions from new vehicles, to reduce demand for liquid fuels and increase electrification. The EU can also impose requirements on manufacturers that zero-emission vehicles make up a certain percentage of their sales, and gradually increase this percentage. Such rules already exist in California and China. The EU also needs to support development of electric highways and fuel cell propulsion, introduce eco-friendly mileage taxes for light and heavy vehicles, and extend sustainability requirements for fuels.

IVL's report describes technologies and trends in the transport sector and presents some similarities and differences between the transport systems in the Nordic and Baltic countries.

Mats-Ola Larsson

The report can be downloaded here: *http://airclim.org/publications/what-will-it-take-phase-out-greenhouse-gas-emissions-road-traffic-nordic-baltic-region*

FLICKR.COM / TÕRNU MAURING CC BY

The Nordic-Baltic Region can be decarbonised by 2030

Zero carbon emissions by 2030 can be achieved in the electricity, heat and industrial sectors without nuclear power and without CCS, according to new report from AirClim.

Most of the decarbonisation of the eight countries[1] can be achieved with wind power and photovoltaic solar power, and improvements in efficiency. The wind and solar capacity needed can be added at a rate similar to that achieved in recent years.

Under this scenario, wind power will increase from 29 TWh in 2014 to 110 TWh in 2030. This is less radical than it looks. Wind power almost trebled between 2007 and 2014, from 9.9 to 29 TWh, which was roughly the required rate.

Solar will grow from 0.7 TWh in 2014 to 35 TWh in 2030. The 2030 target for solar in the NB8 region is less than Germany already has. It will cost us much less to buy and build that solar capacity than it did for Germany.

Cost is not quantified, but cannot be a big issue. Germany went for solar when prices were very much higher than today or tomorrow. Even since Denmark's solar boom in 2013 prices have dropped substantially, while cost estimates for fossil and nuclear power tend to rise.

Electricity consumption will decrease from 410 TWh in 2014 to 371 TWh in 2030, due to increased efficiency. It actually decreased by 12 TWh in 2007–2014, so improvements will have to be made slightly faster from now on.

While economics and technology look good for electricity and heat, there are some challenges for process industries such as steel, aluminium, lime and cement, but nothing that should not be possible to solve technically within a few years and be implemented by 2030. Possible technologies are outlined. Traditional cement can use upwards of 50 per cent fly ash, slag or volcanic ash, instead of lime, right now. Thomas Beton did so in Germany in 2016. Other types of cement and alternative construction materials can be developed fast, if required. Hydrogen can replace coal in the steel industry, and the Swedish ore and steel industry is working toward that goal.

Capacity is an issue for the power sector. The wind does not always blow, and the sun does not always shine. There is also too much wind or solar sometimes. The difficulties should not be exaggerated. Hydro power is a big source of power in our region and can to a considerable extent balance variable renewable energy. So can, to some extent, biopower and bioheat. "Surplus" electricity, i.e. at very low or negative prices, can be stored either as heat or as hydrogen for steelmaking and other industries, and possibly for vehicles. The most important instrument for balancing variable renewable energy sources is however demand-side management, which can reduce peak consumption and thus cut the need for peak and reserve power plants. The need for some such "peakers" is still foreseen, but they will not be widely used.

The zero-carbon target comes with a limited escape clause. The scenario foresees some remaining fossil fuel use and associated CO_2 emissions, but this can be compensated for by exporting electricity to surrounding countries (Russia, Belarus, Poland, Germany, the Netherlands and the UK) where it replaces fossil power for some time, assuming that decarbonisation takes place later there. A net export of 30 TWh of electricity is assumed for 2030.

The scenario implies big change, but big change is always taking place, though often for other reasons than conscious political decisions. The phasing out of nuclear power has been very difficult in Sweden, but happened between 2011 and 2014 in Japan without any political decision. Japan managed without any of its 54 reactors for the whole of 2014, with no severe shortage. Lithuania was 70 per cent dependent on nuclear power until 2010, when it was unceremoniously turned off because it was a condition for Lithuanian EU membership.

A scenario is something that can happen. Whether it will happen or not depends partly on market forces but more on political will and consistency.

Fredrik Lundberg

[1] Iceland, Norway, Sweden, Finland, Denmark, Lithuania, Latvia, Estonia

The report is available in print and at: *http://airclim.org/publications/vision-zero-carbon-emissions-nordic-baltic-region-about-2030*

See also AirClim report:
"The 10 best climate mitigation measures in Northern Europe" *http://airclim.org/publications/10-best-climate-mitigation-measures-northern-europe*

Greenwashing of farm payments

The EU spends 12 billion euro a year on "greening" – a reform that is intended to mainstream environmental practices in agriculture but delivers close to nothing.

It is difficult to overlook the main conclusion of a new report from the European Court of Auditors, since it is clearly stated in the title: "Greening: a more complex income support scheme, not yet environmentally effective".

