

Ship emissions debated

A ban on carrying high-sulphur fuel oil aboard ships not equipped with scrubbers has been finally adopted by the IMO, but there was no significant progress on agreeing measures to cut ships' carbon emissions.

► Page 5

Levels of greenhouse gases rose again in 2017

The level of CO₂ today is similar to that 3–5 million years ago, when the temperature was 2–3°C warmer and the sea level was 10–20 metres higher than now.

► Page 8

Air pollution levels still much too high

Air pollution remains the largest environmental health risk in Europe. Despite slow improvements, it is still responsible for more than 400,000 premature deaths every year.

► Page 10

Cut methane to reduce ozone

Global action to reduce methane emissions could by 2050 avoid up to 130,000 annual premature deaths due to ozone globally, and up to 11,000 in the EU alone.

► Page 14

Climate targets for vehicles in the making

The European Parliament is pushing for more ambitious CO₂ standards for cars and lorries by 2030.

► Page 19

Livestock sector must contract

Numbers of farm animals in the European Union are not within a "safe operating space" for the climate and nitrogen, states a new report.

► Page 20



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EU needs net zero emissions by 2040

In order to stay within the limited carbon budget that is left, the EU will need to reduce its domestic greenhouse gas emissions by at least 3 per cent per year.

The recently published Special Report on Global Warming of 1.5°C (SR1.5) of the International Panel on Climate Change (IPCC) gave both a stark warning, and reason for optimism. It showed that many dangerous impacts of climate change that were previously attributed to a global warming of 2°C will already occur when we pass the 1.5°C threshold. And it showed, as the problem of climate change is man-made, that we are therefore also able to take action and keep temperature rise below 1.5°C.

But this needs strong and sustained action soon. Because our world is warming and we are already experiencing impacts such as heat waves, droughts, forest fires, flooding, and failed crops, and need to prepare for more of these in the coming years. And while the damage in Europe is significant and devastating, we witness even more disastrous impacts in many vulnerable countries and communities around the world, even while they hardly contribute to the problem.

Acid News

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

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

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

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The Air Pollution and Climate Secretariat

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

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

In furtherance of these aims, the Secretariat:

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

Editorial

As a result of the latest extremely alarming scientific findings from the IPCC and WMO, all European countries need to stop using coal for energy production by 2025 and thus avoid large emissions of carbon dioxide (see page 8). All other greenhouse gases should be phased out by 2040 at the latest. Political leaders from the whole of Europe must meet in 2019 in the EU, in the Council of Europe and UNECE to decide about the steps needed to phase out coal power plants by 2025 and launch a new emergency action programme for energy efficiency, energy saving and renewable energy for the whole of Europe.

Renewable energy is now the cheapest form of energy production (see page 18). A new equivalent of the Marshall Plan for Europe could be decided during 2019 which would mobilise finances, put in place a social adaptation programme for workers in the coal industry and initiate a renewable energy revolution investment programme that will give people all over Europe, especially young people, new hope that the threat of dangerous climate change can be solved. This would have many valuable co-benefits, including drastically reducing air pollution, protecting and supporting the beauty of nature through reforestation, and enhancing biodiversity. On page 12 of this issue of Acid News is a link to a list of coal power stations in Europe ranked by plant age and carbon dioxide emissions, as well as a proposal indicating which power plants should be closed by which date over the next seven years. Rich countries must take the lead and start the closure process immediately. Germany need to decide in the next weeks to phase out coal by 2025 under the coal commission that has been negotiating a coal phase-out plan for several months now.

It is now scientifically very clear that a global temperature increase has to stay below 1.5°C, otherwise catastrophic climate change effects will occur for many

people worldwide and for several global ecosystems on land and in the oceans. The WMO recently said that the last time the Earth experienced a comparable concentration of CO₂ as today was 3–5 million years ago, when the temperature was 2–3°C warmer and the sea level was 10–20 metres higher than now. The IPCC 1.5°C report

warns, for example, that at above 1.5°C up to 90 per cent of coral reef systems could vanish. These ecosystems contain 25–30 per cent of the biodiversity in the oceans. A study by the World Wide Fund for Nature has just reported that humanity has globally, on average, wiped out

60 per cent of animal populations and more than 85 per cent in North, Central and South America since 1970. Any temperature rise beyond the current 1–1.5°C will further increase species extinction. Forest protection and sustainable land use in Europe must help to protect species and take up CO₂, and Europe need to decide on a forest protection action programme during 2019.

Climate Action Network Europe is demanding net-zero emissions of all greenhouse gases by 2040 (see front page). Rich countries in Europe, such as Germany, Sweden, Norway, Denmark, Austria, France, the UK and the Netherlands, must take the lead and reach net-zero much earlier. The member organisations of AirClim demand that Sweden should reach net-zero by 2030 and that this target should be reached without the use of nuclear energy and CCS for fossil fuels. All European governments have been aware of the threat of climate change since the first and second World Climate Conferences in Geneva in 1979 and 1989, the Global 2000 Report of the US government in 1980 and the UN Brundtland Report in 1987. Fifty years have gone by; there is absolutely no excuse for European governments not to act forcefully now!

Reinhold Pape



“European countries need to stop using coal for energy production by 2025”

EU needs net zero emissions by 2040

Continued from front page

This all proves that our leaders were right when they agreed at the Paris Climate Summit, in December 2015, to pursue efforts to limit temperature increase to 1.5°C. But unfortunately they did not link this collective commitment to an increase of the individual commitments that all governments brought to Paris. These Paris pledges, in the form of emission reduction targets for 2030, will not limit temperature rise to 1.5°C. At best, they will keep us just below 3°C. This would have a devastating impact.

The IPCC 1.5°C report assesses that under present day warming of around 1°C, the 2018 heatwave would happen every four to five years, while a warming of 1.5°C, would make heatwaves occur in 4 out of 10 summers, and a warming of 2°C would increase this even to 6 out of 10. The difference in terms of impacts between 1.5°C and the old target of 2°C is substantial. For example, an extra 0.5°C could see global sea levels rise 10cm more by 2100 affecting an additional 10 million people; would double the number of people expected to suffer from water shortages; and tropical heat waves would last up to a month longer.

The IPCC report also shows how we can limit temperature rise to 1.5°C. For this, all countries will need to substantially increase current inadequate levels of action. And the EU will need to take its fair share of the action, both in terms of reducing emissions at home, but also by providing financial and other support to poor and vulnerable countries, to enable them to act and help them to adapt to unavoidable impacts and recover from regrettable damages that are already happening.

To achieve the 1.5°C target the EU will need a very fast phase out of the use of fossil fuels, a steep reduction in greenhouse gas emissions and a substantial increase in the capacity of our forests, wetlands and grasslands to remove carbon from the atmosphere, through sustainable ecosystem restoration. Research and innovation will play an important role in making the zero transition happening, but at the same time it needs to be clear that in order to avoid the most dangerous impacts of climate change, we need to adapt our lifestyles

to sustainable levels of consumption, in particular in the fields of transport and food consumption. Furthermore, we need a drastic shift in financial flows from dirty fossil fuel subsidies to investments in clean alternatives, while also enabling a just transition providing maximum support to workers and vulnerable communities.

The above may seem a daunting task, but in fact the proposed solutions offer multiple benefits in terms of economic development, employment, health improvement and access to energy systems. In the energy sector for instance, the cost of renewable energy is comparable or even advantageous to the cost of traditional energy sources. Similarly investments in energy savings, storage, electrification all offer economic opportunities.

On top, taking action now will limit the economic cost that is linked to the impacts of climate change. In the EU alone, climate related economic losses amounted up to 11.6 billion euro in 2015, and the economic costs for the EU would run up to €120 billion per year under a 2°C scenario, and up to €200 billion per year under 3°C.

As a consequence of the near-linear relationship between cumulative carbon emissions and peak temperature, a carbon budget can be identified that sets the maximum total of cumulative emissions that can be allowed to achieve a certain temperature limit. The IPCC Special Report on 1.5°C indicates that in order to have a likely chance (66%) to limit temperature rise to 1.5°C, the world could emit no more than 420 Gigatonne of carbon in the period 2017 to 2100. This equals about 12 years of current emissions. It should be very clear that we have little time to act. For the EU, time is even shorter, as the EU has already consumed more than its fair share of the budget in the period before 2017, and hence should leave space in the global budget for poorer countries that should get more time for their zero carbon transition.

In order to stay within the limited budget that is left, the EU will need to radically phase out its emissions and similarly



drastically increase its capacity to remove carbon from the atmosphere. In order to stay within its fair carbon budget, the EU will need to reduce its domestic greenhouse gas emissions by at least 3 per cent per year, reaching near zero emissions by 2040. This would include setting new greenhouse gas emission reduction targets for 2030 (-60%), 2035 (-80%) and 2040 (-95%).

In order to do so, a rapid shift to a 100% renewable energy system in the power, transport and buildings sectors would be needed. This will need increased political support for investments in renewable energy, energy demand reduction, energy storage, and electrification. Even more action and innovation would be needed to bring the industrial and agricultural sectors towards near zero emissions.

Next to rapid and deep reductions in greenhouse gas emissions, the EU will need to support domestic ecosystem restoration in order to substantially increase the removal capacity of forests, grasslands, wetlands, agricultural lands and peatlands. We need clear rules that ensure we account for what the atmosphere sees in terms of emissions and removals from land use and forestry; and we need more and better sustainable forest and land management, that ensures an increase of the capacity of our natural capital to remove emissions at least beyond the current annual removal of 5% of 1990 emissions.

The combination of both efforts, a -95% reduction of greenhouse gas emissions, and a 5% removal through natural solutions, both compared to 1990 emission levels, would lead to the EU achieving net zero greenhouse gas emissions by 2040. This should be the benchmark for a fair contribution of the EU to the efforts to avoid dangerous climate change.