The EU body, whose role includes checking that EU funds have achieved value for money, is not gracious in its criticism of new greening payments under the Common Agricultural Policy (CAP). The main question they examined was whether greening has been capable of enhancing the policy's environmental and climate performance.

It should be noted that the review is not looking at small change. The EU spends a massive amount on green payments: 12 billion euro per year, representing 30 percent of all CAP direct payments and almost 8 percent of the entire EU budget.

One of the first things they criticise is that greening lacks a fully developed intervention logic. Although the purpose of greening is said to be for environmental and climate reasons, there is no assessment of what it is expected to achieve, or links to relevant EU strategies, such as the EU Thematic Strategy for Soil Protection, the EU 2020 climate and energy package and the EU biodiversity strategy.

It is a basic principle, they note, that subsidies should be proportional to the costs of the beneficiary. The cost of greening measures was estimated at 30 euro/ha. It was found that the majority of farmers, 71 per cent, do not need to comply with any of the greening requirements because of the various exemptions. Among those who do have to comply, two-thirds had costs below 25 euro/ha and 40 percent even less than 10 euro/ha.

It is also difficult to assess what greening achieves, since there are no baseline parameters to compare with. The Commission have in their own communications misled comparisons. Among other things, it is said that 73 percent of EU agricultural land is affected by greening. This is actually the total area of agricultural land that is not exempt from the greening requirements. But because they are so basic, most farms complied with them even before the reform. The share of agricultural land where there has been a change in practice as a result of greening is closer to 5 per cent, according to more detailed studies carried out by the Joint Research Centre and the auditors themselves.

The auditors introduce the term "deadweight", which they aptly describe as "situations where public money (here: the green payment) is paid to a beneficiary (here: a farmer) for public goods (here: farming practices beneficial for the environment) that would have been provided anyway, even without public support, because they are either part of the beneficiary's normal activity or required by law (here: cross-compliance)".

The origin of the greening mechanism can partly be traced back to 2013, when the European Council reached an agreement on the current EU financial framework (2014–2020) and committed to spend 20 per cent of the EU's total budget on climate change. Since the CAP is a very large chunk of the EU budget it was necessary to increase the part of the CAP spent on climate. At the same time, member states were not prepared to allocate more money to the CAP or reduce direct payments. The limited scope of action that was left led the Commission to come up with greening, in which 30 per cent of direct payments are conditional on some baseline measures that are supposed to benefit the climate. This may sound quite sensible.

The auditors also recognise that greening in the initial proposal from the Commission was "a more ambitious, environmentally-focused measure" than the final outcome. They show that the changes made during the legislative process led to watering down of the environmental ambition, by dropping one practice and adding exemptions and flexibility to the other

What is greening?

Greening (or the green payment) is a new type of direct payment to farmers introduced with the last reform of the CAP (2014–2020). It was designed to implement the principle that farmers should be rewarded for the public goods they provide. Through this mechanism greening was meant to enhance the environmental performance of the CAP. The basic idea is that 30 per cent of the direct payments are conditional on the implementation of three types of greening practices:

- **Crop diversification.** Farms larger than 10 ha should have at least two crops, while farms larger than 30 ha should have at least three crops. The share of arable land that farmers may devote to the main crop is limited to 75%. On farms where at least three crops are required, the two main crops taken together must not cover more than 95% of arable land.
- **Permanent grasslands.** Member states should monitor the proportion of permanent grassland in the total agricultural area covered by CAP direct payments. If the ratio falls by more than 5% from a reference level, member states must require farmers to restore permanent grassland previously converted to other land uses. They should also designate the areas of grassland which are the most sensitive from an environmental point of view. The conversion and ploughing of such environmentally sensitive permanent grassland is prohibited. Most countries have only included land already recognised as Natura 2000 areas.
- **Ecological Focus Areas (EFAs).** Farms larger than 15 ha need to designate 5 per cent of arable land as EFAs. Member states are to decide which of the 19 types of EFAs farmers can choose to meet their obligation by. They include land lying fallow, catch crops, nitrogen-fixing crops and several types of landscape features.

three. Ironically the Commission, in their impact assessment, actually warn of a so-called menu approach, meaning that member states can pick and choose from a list of measures, since this could water down the legislation and make it more complicated. This was what was later introduced in the Ecological Focus Areas, and they were proven right.

In a recent communication the Commission suggested that they want to abolish greening for the next post-2020 CAP period. Unfortunately, a majority of member states want to keep direct payments to farmers, while maintaining the CAP budget at present levels or even reducing it. This leaves little space for reforms that would actually make a difference to the climate or other aspects of the environment.

Kajsa Pira

Source: "Greening the CAP: income support more complex and not yet environmentally effective" published by the European Court of Auditors, 12 December 2017, *https://www.eca.europa.eu/en/Pages/NewsItem.aspx?nid=9338*

FLICKR.COM / KUHNMI CC BY

© ERIC ISSELEE/ SHUTTERSTOCK.COM

Freshwater is also becoming more acidic

Rising CO_2 in lakes and reservoirs may harm animals that live in those ecosystems, reports Scientific American. Scientists have known for some time the ocean is acidifying because of climate change. The seas' absorption of human-generated carbon dioxide from the atmosphere is well documented, along with the harm it is causing ocean creatures such as shellfish. A new paper published in Current Biology presents some of the first evidence that freshwater is also acidifying.

In the study, researchers reported a significant increase in CO_2 and a correlating pH decrease of about 0.3 in four reservoirs in Germany over 35 years. They analysed data collected from 1981 to 2015 by the local Ruhr region agency that monitors drinking water, and were able to document the rising carbon dioxide levels over time by factoring in changes in temperature, water density, pH, ion species distribution and total inorganic content.

Source: *https://www.scientificamerican.com/article/like-oceans-freshwater-is-also-acidifying/*

Call to halve meat and dairy consumption

Global meat and dairy production and consumption must be cut in half by 2050 to avoid dangerous climate change and keep the Paris Agreement on track, is the message of a new Greenpeace report "Less is more". According to their calculations agriculture, in a business as usual scenario, is projected to produce 52% of global greenhouse gas emissions in the coming decades, 70% of which will come from meat and dairy.

In response to the rising impacts of animal agriculture on the environment, and the climate, Greenpeace is launching a new global campaign calling for a major shift in the way we eat and the way we farm. Greenpeace calls for a 50% reduction of meat and dairy and a significant increase of plant-based in both production and consumption by 2050.

The report: *https://www.greenpeace.org/international/publication/15093/less-is-more/*

Sustainably feeding the Nordics

It is possible to feed 37 million in the Nordic countries on food mostly produced within the region using organic practices. This would come with a significant reduction in the environmental footprint from food consumption

One year ago, Acid News (AN1/17) presented the preliminary results of the report "Future Nordic Diets", which was finally published in December 2017.

The report describes two scenarios for Denmark, Finland, Norway and Sweden (referred to here as "the Nordic countries"): one in which the majority of food is produced within the region using organic farming practices, and the other in which livestock is mainly fed on grass and by-products not suitable for human consumption:

- In the first scenario, known as "sufficiency" (SY), the number of ruminants was limited to the minimum needed to graze all semi-natural pastures, while monogastric animals (poultry, pigs and aquaculture fish) were limited to available food processing by-products.
- In the second scenario, known as "efficiency" (EY), the number of ruminants was increased to utilise all ley grown in organic crop rotation, and by-product feed for monogastric animals was supplemented with some feed crops grown on arable land. This enabled more food to be produced from Nordic agriculture, thus feeding a larger population.

The scenarios are described in more detail in figure 1.

The results show that the scenarios would be able to produce enough nutritious food for 31 (SY) and 37 (EY) million people respectively in the Nordic countries. The scenarios would thus be able to support the projected population in 2030, albeit with changes in consumption patterns. Consumption of meat decreased by 90 per cent (SY) and 81 per cent (EY) from current levels and was substituted by cereals, legumes and vegetable oil.

Estimates of current greenhouse gas emissions from the agricultural production of food consumed in the Nordic countries range between 1,310 and 1,940 kg CO_2-eq per person per year. The emissions from SY and EY scenario diets are significantly lower, giving rise to 360 kg and 480 kg CO_2-eq per person per year respectively (figure 2). Emissions in the SY scenario are lower because fewer livestock result in lower methane emissions and more carbon is stored when most of the ley is left on the fields.

On the other hand, the potential for reducing eutrophication was higher for the EY scenario than for SY, primarily because the EY scenario provided more diets without using more arable land. Leaching of nitrogen and phosphorus from arable soils accounted for roughly two-thirds of the diet's total eutrophication potential. The remaining third was mainly caused by ammonia emissions into the air from manure management, and for the SY scenario also by ammonia from non-harvested ley residues.

Ammonia was also the main contributor to acidification in the scenario diets, accounting for 97 percent of total acidification potential. Because the SY scenario had fewer animals than the EY it also resulted in less ammonia emissions from manure. This was however counterbalanced by increased emissions from crop residues due to extensive areas of ley being used for green manure in the SY scenario.