Wendel Trio

Director, Climate Action Network Europe

Electric ferries between Sweden and Denmark

In November, Swedish ferry operator HH Ferries Group officially inaugurated the

Tycho Brahe and the Aurora (built in 1991 and 1992 respectively) as the world's largest battery-powered passenger ferries on the high-frequency route between Helsingborg and Helsingör.

In each port, automatic land-based charging stations enable efficient charging of each vessel's 640 batteries within a few minutes. The batteries are located in containers on top of the ferries along with two deckhouses for transformers, converters

and cooling systems. The battery power of each ferry is 4,160 kWh. Although planned to run full time on battery power, the two vessels' quartets of diesel engines are retained on board as back-up to the battery systems.

Source: Shipinsight, 12 November 2018



A robot takes care of charging the batteries when the ferry is in port.

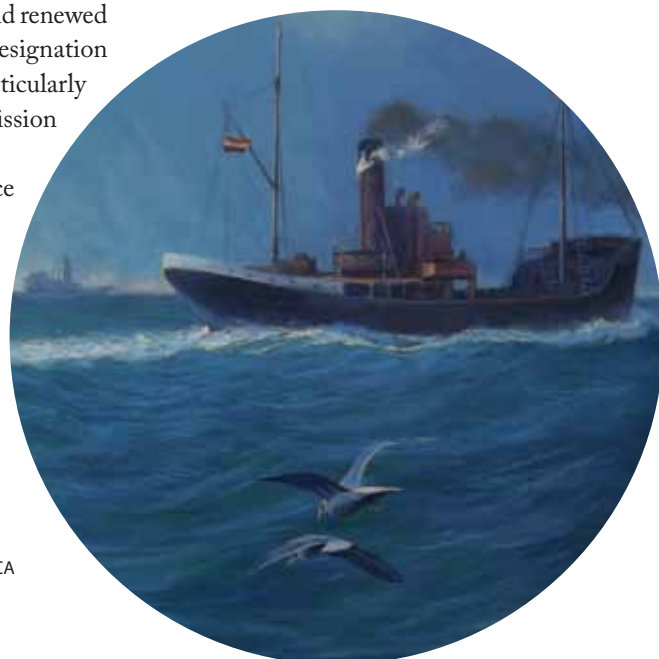
Benefits of a Mediterranean emission control area

At an IMO meeting in London in October, France presented its impact assessment of a possible emission control area (ECA) in the Mediterranean Sea. The findings show that a combined ECA which simultaneously addresses both sulphur and nitrogen oxides has the greatest positive effect in terms of reduced air pollution and resulting socio-economic and ecological benefits. Environmentalist groups welcomed the report and renewed their call for the immediate designation of all European waters and particularly the Mediterranean Sea as emission control areas.

Charlotte Lepitre at France Nature Environment (FNE) said: "People in northern Europe are profiting since years from higher standards for marine fuels, improving their air quality. France is taking the lead on Mediterranean

countries proposing to catch up and protect the citizens' health, ecosystems and the cultural heritage. Such a step would also establish a coherent European legal framework that prevents market distortions and guarantees a level playing field."

Source: FNE and NABU joint press release, 24 October 2018



France has presented an impact assessment for an ECA in the Mediterranean Sea.

Decarbonising European shipping

Powering ships with batteries, hydrogen or ammonia will decarbonise the European fleet and require only half the amount of renewable electricity that less efficient solutions like synthetic methane or synthetic diesel will need, according to a study by sustainable transport group Transport & Environment (T&E).

Battery-powered ships offer the most efficient and immediate solution to decarbonise short sea voyages within the EU. Longer journeys will ultimately require liquid hydrogen and liquid ammonia produced with zero-emission electricity.

Powering ships calling at EU ports with a combination of the three would require around 25 per cent additional renewable electricity compared to total EU electricity production today, the analysis finds. This is a considerable amount but still half of what is required by other options like synthetic methane or synthetic diesel.

Further investment in gas bunkering infrastructure would lock EU countries into using LNG, which does not offer a path to decarbonisation and in some cases is worse than other fossil fuels. Faig Abbasov, shipping officer at T&E,

concluded: "We need to avoid wasting lots of time and money on solutions that can't deliver shipping decarbonisation. The biggest pitfalls are biofuels, which can't be scaled or enforced sustainably, especially in shipping. LNG and synthetic methane are other dead ends due to methane leakage and enforcement problems."

Source: T&E News, 15 November 2018. The report: <https://www.transportenvironment.org/publications/roadmap-decarbonising-european-shipping>



Ship emissions debated

A ban on carrying high-sulphur fuel oil aboard ships not equipped with scrubbers has been finally adopted by the IMO, but there was no significant progress on agreeing measures to cut ships' carbon emissions.

In October, the Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) spent most of two weeks of talks on considering what measures the global shipping sector should take to reduce its climate impact. Governments meeting at the IMO headquarters in London were supposed to start delivering on their April commitment to at least halve greenhouse gas (GHG) emissions from international shipping by 2050 (see AN 2/18, p. 14), but failed to make any significant progress.

While the MEPC meeting was expected to agree immediate measures that reduce emissions before 2023, it is now clear that consideration of such measures will only commence in May 2019. The IMO initial GHG strategy refers to a range of candidate short-, mid- and long-term measures: Short-term measures could be finalised and agreed between 2018 and 2023; mid-term measures, between 2023 and 2030; and long-term measures, beyond 2030.

One of the most important measures being considered to immediately reduce ships' GHG emissions is mandatory speed reduction – either as a standalone measure or as an element of a measure that sets a target for improving ship efficiency. According to green transport group Transport & Environment, either approach, if done right, could meet the needed short-term carbon intensity goal as well as deliver fuel savings for industry. Sections of industry oppose speed reduction but have failed to put forward any alternative measures that come close to the reduction in emissions that will be required.

The possibility of bringing forward the phase 3 requirement of the Energy Efficiency Design Index (EEDI), from 2025 to 2022 for certain ships, was discussed, as well as a proposal to increase the energy efficiency improvement from 30 to 40 per cent for container ships. However, by the end of the day no agreement was reached on this issue either, and the matter will be

back on the agenda for the next meeting in May 2019.

Bill Hemmings, shipping director at Transport & Environment, said: "Time is running short but that's not the feeling you get inside the room. The commitment last April to agree and implement in the short-term immediate emissions reduction measures has fallen victim to procedure, bureaucracy and delay spearheaded by countries who were never really on board. The US, Saudi Arabia and Brazil head that list. And all this despite the authors of the IPCC report making absolutely clear to IMO members that now is the time for action."

The 0.5 per cent limit on sulphur in fuel oil for ships will be in force from 1 January 2020. This limit was adopted back in 2008, and re-confirmed in 2016, and will bring huge benefits for the environment and human health, particularly for people in port cities or living near major shipping routes. It will apply globally, while in designated sulphur emission control areas (ECAs) an even lower limit of 0.1 per cent will remain. Currently, there are four designated ECAs: the Baltic Sea; the North Sea; the North American area (covering designated coastal areas off the United States and Canada); and the US Caribbean Sea (around Puerto Rico and the US Virgin Islands).

At the October MEPC meeting, the IMO sulphur rule in MARPOL Annex VI was complemented by an amendment that will prohibit the carriage of non-compliant fuel oil for combustion



The IMO moves forward on bunkers. But fails to act on carbon emissions.

purposes for propulsion or operation on board a ship – unless that ship has an exhaust gas cleaning system ("scrubber") fitted. The use of scrubbers is accepted as an alternative means to meet the sulphur limit requirement, and ships using scrubbers are allowed to burn fuel oil with up to 3.5 per cent sulphur (see AN 1/18, p.3).

This new amendment will come into force on 1 March 2020, and does not change in any way the entry into force date of the 0.5 per cent limit. It is intended as an additional measure to support consistent implementation and compliance, and provide a means for effective enforcement.

The MEPC meets next time on 13–17 May 2019, and a fifth meeting of the Intersessional Working Group on Reduction of GHG emissions from ships is expected to be held the week before.

Christer Ågren

IMO meeting summary: <http://www.imo.org/en/MediaCentre/MeetingSummaries/MEPC/Pages/MEPC-73rd-session.aspx>

T&E press release, 26 October 2018: <https://www.transportenvironment.org>

What goes up must come down

Over the last decade the downward trend in emissions has flattened out – some countries are even reporting increasing emissions of ammonia and particulate matter.

Since 1980, total European emissions of sulphur dioxide (SO₂) – the most significant acidifying pollutant and an important precursor to health-damaging secondary fine particles (PM_{2.5}) – from land-based emission sources have fallen by nearly 90 per cent, from around 53 million tonnes in 1980 to 6 million tonnes in 2016.

Emissions of nitrogen oxides (NO_x), non-methane volatile organic compounds (VOCs), and ammonia have also gone down, although to a lesser extent. VOCs have more than halved (-52%) and NO_x emissions have come down by 45 per cent since 1980, while ammonia emissions – which emanate primarily from agricultural activities – have dropped by only 25 per cent.

Historic emissions of primary particulate matter (PM_{2.5}) are not as well documented as those of other air pollutants, and many countries lack emissions data for the 1990s. Between 2000 and 2016 it is estimated that emissions of PM_{2.5} from land-based sources have fallen by 24 per cent, from 2.7 to 2 million tonnes.

Although overall emissions continue to fall, the downward trend has flattened out over the last decade. This is especially the case for ammonia and primary particles, which are even reported to be increasing in some countries over the last few years.

Looking specifically at the 28 member states of the EU, between 1980 and

Table 2: The proportion of total air pollutant depositions of sulphur and oxidised nitrogen from shipping, on various countries in 2016.