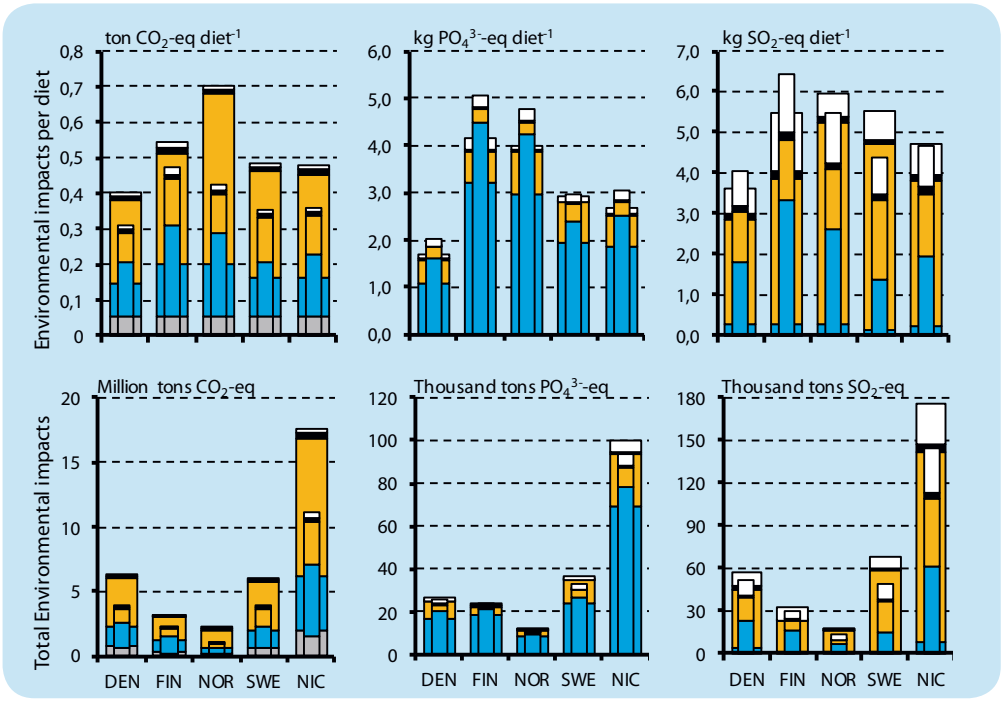
The total of the reported ammonia emissions from agriculture and agricultural land use to the UNECE from the four countries was 174 thousand tonnes in 2014. The total ammonia emissions under the scenarios were 74 thousand tonnes (SY) and 90 thousand tonnes (EY), though they are not directly comparable since they also include ammonia emissions from harvest residue.

The present study indicated a net sequestration of carbon in soils for the SY scenario and net carbon emissions for the EY scenario. However, the modelled carbon stock changes in this study did not take into account any increased allocation of biomass to roots, which may lead to an underestimation of the actual potential to sequester carbon in arable soils in the scenarios.

Changes in carbon stock were also assessed for the two scenarios. But because of limitations in the model used this was only done for Sweden. The results show

FLICKR.COM / SUSY MORRIS CC BY-NC

Figure 2. Estimated annual Global Warming Potential (GWP_{100}), Eutrophication Potential (EP) and Acidification Potential (AP) from agricultural production and fisheries fuel consumption for the SY (thin bars) and EY (thick bars) scenario diets. The impacts are divided between imports (grey), crop production (blue), livestock production and manure management (orange), energy use (black) and bioenergy production (white). Only GWP_{100} was estimated for the imported products. The total impacts are largely dependent on the total number of people who could be fed in the different case countries, leading for example to relatively high emissions from the Danish scenarios, since it would be possible to feed substantially more people from Danish resources than the current number of inhabitants



a net sequestration of carbon in soils for the SY scenario and net carbon emissions for the EY scenario. Carbon sequestration figures should always be treated with caution. But these results indicate that a transition to organic farming of the type we have today is not enough to achieve the requirements of the Paris Agreement – that anthropogenic greenhouse gas emission sources and sinks are balanced by the second half of this century. To make this possible we will need other types of actions and management methods.

One of the weaknesses of the study is that both scenarios showed deficits in the soil nutrient balances, which need to be compensated by further N and P inputs to arable soils. This could partly be alleviated by recovering nutrients present in human excreta, but other sources would also be needed for the long-term sustainability of the farming systems. The closing of nutrient cycles is an issue that needs further work.

Although there are issues to resolve, the report shows that a more extensive approach to agriculture combined with altered eating patterns has the potential to be an important building stone in developing a sustainable food system in the Nordic countries.

Kajsa Pira

Future Nordic Diets – exploring ways to sustainably feed the Nordic countries *http://airclim.org/publications/future-nordic-diets*