Sulphur		NOx-Nitrogen	
Portugal	18%	Norway	24%
Spain	15%	Denmark	22%
Ireland	12%	Sweden	21%
Italy	11%	Estonia	19%
France	11%	Netherlands	19%
Norway	10%	Portugal	18%
UK	8%	Finland	16%
Greece	7%	Greece	16%
Netherlands	5%	UK	15%
Denmark	4%	Spain	14%
Sweden	3%	Ireland	14%
Belgium	3%	France	13%

2016 the emissions of SO₂ came down by as much as 94 per cent, while those of NO_x and VOCs fell by 57 and 62 per cent respectively. Emissions of ammonia fell by only 25 per cent. Primary PM_{2.5} particles were reduced by 28 per cent between 2000 and 2016.

Emissions of SO₂ from international shipping in European waters showed a steady increase up to around 2006, after which emissions have fallen, primarily as a result of ship fuel sulphur regulations introduced by the EU and the International Maritime Organization (IMO). The emission reductions were particularly marked in the northern Sulphur Emission Control Areas (SECA), which cover the Baltic Sea and the North Sea, including the English Channel.

Ship NO_x emissions increased steadily for many years, but appeared to stabilise, or even come down somewhat, during the economic crisis of 2008–2009. However, because of the lack of effective international ship NO_x regulation, they are likely to increase again as the economy and trade grow.

The proportion of pollutant depositions contributed by shipping has been steadily rising.

The data in Table 1 is based on figures reported by countries themselves to the Convention on Long-range Transboundary Air Pollution (LRTAP), and was compiled by the Centre on Emission Inventories and Projections (CEIP) of the European Monitoring and Evaluation Programme (EMEP). The Convention's EMEP keeps track of the ways in which emissions from one country affect the environment in others. The EMEP report also provides an overview of calculations for source-receptor relationships (including transboundary movements between countries), covering acidifying, eutrophying, photo-oxidant, and particle pollution. This shows that for most European countries the biggest share of depositions of sulphur and nitrogen emanate from outside their own territory.

Since land-based emissions have been falling much faster than those from international shipping, the proportion of pollutant depositions and concentrations contributed by shipping has been steadily rising. For 2016 it was estimated that ship emissions were responsible for 10 per cent or more of the total depositions of both sulphur and oxidised nitrogen compounds in many countries (see Table 2). In the coastal areas of these countries, shipping's contribution to the overall pollution load is even higher.

It should be noted that the contribution of shipping to sulphur deposition in countries around the Baltic Sea and the North Sea decreased markedly after the entry into force of stricter fuel sulphur limits in those sea areas from 2015. Countries that are still particularly exposed to sulphur pollution from shipping include Portugal, Spain, Ireland, Italy and France.

Several more countries are highly impacted by ships' NO_x emissions, especially the Nordic countries, the Netherlands and Portugal, but also many Mediterranean countries as well as Ireland and the United Kingdom.

Christer Ågren

Report: "Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components." EMEP Status Report 1/2018. www.emep.int

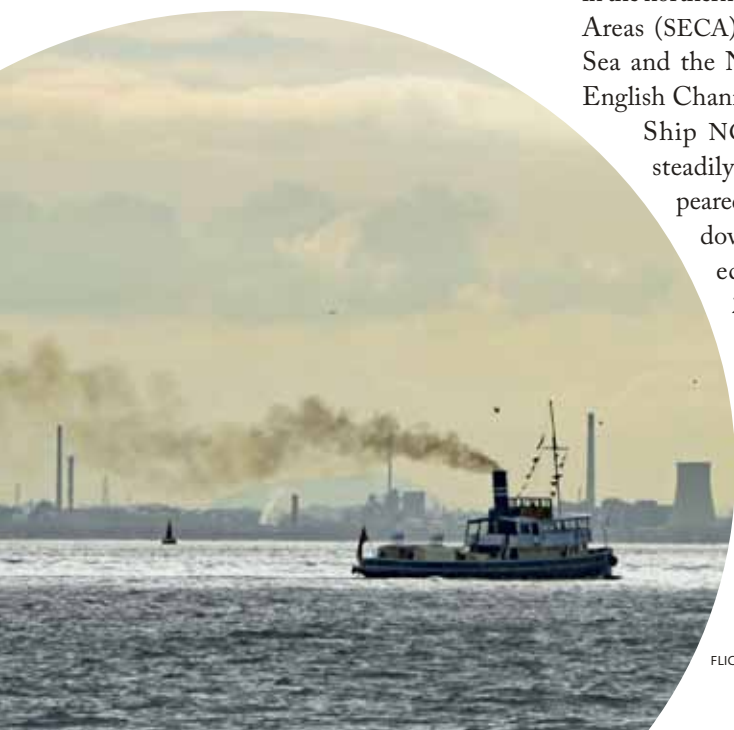


Table 1: European emissions of sulphur dioxide (SO₂), nitrogen oxides (as NO₂), non-methane volatile organic compounds (NMVOC), ammonia (NH₃), and particulate matter (PM_{2.5}) (kilotonnes). Data for 2000, 2010 and 2016 is from the 2018 EMEP report, while data for 1990 is from earlier EMEP reports or from the EMEP website. Russia in the table refers only to the western part of the Russian Federation.

	Sulphur dioxide				Nitrogen oxides				VOCs				Ammonia				PM _{2.5}		
	1990	2000	2010	2016	1990	2000	2010	2016	1990	2000	2010	2016	1990	2000	2010	2016	2000	2010	2016
Austria	74	32	16	14	220	215	185	154	303	176	144	138	66	66	67	68	25	20	18
Belgium	365	172	60	42	411	344	246	193	330	217	142	114	123	92	71	68	41	32	25
Bulgaria	1,101	862	388	105	284	147	138	125	561	107	90	84	121	54	47	50	26	31	32
Croatia	170	59	35	15	106	86	67	52	175	106	90	70	54	41	38	35	33	31	18
Cyprus	31	48	22	16	16	22	19	15	15	15	15	9	5	6	6	6	3	2	1
Czech Rep.	1,755	233	164	115	812	295	226	165	571	302	242	213	190	87	72	73	51	45	39
Denmark	178	33	15	10	303	227	150	115	204	172	122	103	126	97	80	75	24	25	21
Estonia	272	97	83	30	79	45	43	31	66	38	24	22	24	9	11	12	15	14	8
Finland	249	82	66	40	306	234	184	131	233	176	116	88	34	34	35	31	29	26	20
France	1,282	625	279	140	1,953	1,617	1,078	842	2,417	1,615	771	608	668	662	625	630	329	214	170
Germany	5,486	646	411	356	2,888	1,929	1,357	1,218	3,402	1,609	1,230	1 052	743	647	626	663	163	121	101
Greece	494	553	219	108	369	388	343	230	331	319	255	113	78	66	64	56	58	46	26
Hungary	824	427	31	23	235	183	142	117	320	205	144	141	149	93	78	87	48	50	53
Ireland	183	140	26	14	169	175	117	112	143	122	109	108	110	115	108	117	24	19	16
Italy	1,784	756	218	116	2,068	1,489	972	761	1,996	1,590	1,117	904	472	455	387	382	195	196	162
Latvia	100	18	4	4	89	41	39	35	83	53	42	40	37	14	15	16	23	19	16
Lithuania	191	37	20	15	129	53	56	54	117	68	59	52	80	35	37	34	7	7	6
Luxembourg	15	3	2	1	40	41	33	20	26	16	12	13	7	7	6	7	2	2	2
Malta	10	24	8	2	7	9	10	5	2	3	3	3	2	2	1	1	1	0	0
Netherlands	197	78	35	28	656	464	334	254	498	252	175	141	350	175	133	127	29	17	13
Poland	2,649	1,404	866	582	1,052	846	858	726	495	596	636	609	441	319	285	267	170	163	146
Portugal	324	265	68	47	260	289	202	161	223	224	163	154	82	78	57	56	67	51	47
Romania	802	493	354	108	487	263	234	211	353	281	288	258	131	168	175	167	94	132	110
Slovakia	418	126	69	27	215	113	94	67	169	121	90	64	74	40	31	30	31	28	27
Slovenia	201	94	11	5	72	60	50	37	64	52	37	31	22	20	19	18	10	14	12
Spain	2,053	1,401	250	218	1,391	1,388	952	765	1,021	947	637	594	502	540	456	492	185	139	128
Sweden	103	43	28	19	280	216	157	131	353	224	184	159	60	60	55	53	28	23	18
United Kingdom	3 767	1,286	450	179	3,242	2,026	1,242	916	2 990	1 648	903	821	331	312	270	289	151	122	109
Total EU28	25,078	10,037	4,198	2,379	18,139	13,205	9,528	7,643	17,461	11,254	7,840	6,706	5,082	4,294	3,855	3,910	1,862	1,589	1344
Albania	86	34	27	15	24	18	22	25	43	23	34	38	29	29	24	24	9	14	15
Belarus	637	135	59	56	285	211	170	143	533	430	308	291	215	150	151	136	61	45	39
Bosnia & Herz.	480	217	201	191	73	35	32	31	48	52	39	34	21	17	19	21	16	15	14
Iceland	21	35	74	50	31	28	24	24	14	9	7	7	6	5	5	5	1	1	1
Macedonia	110	106	91	59	40	43	38	22	48	48	36	27	16	13	11	11	30	24	14
Moldova	152	4	10	9	91	13	25	27	100	29	42	49	52	23	22	23	4	4	11
Montenegro	14	14	28	51	8	9	10	14	10	10	8	8	6	6	3	2	4	4	5
Norway	52	27	20	16	199	209	189	151	302	390	150	152	27	28	29	28	42	38	27
Russia	4,671	2,867	1,911	2,080	3,600	3,349	2,897	3,154	3,668	3,414	3,339	3,548	1,191	966	1,088	1,196	489	429	389
Serbia	563	448	392	408	182	144	144	145	188	146	134	127	94	77	68	65	39	42	41
Switzerland	40	15	10	6	140	105	77	63	287	135	83	71	69	62	60	57	11	8	7
Ukraine	2,783	2,310	1,241	778	1,097	828	716	648	1,369	555	534	521	729	302	251	281	121	135	143
Total Non-EU	9,609	6,212	4,064	3,719	5,770	4,992	4,344	4,447	6,610	5,241	4,714	4,873	2,455	1,678	1,731	1,849	827	759	706
Total Europe	34,687	16,249	8,262	6,098	23,909	18,197	13,872	12,090	24,071	16,495	12,554	11,579	7,537	5,972	5,586	5,759	2,689	2,348	2,050
Int. ship: Baltic Sea	160	181	106	8	310	351	333	257	8	2	2	2					16	10	8
Int. ship: Black Sea	33	37	37	36	85	96	90	86	2	1	1	1					5	5	6
Int. ship: Mediterran.	504	571	560	554	1,119	1,270	1,168	1,115	41	11	10	8					79	77	80
Int. ship: North Sea	352	399	215	26	627	711	669	565	18	6	6	5					38	25	19
Int. ship: N.E. Atlantic	330	375	368	355	680	772	725	689	19	7	6	5					50	50	50
Total internat. ship.	1,379	1,563	1,286	979	2,821	3,200	2,985	2,712	88	27	25	21					188	167	163
Total Euro. + ships	36,066	17,812	9,548	7,077	26,730	21,397	16,857	14,802	24,159	16,522	12,579	11,600	7,537	5,972	5,586	5,759	2,877	2,515	2,213
Turkey	1,691	2,242	2,557	2,251	255	585	698	703	885	1,072	1,060	1,071	540	559	547	713	340	368	385

The warming effect of long-lived greenhouse gases on our planet has increased by 41 per cent since 1990.

Levels of long-lived greenhouse gases rose again in 2017

The level of CO₂ today is similar to that 3–5 million years ago, when the temperature was 2–3°C warmer and the sea level was 10–20 metres higher than now.

Levels of heat-trapping greenhouse gases in the atmosphere have reached another new record high, according to the World Meteorological Organization (WMO). There is no sign of a reversal in this trend, which is driving long-term climate change, sea level rise, ocean acidification and more extreme weather.

Globally averaged concentrations of carbon dioxide (CO₂) reached 405.5 parts per million (ppm) in 2017, up from 403.3 ppm in 2016 and 400.1 ppm in 2015. Concentrations of methane and nitrous oxide also rose.

Since 1990, there has been a 41 per cent increase in total radiative forcing – the warming effect on the climate – by long-lived greenhouse gases. CO₂ accounts for about 82 per cent of the increase in radiative forcing over the past decade.

“The last time the Earth experienced a comparable concentration of CO₂ was 3–5 million years ago, when the temperature was 2–3°C warmer and sea level was 10–20 metres higher than now,” said the WMO.

Carbon dioxide is the main long-lived greenhouse gas in the atmosphere. Concentrations reached 405.5 ppm in 2017, 146 per cent of the level in the pre-industrial era (before 1750). The increase in CO₂ from 2016 to 2017 was about the same as the average growth rate over the last decade. It was smaller than the record leap observed between 2015 and 2016 under the influence of a strong El Niño event, which triggered droughts in tropical regions and reduced the capacity of “sinks” such as forests and

vegetation to absorb CO₂. There was no El Niño in 2017.

Methane (CH₄) is the second most important long-lived greenhouse gas and contributes about 17 per cent of radiative forcing. Approximately 40 per cent of methane is emitted into the atmosphere by natural sources (e.g. wetlands and termites), and about 60 per cent comes from human activities like cattle breeding, rice agriculture, fossil fuel exploitation, landfills and biomass burning.

Atmospheric methane reached a new high of about 1859 parts per billion (ppb) in 2017 and is now 257 per cent of the pre-industrial level. Its rate of increase was about equal to that observed over the past decade.

Nitrous oxide (N₂O) is emitted into the atmosphere from both natural (about 60%) and anthropogenic sources (approximately 40%), including oceans, soil, biomass burning, fertiliser use, and various industrial processes.

Its atmospheric concentration in 2017 was 329.9 parts per billion. This is 122 per cent of pre-industrial levels. It also plays an important role in the destruction of the stratospheric ozone layer that protects us from the harmful ultraviolet rays of the sun. It accounts for about 6 per cent of radiative forcing by long-lived greenhouse gases.

Compiled by Reinhold Pape

Source: WMO Press release, 20 November 2018

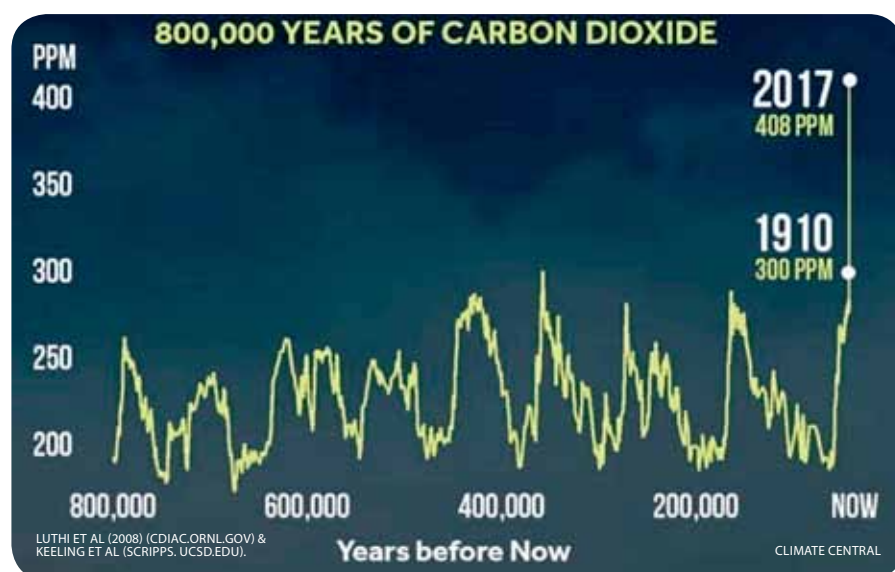


Figure: Levels of carbon dioxide over the past 800,000 years.

Limiting global warming to 1.5°C is possible

Climate Action Network evaluates the IPCC's Special Report on Global Warming of 1.5°C for the Talanoa Dialogue.

Climate Action Network (CAN) has reviewed the IPCC's Special Report on 1.5°C. CAN considers the findings in the report to be a wake-up call with regards to the quantification of different climate risks and impacts at 1.5°C degrees and 2°C degrees of global warming and with regards to the goals of the Paris Agreement.

CAN emphasises a number of findings in the report, including that climate change is happening now and that the current warming level of approximately one degree is already affecting people, ecosystems and livelihoods all around the world; that we know what is needed to achieve 1.5°C and that every half-a-degree matters for people and nature; that rapid and deep cuts of global greenhouse gas emissions in all economic sectors are needed to limit global warming but can go hand-in-hand with other world goals.

Regarding the discussions in the report concerning carbon dioxide removal CAN points out that some 1.5°C pathways with more stringent emission cuts, reduce the need for later removals and that forest and land use restoration are better than riskier, untested options.

CAN recognises with great concern that the report identifies impacts at the current global warming level and that even 1.5°C of global temperature rise will be expected

to result in very severe impacts in several global ecosystems, such as coral reefs and the Arctic region, as well as more extreme weather events, increased coastal and river flooding, lower crop yields, and increased heat-related morbidity and mortality.

A key conclusion is that the world is far from being on track to meet the Paris Agreement targets. Current NDCs (Nationally Determined Contributions) could lead us to a world of 3–4°C of warming. The report states that global net anthropogenic CO₂ emissions must decline by about 45 per cent from 2010 levels by 2030 (40–60% interquartile range), reaching net zero around 2050 (2045–2055 interquartile range) to limit global warming to 1.5°C.

The network also encourages parties to fully consider the findings of the special report in the Talanoa Dialogue, and respond by recognising the need to significantly step up the level of ambition in current NDCs and committing to update NDCs by 2020 in line with the best available science.

CAN states that the outputs from the Talanoa Dialogue should include actionable, next-step recommendations from the Presidencies, laying out the practical next steps countries need to take at national

level to assess the areas, opportunities and solutions for enhancing their NDCs. Likewise, the UNFCCC needs to provide enough space for countries, international organisations and other actors to report back on progress at national level on enhancing their climate ambition. Additionally, the UNSG Summit in 2019 is a critical opportunity to further assess whether enough progress is being made collectively at the global level to safeguard the 1.5°C target and would be a critical milestone for reporting on progress in the national review process.

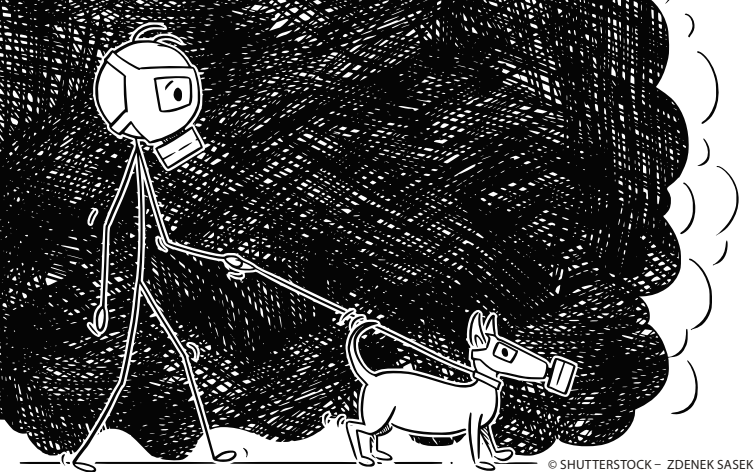
CAN recommends a more in-depth analysis of the Special Report on Global Warming of 1.5°C by the UNFCCC in the next few months as the Second Periodical Review will re-start its work and concludes that, based on the report, the CAN position remains that global temperature increases must stay below 1.5°C to minimise these risks.