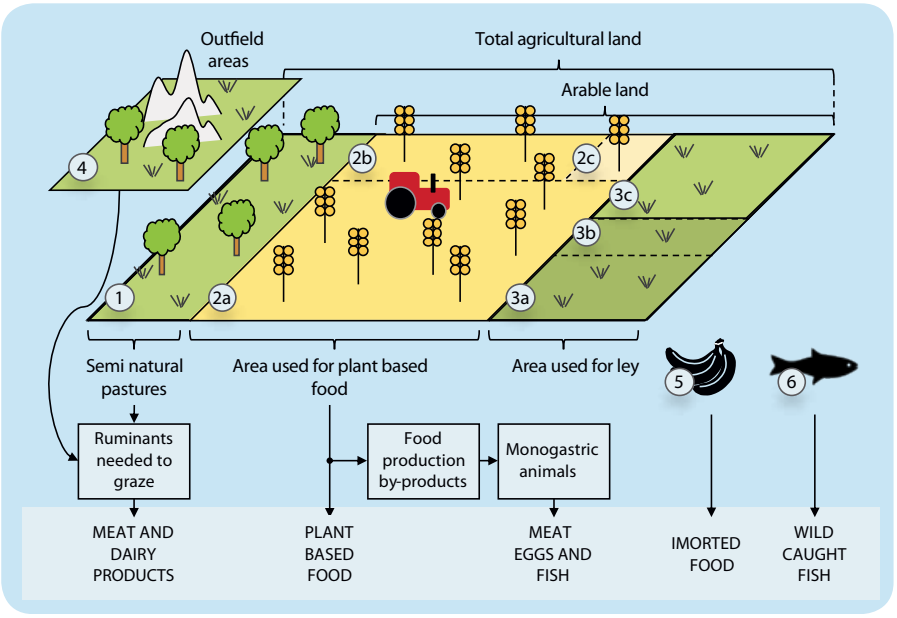


Figure 1.
1 The amount of semi-natural pastures available for grazing sets a limit on the number of ruminants needed to keep these areas grazed. The ruminants provide meat and dairy products for the diets.
2a Arable land was allocated to produce most of the plant-based food in the diets. Food processing generates byproducts that were used to supplement the ruminant feed and feed monogastric animals (poultry, pigs and aquaculture fish). The monogastric animals provide additional meat, eggs and fish to the diets.
2b To compensate for a reduced consumption of meat and other animal products, additional arable land was allocated to grow supplementary plant-based food (legumes, cereals and vegetable oil).
3 To provide green manure and pest control, ley was grown for at least two years in a six-year crop cycle. All crops except greenhouse horticulture and fruit orchards were grown in a crop rotation that included ley.
3a Some ley was allocated to provide winter feed for ruminants and pasture for dairy cows that were assumed to be able to graze semi-natural pastures only to a limited extent.
3b Slaughter and food waste, manure and, to some extent, straw were used to produce bioenergy for heat, electricity and fuel use on the farms. If additional energy was needed, ley was harvested to produce bioenergy. The digestate was returned to the soils as organic fertilizer.
3c Ley that was not used for 3a or 3b was not harvested in scenario SY. In scenario EY this land was used to provide more pasture and winter feed for a larger number of ruminants.
4 In the EY scenario, Norwegian outfield areas were also included because of their importance in Norway's animal husbandry. This provided additional pasture for ruminants, especially sheep.
5 Some plant-based food (tropical fruits, nuts, tea and coffee) was imported and included in the diets.
6 A global "fair share" of wild-caught fish was included in the diets.

The communal deficits of German lignite usage

For a successful phase-out of coal in Germany, it is important to understand the dependence of mining and industrial communities on lignite.

Since German reunification in 1990, lignite mining employment has declined from almost 130,000 to about 20,000 today due to industrial modernization and fuel substitution. The diminished regional significance of mining has commensurately reduced the business income and tax revenues received by local communities from the lignite industry. Although renewable energies provide many more employment opportunities in comparison with fossil fuel power generation, wind and solar installations generate far less energy per square kilometre than a lignite mine. In consequence, the ensuing revenues from new energy technologies are distributed over a wider area at significantly lower density. Formerly prosperous lignite regions are incapable of regaining former levels of communal welfare from wind and solar farms installed on abandoned mining sites.

Nearly one-quarter of total grid power in Germany is currently generated using 152 Mt/a of lignite mined in three geologically distinct regions: Rhineland, Central Germany, and Lusatia. The widely mechanized operations contribute only marginally to regional employment. The lignite industry nevertheless remains the primary source of local tax revenues. In addition, shareholding municipalities in the Rhineland realize dividends from Europe's largest lignite corporation RWE AG.

Renewable generation provides electricity to transmission and distribution grids on the priority basis prescribed by Germany's Renewable Sources Act (EEG). Due to equipment additions, the total connected capacity now exceeds lignite power plant ratings by a ratio of more than 4:1. Total generation during periods of high wind intensity, particularly in coincidence with daytime solar generation, provides electricity far exceeding maximum grid demand.

Declining lignite corporation revenues in competition with renewable energies have affected all mining regions. The 23.1% contribution of lignite to total power generation in 2010 remained unchanged until 2016, providing 150 TWh in absolute terms. In view of this stable demand, the communities benefitting from lignite industry business taxes felt confident of continuing prosperity. Many towns had accrued the highest statewide tax revenues per inhabitant from lignite extraction on their territory. The price of lignite also remained resistant to international fuel market developments due to cost-effective local mining and generation, providing steady community revenues related to production volumes rather than to electricity and fuel exchange price fluctuations.