Compiled by Reinhold Pape

CAN International Briefing, 8 November 2018:
<http://www.climatenetwork.org/publication/can-briefing-ipcc%E2%80%99s-special-report-global-warming-15%C2%B0c-sr15-cop-24-and-talanoa-dialogue>

Governments need to significantly step up the level of ambition.





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Harmful air pollution levels still much too high

Air pollution remains the largest environmental health risk in Europe. Despite slow improvements, it is still responsible for more than 400,000 premature deaths every year.

Air pollution shortens people's lifespan and contributes to serious illnesses such as heart disease, respiratory problems and cancer. Between 2014 and 2016, up to 85 per cent of the EU urban population was exposed to levels of fine particulate matter (PM_{2.5}) exceeding the air quality guidelines established by the World Health Organization (WHO) to protect people's health. And up to 98 per cent of EU urban citizens were exposed to ozone levels above the WHO's guideline value (see Table 1).

A new report from the European Environment Agency (EEA) presents the latest official air quality data reported by more than 2,500 monitoring stations across Europe. It shows that despite slow improvements (see Figure), high concentrations of air pollutants still have significant health impacts, with particulate matter,

nitrogen dioxide (NO₂) and ground-level ozone (O₃) causing the greatest harm.

In the 41 countries considered, 422,000 premature deaths in 2015 were attributed to PM_{2.5} exposure, 79,000 to nitrogen dioxide exposure and 17,700 to ozone exposure. In the EU, the numbers of premature deaths attributed to PM_{2.5}, NO₂ and O₃ exposure were 391,000, 76,000 and 16,400, respectively.

Table 2 shows the best-estimate figures for total mortality due to exposure to each of the three pollutants, for each of the European countries included in the analysis.

Country-by-country data is presented for the estimated number of years of life lost (YLL) and the YLL per 100,000 inhabitants due to exposure to the different pollutants. Regarding the latter, the largest impacts from PM_{2.5} are observed

in the central and eastern European countries, which is also where the highest concentrations are observed, i.e. Kosovo, Bulgaria, Serbia, Macedonia, Hungary, Poland and Romania.

The largest health impacts attributable to NO₂ exposure, expressed as YLL per 100,000 inhabitants, are found in Italy, Greece, Spain, France and Germany. Regarding ozone, the countries with the highest rates of YLL per 100,000 inhabitants are Kosovo, Montenegro, Hungary, Serbia and Greece.

It should be noted that the impacts estimated for each pollutant may not be added to determine the total impact attributable to exposure to the three pollutants. Because concentrations – especially those of PM_{2.5} and NO₂ – are correlated, additions may result in double counting.

A wider historic assessment included in this year's report shows that annual premature deaths due to PM_{2.5} have been cut by about half a million, from around 960,000 in 1990 to around 445,000 in 2015 in the EEA-39 countries, except Turkey. Taking into account the population growth during this 25-year period, it is clear that health risks associated with air pollution have at least halved – an improvement that is largely due to the implementation of air quality policies and the introduction of emission abatement measures at national and local level which have led, for example, to cleaner

New EEA briefing on health risk assessments

In a new briefing, the EEA describes how it calculates and quantifies the impacts of air pollution on health. EEA has selected mortality as the health outcome that is quantified, as this is the parameter for which the evidence is most robust. Mortality is estimated in terms of "premature deaths" and as "years of life lost". The estimated health impacts in the EEA air quality report are those attributable to exposure to PM_{2.5}, NO₂ and O₃ and are based on information

on air pollution, demographic data and the relationship between exposure to pollutant concentrations and specified health outcomes. The estimates provide a measure of the general impact of air pollution across a given population and cannot be assigned to specific individuals living in a specific geographical location.

The briefing "EEA's health risk assessments of air pollution": <https://www.eea.europa.eu/themes/air/health-impacts-of-air-pollution/assessing-the-risks-to-health>

Table 1. Percentage of EU urban population exposed to air pollutant concentrations above EU and WHO reference levels (2014–2016).

Pollutant	EU reference value ($\mu\text{g}/\text{m}^3$)	Exposure estimate (%)	WHO air quality guideline ($\mu\text{g}/\text{m}^3$)	Exposure estimate (%)
PM _{2.5}	Year (25)	6–8	Year (10)	74–85
PM ₁₀	Day (50)	13–19	Year (20)	42–52
O ₃	8-hour (120)	7–30	8-hour (100)	95–98
NO ₂	Year (40)	7–8	Year (40)	7–8
BaP	Year (1 ng/m ³)	20–24	Year (0.12 ng/m ³)	85–90
SO ₂	Day (125)	< 1	Day (20)	21–38

Colour coding:	< 5%	5–50%	50–75%	> 75%
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Figure: Percentage of EU urban population exposed to air pollutant concentrations above WHO air quality guidelines (2000–2016)

cars and lower emissions from industry and energy production.

On top of the health impacts, air pollution continues to damage vegetation and ecosystems. Elevated concentrations of ground-level ozone, for example, damage agricultural crops, forests and plants. In 2015, the EU's long-term objective for the protection of vegetation was exceeded in 79 per cent of the total EU agricultural area, and the critical level for the protection of forests was exceeded in 61 per cent of the total EU forest area.

Excess deposition of sulphur and nitrogen compounds (from emissions of SO₂, NO_x, and NH₃) contribute to the acidification of soil, lakes and rivers, causing the loss of biodiversity. In 2014, six per cent of the EU's ecosystem area was exposed to acidifying depositions exceeding the limits of nature's tolerance.

Emissions of NH₃ and NO_x also disrupt land and water ecosystems by introducing excessive amounts of nutrient nitrogen, causing eutrophication (the over-supply of nutrients), with resulting impacts on

biodiversity. In 2015, about 72 per cent of the EU's ecosystem area was exposed to nitrogen deposition exceeding the critical eutrophication limits.

This year's report also looks into tropospheric (ground-level) ozone pollution in some more detail. The development and causes of ozone pollution in Europe, and especially in the Mediterranean, are analysed, along with some abatement strategies. Tropospheric ozone is a secondary pollutant formed from precursor pollutants, such as NO_x and VOCs, by chemical reactions in the presence of sunlight.

It is stated that the EU's long-term objectives for ozone cannot be met without additional action worldwide, and reference is made to a recent scientific assessment report, which emphasises that measures targeting methane emission abatement would be beneficial for both climate change mitigation and ozone reduction.

Christer Ågren

The report "Air quality in Europe – 2018 report" (EEA Report No. 12/2018) is available at: www.eea.europa.eu

Table 2. Estimates of premature deaths attributable to exposure to PM_{2.5}, O₃ and NO₂ in 41 European countries in 2015.

	PM _{2.5}	O ₃	NO ₂
Austria	5,900	380	1,200
Belgium	7,400	220	1,500
Bulgaria	14,200	350	640
Croatia	4,500	230	430
Cyprus	750	40	30
Czech Rep.	10,100	460	490
Denmark	2,800	90	80
Estonia	560	20	
Finland	1,500	50	40
France	35,800	1,800	9,700
Germany	62,300	3,000	13,100
Greece	12,000	610	2,300
Hungary	12,800	530	1,300
Ireland	1,100	20	30
Italy	60,600	3,200	20,500
Latvia	1,600	50	130
Lithuania	2,600	90	70
Luxembourg	240	10	50
Malta	240	10	20
Netherlands	9,800	290	1,900
Poland	44,500	1,300	1,700
Portugal	5,500	300	890
Romania	25,400	580	1,300
Slovakia	5,200	210	240
Slovenia	1,800	100	160
Spain	27,900	1,800	8,900
Sweden	3,000	140	110
UK	31,300	590	9,600
Total EU28	391,000	16,000	76,000
Albania	1,400	70	130
Andorra	50		
Bosnia & Herz.	3,700	170	150
Iceland	60		
Kosovo	3,700	120	70
Lichtenstein	20		
Macedonia	3,000	90	110
Monaco	20		20
Montenegro	640	30	20
Norway	1,300	50	200
San Marino	30		
Serbia	13,000	420	860
Switzerland	4,200	300	1,000
Total all	423,000	18,000	79,000

EEA: Air quality in Europe – 2018 report

Phasing out coal in Europe

Elements for a plan to phase out coal by 2025 are presented.

Coal is being phased out in Europe. The EU produced 31 per cent less coal power in 2017 than in 2007. But a much faster phase-out is needed for the climate, health and the environment. Here is a sketch of how to end coal power by 2025, a target supported by AirClim.

EU coal power plants emitted 652 million tonnes of CO₂ in 2016, 19 per cent of EU total CO₂. The biggest coal power producer is Germany with 261 TWh in 2016 out of 694 TWh for the entire EU, followed by Poland with 133 TWh, Spain 45, Italy 33, the Netherlands 31 and the UK with 31 TWh.

In Europe, outside the EU, the biggest emitters are Russia with 149 TWh, Turkey 92 and Ukraine with 61 TWh.

Change is possible, as can be seen in the UK, which produced 108 TWh of coal power in 2011, which was reduced to around 17 TWh by 2018. That coal power was mainly replaced with renewable power (some 65 TWh), biomass, increased efficiency (17 TWh less electricity use), and more net imports (9 TWh). Nuclear, gas and oil power are not part of the picture; they all decreased between 2011 and 2018.

The EU and Europe as a whole could do the same. A phase-out of the 180 GW of coal power plants now operating could be achieved step by step. The steps could be as follows:

1. Plants under construction, or planned, should immediately be stopped. A new plant is a commitment for 40 years of several million tons per year. If built, the Gubin lignite power plant in Poland, 150 kilometres from Berlin, is estimated to

emit almost half a billion tons of CO₂ during its lifetime. New projects total 54 GW, while those under construction total 6 GW. Many of them are in Turkey. The first tranche of the phase-out is to stop the construction and planning of new coal plants.

2. The oldest first. There is some variation, but older plants are usually less efficient and dirtier. The second tranche is units commissioned in 1970 and earlier. The oldest date from 1951. They account for some 33 GW.
3. Lignite is even dirtier than hard coal, so tranche 3 may be lignite units commissioned in 1971–1990. This third tranche contains some 46 GW.
4. The fourth tranche includes 50 GW of hard coal units commissioned in 1971–90.
5. The fifth tranche includes 21 GW of units commissioned in 1990–2000
6. The sixth tranche contains the remaining 34 GW, i.e. units commissioned from 2001 on.

Step / Tranche	Measure	Giga-watts	Year
1	stop future coal	54 plan +6 constr	2019
2	units from 1970 and older	33	2020
3	Lignite units 1971–90	46	2021
4	Hard coal units 1971–90	50	2022
5	Units 1991–2000	21	2023
6	Remainder, 2001–	34	2025

As in the UK, coal would be replaced by mainly wind, solar, efficiency and some biomass, and in southern Europe also some solar thermal power. Gas will be needed for balancing, but not necessarily using more gas per year.

Phasing out coal in the rest of Europe has drawbacks and advantages compared to the UK.

Drawbacks: Coal is still mined in some countries, which makes it politically more difficult to close power plants and mines. Few countries have as much offshore wind power potential as the UK. The UK plants were very old, and either illegal or uneconomic to retrofit. That is not the case everywhere. Some countries, notably Poland, are now more dependent on coal power than the UK was in 2011.

Advantages: Renewables and efficiency will be a lot cheaper from 2019 on than the average cost in 2012–2018. Many countries have more power lines for importing/exporting power; many have more hydro (for balancing wind and solar); most have more sun and biomass. In southern Europe, solar thermal is an option that is more expensive than photovoltaics, but has built-in storage. Southern Europe can also integrate solar power more easily (and import some from the Sahara), as there is a fairly good match between summer afternoon peak demand for air conditioning and PV production. The potential for onshore wind power is good everywhere, but in the UK development was effectively stopped in 2014; few other countries have such self-imposed restrictions.

The UK has wasted a lot of political attention on fruitless efforts to develop



nuclear power, including fusion, so-called Generation IV and CCS, none of which will have cut emissions by a single gram by 2025. Other countries could focus their efforts better. By 2025, or even earlier, parts of the battery vehicle fleet could be used to balance wind and solar. Electric cars could charge when power is abundant and discharge to the grid when power is scarce. Much more is now known about how to integrate a large share of wind and solar into power production. Much of this could be left to the market if the price signal is allowed to be strong.

Fredrik Lundberg

Sources: The complete database can be downloaded from <https://beyond-coal.eu/data/>

The latest available update for this article was 16 November 2018. Under the tab "Plant" there is data for CO₂, SO₂, NO_x, PM, health impact and further sources.

The distribution of plants by age and fuel (hard coal or lignite) is taken from the tab Units in this database and can be found here: <http://airclim.org/downloads/beccoaltable>

There is less data for units than for plants, which often consist of several units. But the "Units" list is more relevant for age, and also includes countries in the western Balkans and Turkey.

Data for coal power production in TWh for various countries, and the European Union, comes from <https://www.bp.com/content/dam/bp/en/corporate/excel/energy-economics/statistical-review/bp-stats-review-2018-all-data.xlsx>, tab "Electricity generation from coal". BP also has statistics for wind, solar and other renewables, through 2017.

2018 data for the UK is taken from <http://www.mygridgb.co.uk/last-12-months/>, other data from <https://www.gov.uk/government/statistical-data-sets/historical-electricity-data>

This is a preliminary version of a phase-out plan for coal by 2025 in Europe. A final version covering all countries in Europe will be published by AirClim in 2019.

Mercury pollution still a big problem

Historical and current emissions of mercury continue to present a significant risk to the environment and human health, according to the European Environment Agency (EEA). The main source of new mercury emissions in Europe is coal burning, but about half of the mercury deposited in Europe's environment originates from outside Europe.

Mercury presents the biggest risk in rivers, lakes and oceans where it takes a highly toxic form that is absorbed by animals, including fish. Nearly 46,000 out of approximately 111,000 surface water bodies in the EU do not meet mercury levels set to protect fish-eating birds and mammals. Humans become exposed to mercury mainly when they eat large predator fish, such as

tuna or monkfish, that have been eating smaller fish with mercury in their bodies. Mercury presents a particular and significant risk to the neurological development of foetuses, newborn babies and children.

Source: EEA news, 19 September 2018.

The report: <https://www.eea.europa.eu/publications/mercury-in-europe-s-environment>



Monkfish is one of the species with the highest levels of mercury.

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Hidden subsidies for coal, gas and nuclear

New research by Greenpeace reveals that €58 billion goes to supporting coal, gas and nuclear in the form of so-called capacity mechanisms – a controversial type of subsidy given supposedly to safeguard supply in case extra power is needed, although the plants that receive the subsidies are rarely called on.

To date, capacity mechanisms have cost consumers €32.2 billion, and a further €25.7 billion has been earmarked until 2040. The countries handing out the most capacity mechanisms are Spain and Poland (€17.9 billion and €14.4 billion respectively), followed by Belgium, Ireland and the UK (all around €6 billion) and Germany (around €3 billion).

Greenpeace researchers were able to identify the type of fuel receiving the subsidy in around half of the cases, with 66 per cent of that money going to coal-fired plants.

Whilst the European Commission and Parliament want to restrict capacity mechanisms, national governments have rejected such restrictions. Poland, the UK, and Greece are leading the charge in favour of capacity mechanisms so that they can continue to subsidise their unprofitable fossil fuel and nuclear power plants.

Link: <https://www.greenpeace.org/eu-unit/issues/climate-energy/1519/exposed-e58-billion-in-hidden-subsidies-for-coal-gas-and-nuclear/>

Two thirds of the so-called capacity mechanism was estimated to support coal power.



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Cut methane to reduce ozone

Global action to reduce methane emissions could by 2050 avoid 70,000 to 130,000 annual premature deaths due to ozone pollution globally, and 6,000 to 11,000 in the EU alone.

Ground-level, or tropospheric, ozone is produced by the interaction of sunlight with emissions of nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC) and methane (CH₄). Comparison of ozone observations at the end of the 20th century with earlier data shows that over the last century levels of ground-level ozone in Europe have more than doubled. While short-term peak levels of ozone in Europe and North America have declined over the last few decades as a result of lowered NO_x and VOC emissions, no such trend can be found for average long-term levels.

Methane is not only a major source of ground-level ozone pollution, which damages human health and plants, it is also a significant contributor to global warming. Moreover, ozone is in itself a so-called short-lived greenhouse gas.

Reducing methane emissions would therefore be beneficial for both air quality and climate change.

A new report by the EU's Joint Research Council (JRC) analyses methane's role in ozone formation, looks at emission trends, and estimates the impacts in Europe and globally of various future methane emission scenarios.

Since the pre-industrial era, methane

Table: Summary of global and European impacts of "high" and "low" methane emission scenarios. Figures show changes relative to base year 2010.

	High emission scenarios		Low emission scenarios	
	Change in global methane emissions relative to 2010 (Tg CH ₄ /year)			
2030	57 to 129		-132 to -87	
2050	111 to 307		-183 to -102	
	Change in CH ₄ -related ozone mortalities relative to 2010 exposure levels			
	Global	Europe	Global	Europe
2030	15,000 to 30,000	1400 to 2800	-14,000 to -5000	-1200 to -400
2050	40,000 to 90,000	3600 to 8300	-40,000 to -30,000	-2800 to -2100
	Change in crop economic losses relative to 2010 (million USD)			
	Global	Europe	Global	Europe
2030	1050 to 2075	130 to 250	-920 to -290	-110 to -35
2050	2160 to 5000	265 to 600	-2000 to -1500	-250 to -180
	Change in global radiative forcing relative to 2010 (mW/m ²)			
2030	140 to 340		-280 to -190	
2050	290 to 900		-370 to -220	

concentrations have more than doubled. And after a period of stagnation, they are increasing again since the last decade.

"Worldwide, methane emissions increased by 17 per cent between 1990 and 2012, compared to a 53 per cent increase in CO₂ emissions. The methane emissions of the EU28 and the contributions of methane to the overall EU GHG emissions declined substantially in the 1990s, but in the last 15 years the rate of decline has been much less," explains JRC researcher Rita Van Dingenen.

Under business as usual, global man-made methane emissions could increase by 35–100 per cent by 2050, from the 2010 level of about 330 Tg. By contrast, more sustainable scenarios, such as those that target the 2° Paris Agreement goals, have projected methane emission reductions of up to 50 per cent by 2050.

If nothing is done about reducing methane emissions worldwide, they could cause between 40,000 and 90,000 more premature deaths globally by 2050, compared to the present situation. But if concerted action is taken to reduce emissions, the number of annual ozone mortalities could instead be cut by up to 40,000 (see Table).

Man-made methane emissions originate primarily from agriculture, landfills and

wastewater, and fossil fuel production and distribution, so targeting these three sectors can bring a significant reduction in overall methane emissions and ozone concentrations globally.