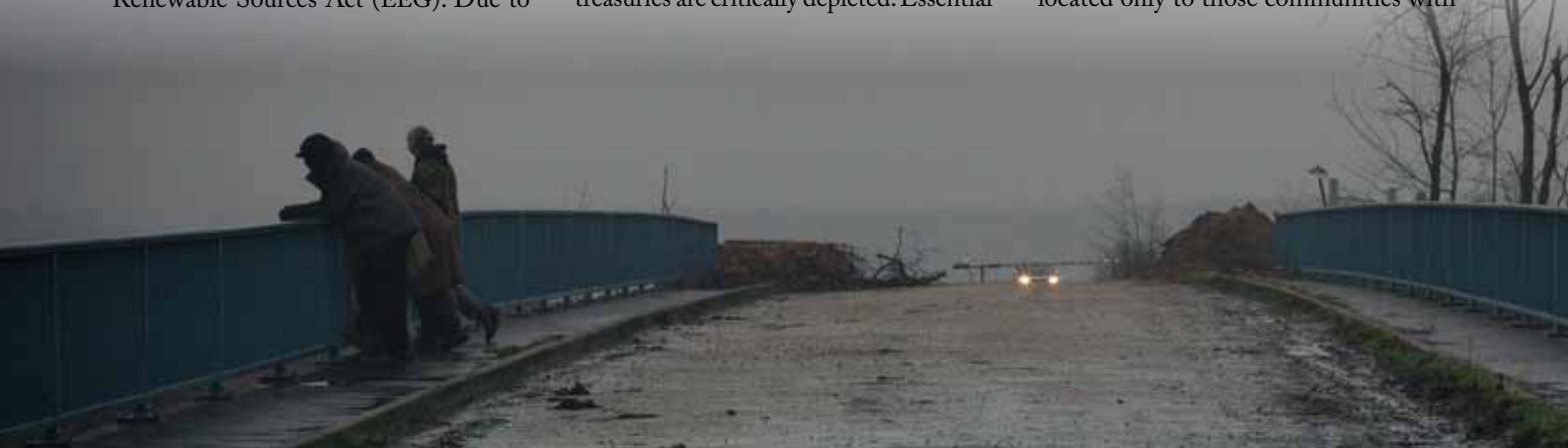
In recent years, however, some of these same municipalities have reported the highest deficits of any communities in Germany. Not only are lignite industry revenues declining to the detriment of operating profits, but the energy corporations are also entitled to receive retroactive business tax refunds compensating for their financial losses. Information available has confirmed that many lignite community treasuries are critically depleted. Essential financial resources are therefore deficient not only for future regional development, but also for providing regular municipal services to residents. As a result, communal revenues have proven to be highly susceptible to changes in the economic prerequisites that had formerly prevailed as assurances of economic stability.

Germany's largest (around 90 Mt annually) lignite producer, RWE AG in the lower Rhine basin, accrued 60% of total revenues in 2014 from lignite and coal generation. By that time, however, mounting operating losses underlined the need for business diversification. RWE posted a total year-end loss of €5.7 billion.

Regular RWE stock dividends have been cancelled entirely for cities, counties, regional utility companies (Stadtwerke) and local banks that hold nearly one-fourth of shareholder equity. RWE has discharged 10,000 employees (14% of total staffing) since 2014 to reduce operating costs. By the end of 2018, another 2,000 positions will have been eliminated.

RWE's municipal shareholders are required to write down stock losses below the original purchase price. For this reason, the city of Essen lost €680 million of equity valuation in 2013 alone. Bochum recently began divesting its 6.6 million RWE shares at a current unit price of around €15, compared with €100 a decade ago.

In contrast with the partial municipal ownership of RWE, eastern German cities and towns have no direct investments in the lignite industry. Tax revenues are allocated only to those communities with



© YUROMANOVICH / SHUTTERSTOCK.COM

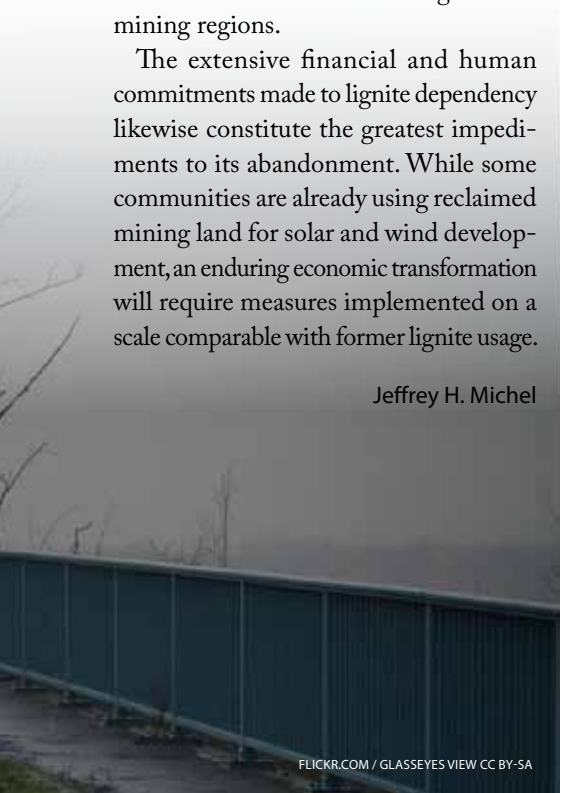
corporate assets immediately within their boundaries.

The municipal business tax income nominally reflects the profits obtained from lignite mining and power generation.

The need to establish post-mining economies has been imposed upon the lignite regions by developments unanticipated a few years ago. Communities can no longer expect to receive significant trade taxes or other revenues from local lignite operations. Additional business tax refund obligations could be retroactively imposed, while CO_2 reductions have become inevitable. The resulting 2016 standby status of the MIBRAG Buschhaus power plant has simultaneously eliminated lignite deliveries from the company's Profen mine, affecting local communities unprepared for a rapid post-lignite transision. Seven additional power blocks at RWE and LEAG are also entering standby operation by 2019. Other plants may soon be retired due to declining profitability and climate protection directives. To minimize the inherent risks to local economies, proactive lignite transition strategies have become essential for communities throughout the mining regions.

The extensive financial and human commitments made to lignite dependency likewise constitute the greatest impediments to its abandonment. While some communities are already using reclaimed mining land for solar and wind development, an enduring economic transformation will require measures implemented on a scale comparable with former lignite usage.

Jeffrey H. Michel



FLICKR.COM / GLASSEYES VIEW CC BY-SA

2017 record year for offshore wind projects

A new report released by WindEurope highlights a record year for Europe and UK offshore wind projects according to Euroactive. Offshore wind is quickly becoming a mainstream energy source for nations, with installation costs tumbling at record rates. Wind Europe's chief executive Giles Dickson said: "Offshore wind is now a mainstream part of the power system. And the costs have fallen rapidly. Investing in offshore wind today costs no more than in conventional power generation.

Source: *https://www.euractiv.com/section/energy/news/winds-of-change-seven-key-statistics-of-europes-booming-offshore-wind-industry/*

100% renewables more cost effective than fossils

A new groundbreaking study by Lappeenranta University of Technology (LUT) and the Energy Watch Group (EWG) simulates a global electricity system based entirely on renewable energy on an hourly basis throughout a whole year. Its results prove that the existing renewable energy potential and technologies, including storage, are able to generate sufficient and secure power worldwide by 2050. Under favourable political conditions, full decarbonisation and nuclear phase-out of the global electricity system can succeed even earlier than that. The study proves that a 100% renewable electricity is more cost effective than the existing system, which is largely based on fossil fuels and nuclear energy.

Link: *https://medium.com/thebeammagazine/100-renewable-electricity-worldwide-is-a-new-cost-effective-reality-595e33d42547*

Accurate climate models

The most accurate climate change models predict the most alarming consequences, the Washington Post reports.

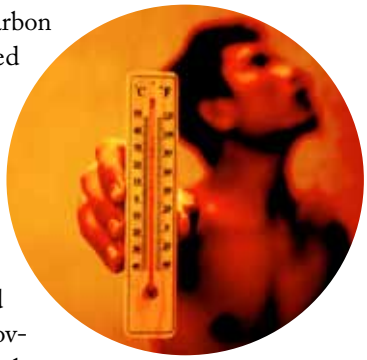
The climate change simulations that best capture current planetary conditions are also the ones that predict the most dire levels of human-driven warming, according to a statistical study released in the journal Nature.

The study, by the Carnegie Institution for Science in Stanford, Calif., examined the high-powered climate change simulations, or "models," that researchers use to project the future of the planet based on the physical equations that govern the behaviour of the atmosphere and oceans.

The researchers then looked at what the models that best captured current conditions high in the atmosphere predicted was coming. Those models generally predicted a higher level of warming than models that did not capture these conditions as well.

The study adds to a growing body of bad news about how human activity is changing the planet's climate and how dire those changes will be.

In the past, it has been common to combine together the results of dozens of these models, and so give a range for how much the planet might warm for a given level of carbon dioxide emitted into the atmosphere. That's the practice of the leading international climate science body, the United Nations' Intergovernmental Panel on Climate Change.



© TINNY PHOTO / SHUTTERSTOCK.COM

Models predicting higher temperatures appear to be more accurate

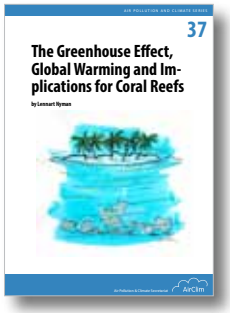
Instead, the new study compared these models' performance with recent satellite observations of the actual atmosphere and, in particular, of the balance of incoming and outgoing radiation that ultimately determines the Earth's temperature. Then, they tried to determine which models performed better. The research found the models that do the best job capturing the Earth's actual "energy imbalance," as the authors put it, are also the ones that simulate more warming in the planet's future.