The JRC points out that there are cheap and even profitable options for reducing methane emissions in a relatively short time frame. In particular, important emissions reductions can be obtained by:

- Lowering energy consumption, substituting fossil fuels, upgrading old gas and oil production, and gas distribution infrastructure to reduce unintended leakage.
- Enforcing maximum waste separation and treatment, and not using landfill for biodegradable waste. The global abatement potential in the solid waste landfill sector is estimated to be approximately 61 per cent of the baseline emissions by 2030, of which 12 per cent can be achieved at relatively low or zero costs.
- Improving the sanitary standards in developing countries and implementing western standards for wastewater sanitation.
- Following FAO recommendations to improve animal health and efficiency of milk and meat production. Ruminant enteric fermentation – an important source of methane – can also be reduced

Stop dumping biodegradable waste in landfills is a cheap measure to reduce methane emissions.

Fossil fuels are another source of methane emissions. Prevent unintended leakage or even better stop using them.

for instance through adjustment of animals' diets and vaccination.

- Changing dietary habits by reducing meat and dairy consumption, which would also bring additional health benefits.

In its 2016 "Declaration on the review of methane emissions", the European Commission stated its intention to review methane emissions in the context of assessing options to further reduce ozone concentrations in the EU, and to promote methane reductions internationally.

According to the JRC, Europe's contribution to global methane emissions is currently only about 6 per cent, so reducing emissions in Europe alone is not enough to make a difference. Global cooperation to reduce methane emissions is essential – not only for the climate but also to prevent air pollution.

Christer Ågren

The report "Global trends of methane emissions and their impacts on ozone concentrations": <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/global-trends-methane-emissions-and-their-impacts-ozone-concentrations>

European Commission declaration on methane: <http://data.consilium.europa.eu/doc/document/ST-14973-2016-ADD-1/en/pdf>

German coal plants can cut much more NOx

Germany's fleet of hard coal-fired power plants could cut emissions of harmful nitrogen oxides (NOx) in half tomorrow, if they used already-fitted pollution reduction equipment at full capacity. In Germany, a quarter of the NOx emissions come from the energy sector.

A report, commissioned by BUND and KlimaAllianz and prepared by independent environmental consultants Ökoburo, reveals that the owners of the country's hard coal power stations choose to operate their NOx emissions abatement installations below capacity, resulting in a doubling of harmful emissions. If they were instead to meet an annual NOx limit of 85 mg/m³, Germany's hard coal plants could cut their emissions by 26,700 tonnes, or 47 per cent.

Germany's hard coal power stations, unlike the country's hugely polluting lignite plants, are all fitted with catalytic equipment to cut NOx pollution. The



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Just by using equipment already installed, coal power plants could slash NOx emissions.

amount of NOx the equipment removes from the plant's emissions depends on the intensity at which it is operated. Removing more toxic pollution costs more money, so firms limit the use of their equipment.

Source: EEB Meta: <https://metamag.org/2018/10/25/german-coal-turns-up-pollution-to-save-money-for-penny-pinching-firms/>

Solving the Asian air pollution crisis

A new report by UN Environment identifies and proposes 25 clean air measures that can positively impact human health, crop yields, climate change and socio-economic development, as well as contribute to achieving the Sustainable Development Goals. Implementing these measures could help 1 billion people in Asia to breathe cleaner air by 2030 and reduce global warming by a third of a degree Celsius by 2050.

Approximately 7 million people worldwide die prematurely each year from air pollution related diseases, with about 4 million of these deaths occurring in Asia-Pacific. The reductions in outdoor air pollution from the 25 measures could reduce premature mortality in the region by one third, and help avoid about 2 million premature deaths from indoor air pollution. Moreover, implementing the 25 measures would result in a 20 per cent reduction in carbon dioxide and a 45

per cent reduction in methane emissions, preventing up to a third of a degree Celsius in global warming. Resulting reductions in ground-level ozone would reduce crop losses by 45 per cent for maize, rice, soy and wheat combined.

The report "Air pollution in Asia and the Pacific: science-based solutions" can be downloaded from: <https://www.sei.org/publications/air-pollution-asia-pacific-science-solutions/>



Around 4 million people in Asia-Pacific die prematurely each year from air pollution related diseases.



Citizens support diesel bans to tackle air pollution

Two-thirds of EU citizens support the introduction of low-emission zones banning polluting cars from city centres, according to a recent survey.

Green transport group Transport & Environment (T&E) has analysed the evolution of low-emission zones (LEZ) for cars and vans in EU cities and analysed their effect on consumer behaviour. In a new briefing paper they conclude that there is a steadily growing number of cities that are introducing or tightening low-emission zones, and there are currently more than 260 low-emission zones in twelve EU countries, among which 250 cover passenger cars.

A survey undertaken by Ipsos for Transport & Environment shows among other things that the public support for LEZs is the highest in Hungary (77%), Italy (74%) and Great Britain (73%), and that more than half of those surveyed in other countries also supported the bans: Poland (66%), Spain (65%), Sweden (63%), Belgium (60%), France (60%) and Germany (57%).

Jens Müller at T&E said: “Low-emission zones are the fastest and most effective way to lower harmful levels of toxic air in our cities. People want to breathe clean air and demand action from politicians now.”

Three years after the diesel scandal the number of grossly polluting diesel cars and vans on EU roads is continuing to grow and has now reached 43 million. But the scandal – combined with the increasing number of LEZs – is turning off car buyers from choosing new diesel models and persuading them to shift to

cleaner alternatives. The survey found 69 per cent of EU citizens said it is “not too likely” (31%) or “not at all likely” (38%) that the next car they buy or lease will be diesel, mainly because of concerns over air pollution in their cities. This is underlined by the slump in recent diesel car sales.

With the growing numbers of LEZs, older and more polluting diesel cars are increasingly being exported to countries in Central and Eastern Europe. Jens Müller added: “Exporting second-hand dirty diesels east to places where there are no bans yet is shifting, not solving Europe’s toxic air crisis. We need national regulators to require carmakers to clean up the emissions, as well as coordination of these measures at European level. All Europeans deserve to breathe cleaner air.”

On 6 November, T&E together with Eurocities and the European Public Health Alliance held the first ever European Diesel Summit to highlight solutions to clean up the dirty diesels that keep on driving on EU roads.

A declaration supported by the three organisations and presented to EU Commissioner Elżbieta Bieńkowska urged member states and the EU to take five specific actions without delay:

- Clean up all the existing dirty diesel vehicles across all member states, and support cleaner new vehicles;
- Coordinate the recall and fixing of vehicles; prevent the sale and use of

polluting cars that have not been fixed and exports from west to east;

- Ensure all fixed vehicles undergo independent real-world testing to verify emissions performance;
- Create an ‘EU Clean Air Fund’ and ensure that industry contributes significantly;
- Strengthen EU level legislation on vehicle emissions and testing frameworks; incentivise the modal shift and invest in infrastructure at national level.

Anna Lisa Boni, Secretary General at Eurocities said: “Three years on from the Dieselgate scandal, the number of polluting cars on our roads continues to rise, putting lives at risk. As cities we are committed to delivering clean air for our citizens. We will continue to implement low emission zones and restrict vehicles where necessary to promote public health and protect the environment. We also encourage alternatives, such as public transport, walking and cycling. But for a stronger impact, we need greater action at EU level to clean up dirty diesels and promote sustainable urban mobility.”

Christer Ågren

Source: T&E press releases, 31 October and 6 November 2018

T&E briefing “City bans are spreading in Europe”: <https://www.transportenvironment.org/publications/city-bans-are-spreading-europe>

EU auditors urge tougher action on air quality

Air pollution rules are still too weak and most EU governments are failing to meet current air quality requirements, says a damning report by EU auditors.

Action by EU governments and the European Commission to protect human health from air pollution has not delivered its expected impact, according to a new report from the European Court of Auditors (ECA). Every year, air pollution causes more than 400,000 premature deaths in the EU and hundreds of billions of euros in health-related external costs.

The Court of Auditors conclude among other things that most member states still do not comply with the binding air quality standards and have failed to take effective action to sufficiently improve air quality. Measurements of air pollution are not always reliable or representative, and Air Quality Plans, which are a key requirement of the Ambient Air Quality Directive, have often not delivered their expected results. Moreover, the Commission has insufficient powers to force governments to take action against air pollution.

The EU's air quality standards were established almost twenty years ago and some of the standards are much weaker than the World Health Organization's (WHO) guidelines and levels suggested by the latest scientific evidence.

In 2016, only six EU member states were compliant with binding air quality limits for the three pollutants: particulate matter (PM), nitrogen dioxide (NO₂) and sulphur dioxide (SO₂). This means that limits were breached in 22 countries in the most recent year for which data is available.

As of January 2018, the Commission had 16 ongoing infringement proceedings due to excess PM pollution, 13 due

to NO₂, and one due to SO₂, as well as two infringement proceedings regarding air pollution monitoring. After several years of dialogues between non-compliant member states and the Commission, the European Court of Justice eventually ruled against Bulgaria (in April 2017) and Poland (in February 2018) and the Commission in May this year sent a further six governments to the court. The Court of Auditors criticises enforcement action as lengthy and failing to lead to effective change.

The report found worrying differences in air pollution alert systems – the often colour-coded warnings that are supposed to help the general public understand the danger posed by dirty air. For example, the concentration of particulate matter (PM) that the European Environment Agency considers as representing “poor” air is declared as “good” to citizens in Krakow, and “horrible” air in Milan and Brussels is considered “sufficient” in Sofia and Krakow.

The report gives a number of recommendations, including:

- More effective action by the Commission, for example trying to speed up the infringement procedure and sharing best practices from member states;
- Updating of the 2008 Ambient Air Quality Directive, e.g. to align the standards with the latest WHO guidance and improving Air Quality Plans and

strengthening monitoring requirements;

- Prioritising air quality in EU policies and mainstreaming air quality into other EU policies, so that action that has a negative impact for air quality should not be supported from the EU budget;

- Improving information and communication in order to increase public awareness and involve citizens in air quality matters. The Commission has recently conducted a public consultation as part of a so-called fitness check of

the Ambient Air Quality Directive, a process that is due for completion by the end of 2019.