Source: *https://www.washingtonpost.com/news/energy-environment/wp/2017/12/06/the-most-accurate-climate-change-models-predict-the-most-alarming-consequences-study-claims/?utm_term=.cb89f2e5fd1d*

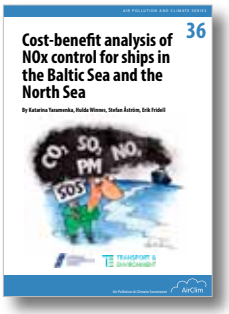
Air Pollution & Climate Secretariat
Första Långgatan 18
413 28 Göteborg
Sweden

Recent publications from the Secretariat

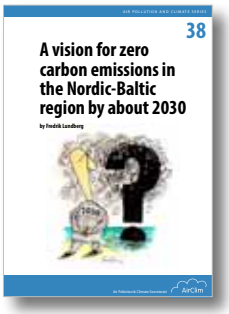
Reports can be downloaded in PDF format from *www.airclim.org*



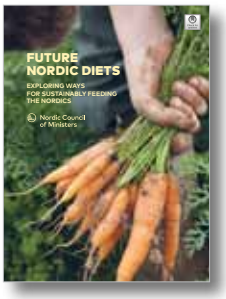
The Greenhouse Effect, Global warming and Implications for Coral Reefs (March 2018). By Lennart Nyman. Tropical coral reefs harbor some 25 per cent of all marine species.



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.



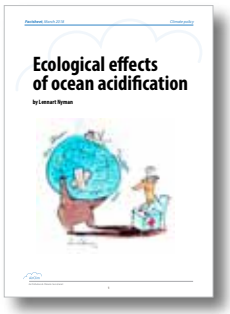
A vision for zero emissions in the Nordic-Baltic region by about 2030 (March 2018). By Fredrik Lundberg. A scenario for the electricity, heat and industrial sectors.



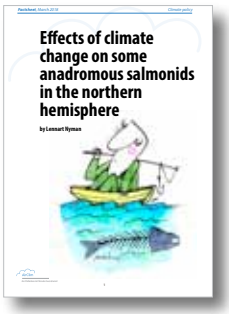
Paths to a sustainable agricultural system (Dec 2017). By Johan Karlsson et al. Exploring ways for sustainably feeding the Nordics.

What will it take to phase out greenhouse gas emissions from road traffic in the Nordic-Baltic region by 2030-2035? (March 2018). By Mats-Ola Larsson. A conceivable scenario.

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



Ecological effects of ocean acidification (March 2018). By Lennart Nyman. By absorbing CO_2 the ocean is becoming more acidic, and this happens at a rate faster than any period in the past 300 million years.



Effects of climate change on some anadromous salmonids in the northern hemisphere (March 2018). By Lennart Nyman. Some direct impacts on salmons can be predicted.

Subcribe to *Acid News* via email

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

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

Coming events

Saltsjöbaden 6: Clean air for a sustainable future – goals and challenges. Göteborg, Sweden, 19-21 March 2018. Information: *http://saltsjobaden6.ivl.se*

IMO MEPC 72 (Marine Environment Protection Committee). London, UK, 9 - 13 April 2018. Information: *www.imo.org*

UNFCCC First sessional period in 2018. Bonn, Germany, 30 April - 10 May 2018. Information: *http://unfccc.int/*

OECD International Transport Forum. Leipzig, Germany, 23 - 25 May 2018. Information: *https://2018.itf-oecd.org*

EU Green Week "Green cities for a greener future". Brussels, Belgium, 21 - 25 May 2018. Information: *https://www.eugreenweek.eu*

CLRTAP Working Group on Strategies and Review. Geneva, Switzerland, 22 - 25 May 2018. Information: *www.unece.org/env/lrtap/welcome.html*

Air Pollution 2018: 26th International conference on modelling, monitoring and management of air pollution. Naples, Italy, 19 - 21 June 2018. Information: *http://www.wessex.ac.uk/conferences/2018/air-pollution-2018*

EU Environment Council. Luxembourg, 25 June 2018. Information: *www.consilium.europa.eu/en/press/calendar/*

CLRATP EMEP Steering Body and the Working Group on Effects. Geneva, Switzerland, 10 - 14 September 2018. Information: *www.unece.org/env/lrtap/welcome.html*

IMO MEPC 73 (Marine Environment Protection Committee). London, UK, 22 - 26 October 2018. Information: *www.imo.org*

WHO First global conference on air pollution and health. Geneva, Switzerland, 30 October - 1 November 2018. Information: *http://www.who.int/airpollution/events/conference/en/*

10th Better Air Quality Conference. Kuching, Malaysia, 14 - 16 November 2018. Information: *http://baqconference.org*

UNFCCC Second sessional period in 2018; COP 24. Katowice, Poland, 3 - 14 December 2018. Information: *http://unfccc.int/*

CLRTAP Executive Body. Geneva, Switzerland, 10 - 13 December 2018. Information: *www.unece.org/env/lrtap/welcome.html*