Environmental organisations have called on the EU to do more to enforce existing air quality laws and for national governments to take serious steps to bring air quality into line with the latest WHO recommendations. In September, the EEB, ClientEarth, T&E and AirClim released a position paper “The first ten years of the EU Ambient Air Quality Directive – an essential tool for protecting our health” with ten recommendations for the future of the EU's air quality laws.

Christer Ågren

The ECA Special Report No. 23/2018 “Air pollution: Our health still insufficiently protected” is available in 23 languages at: <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=46723>

NGO position paper: <https://www.env-health.org/wp-content/uploads/2018/09/The-first-ten-years-of-the-eu-ambient-air-quality-directive.pdf>



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22 member states breached the air quality limits in 2016.

Air pollution warning language in different member states varies considerably.

Index based on PM hourly/daily value										
	0	10	20	30	40	50	60	70	80	90
EEA	good		fair		moderate		poor		very poor	
Brussels	excellent	very good	good	fairly good	moderate	poor	very poor	bad	very bad	horrible
Milan	good	fair	moderate	poor	mediocre	bad	very bad	horrible		
Krakow	very good	good	moderate	poor	very poor	bad	very bad	horrible		
Ostrava	very good	good	moderate	poor	very poor	bad	very bad	horrible		
Stuttgart	very good	good	moderate	poor	very poor	bad	very bad	horrible		
Sofia	very good	good	moderate	poor	very poor	bad	very bad	horrible		

Rovinari coal power plant.



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Heavily polluting Romanian power plant challenged

Greenpeace Romania, with the support of ClientEarth, has submitted a legal challenge against a lifetime permit granted in September to one of Romania's oldest and largest coal power plants, Rovinari. The organisations seek to annul the plant's permit, as it does not comply with EU pollution laws and fails to consider the impact on the health of people and the planet.

An Environmental Impact Assessment (EIA) should have been carried out, or at least considered, before extending Rovinari's permit, and failure to consider an EIA disregards both EU and Romanian law. ClientEarth lawyer Dominique Doyle said: "Rovinari is one of the biggest CO₂

polluters in the EU and one of the deadliest in terms of air pollution but amazingly it has been granted fresh permission to pollute indefinitely without having to assess any of these risks."

The authority has approximately one month to respond to Greenpeace Romania's administrative challenge. If no changes are made to the permit to rectify the breaches in the law, the campaigners will challenge the permit through the courts.

Source: ClientEarth press release, 31 October 2018.

Link: <https://www.clientearth.org/legal-challenge-targets-romanian-giant-polluter-power-plant/>

Renewable energy now cheapest energy source

"Solar and/or wind are now the cheapest new source of generation in all major economies except Japan," according to a new Bloomberg study reported by the Institute for Energy Economics and Financial Analysis (IEEFA) in the USA. "This includes China and India, where not so long ago coal was king. In India, best-in-class solar and wind plants are now half the cost of new coal plants. The benchmark global levelised cost for onshore wind sits at \$52/MWh, down 6 per cent from the 2018 analysis. This is on the back of cheaper turbines and a stronger US dollar. Onshore wind is now as cheap as \$27/MWh in India and Texas, without subsidies. In most locations in the US today, wind outcompetes combined-

cycle gas plants (CCGT) supplied by cheap shale gas as a source of new bulk generation. If the gas price rises above \$3/MMBtu, IEEFA analysis suggests that new and existing CCGTs are going to run the risk of becoming rapidly undercut by new solar and wind. This means fewer run-hours and a stronger case for flexible technologies such as gas peaker plants and batteries that do well at lower utilisation (capacity factor).

Short-duration batteries are today the cheapest source of new fast-response and peaking capacity in all major economies except the US, where cheap gas gives peaker gas plants an edge. As electric vehicle manufacturing ramps up, battery costs are set to drop another 66 per cent

by 2030, according to IEEFA. This, in turn, means cheaper battery storage for the power sector, lowering the cost of peak power and flexible capacity to levels never reached before by conventional fossil-fuel peaking plants.

Batteries co-located with PV or wind are becoming more common. IEEFA suggests that new-build solar and wind paired with four-hour battery storage systems can already be cost competitive, without subsidies, as a source of dispatchable generation compared with new coal and new gas plants in Australia and India."

Institute for Energy Economics and Financial Analysis, 20 November 2018, <http://ieefa.org/bnef-unsubsidized-wind-solar-are-now-the-cheapest-bulk-generation-sources/>

In India, best-in-class solar and wind plants are now half the cost of new coal plants.



Climate targets for trucks and cars in the making

The European Parliament is pushing for more ambitious CO₂ standards for cars and lorries by 2030. Though even more cuts are needed to decarbonise the vehicle fleet by 2050.

One year ago, in November 2017, the Commission presented a proposal for new CO₂ standards for cars and vans. In their view, CO₂ emissions from new cars and vans should be cut by 30 per cent by 2030 with an interim target of 15 per cent by 2025, compared to 2020.

In early October, the Parliament agreed on a position to raise the target to a 40 per cent cut in CO₂ by 2030, with an interim target of 20 per cent compared to 2021 for both vehicle types. The Council also wants to go further than the Commission for cars, favouring a 35 per cent target, but does not want to raise the ambition for vans.

As with the previous CO₂ targets it is the average emissions of all cars sold from each car manufacturer that is regulated. Automakers that do not comply face heavy fines.

Aside from these core targets, various derogations are debated that risk undermining the main ambition.

The Commission's proposal includes a "super-credit" system, under which zero- and low-emission vehicles are given extra weight in the accounting. The idea is also to create differentiation between member states depending on the current sales of zero- and low-emission vehicles. This system risks unintended distortions, in which a car will be registered in one country where it is given a "super-credit" and then immediately sold in another member state that has less generous rules. The Parliament wants to replace this system by benchmarking sales of zero- and low-emission vehicle with a 5 per cent sales target by 2025 and 30 per cent by 2030.

There are also conflicting standpoints on derogations for so-called niche manufacturers. Austria, which currently has Presidency of the Council, suggests that automakers that register less than 270,000



The Parliament wants to benchmark sales of zero- and low-emission vehicles with a 5 per cent sales target by 2025 and 30 per cent by 2030.

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new vehicles per calendar year will be exempted from fines for non-compliance. This would benefit firms such as Ferrari, Jaguar, Volvo and Honda, among others. The European Parliament argue that the differentiation between niche manufacturers and large manufacturers is outdated, since they all have the same potential to meet the CO₂ targets.

Similar standards for heavy-duty-vehicles, such as lorries, buses and coaches, are being negotiated in parallel. The Commission presented their proposal in May 2018 and it echoes their proposal for cars and vans: 15 per cent cuts by 2025 and 30 per cent cuts by 2030. But in this case the base year is 2019 and the final target is only interim and subject to review in 2022.

The Council have not yet settled on a position, but preliminary texts suggest that they will take the same line as the Commission. Parliament, on the other hand, wants to raise the ambition to a

35 per cent cut by 2030, with an interim 2025 target of 20 per cent.

As with cars, the Commission has proposed a "super credit" system for zero- and low-emission vehicles, while the Parliament advocates a benchmark for sales.

Worth to note is that also the Parliament proposal falls short in the ambition to achieve a decarbonised vehicle fleet by 2050. A recent report by Transport and Environment states it implies that all vehicles sold would be zero emission vehicles by the early 2030s and by 2035 at the very latest.

The aim for both sets of regulations is to have them settled before the European Parliament elections in May.

Kajsa Pira

ENDS Daily 3 December 2018, 30 November 2018, 14 November 2018, 30 October 2018, 3 October 2018

Commission proposal for cars and vans https://ec.europa.eu/clima/policies/transport/vehicles/proposal_en

Commission proposal for lorries https://ec.europa.eu/clima/policies/transport/vehicles/heavy_en



Livestock sector must contract

Numbers of farm animals in the European Union are not within a “safe operating space” for the climate and nitrogen, states a new report from the RISE foundation.

Inspired by the planetary boundaries identified by Johan Rockström in 2005, the Rise foundation explores whether there is safe operating space for livestock in the European Union. They recognise that livestock contributes to values such as nutrition and health, pasture and residue utilisation, nutrient cycling, culture and livelihoods. But it also has several negative impacts, such as overconsumption, climate harm, nutrient surplus, water and air pollution, biodiversity and land degradation, antimicrobial resistance and zoonoses, and compromised animal welfare (table). Of these variables they selected four for an attempt to quantify the boundaries: human nutrition, pasture utilisation, climate impact and nitrogen surplus.

Starting with nutrition, they recognise that it is possible to survive on a vegan diet. So, from a strict standpoint livestock are not needed. But veganism is assumed not to be a culturally accepted diet by the vast majority. Instead they focus on the suggested National Dietary Recommendations for meat, dairy and eggs. Since these are not the same for all member

states they used average values and then compared these with data on what people actually eat. It was found that throughout the European Union the intake of meat is above the recommendations, and in 19 member states consumption is more than double the recommendations. It is therefore possible to reduce consumption by 65 per cent on average. The situation for dairy and egg consumption was more mixed, with some member states consuming above the recommended level, but other member states consuming less than this level. However, on average, consumption could be reduced by around 20 per cent to bring it in line with the recommendations.

For pasture utilisation, they made some rough estimates. According to Eurostat there are 59 million hectares of “permanent grassland”, of which one third corresponds to “rough grazing areas” in the European Union. The authors assumed grazing intensities of 0.5–1 livestock units per hectare and halved this intensity on rough grazing areas. This gives a figure of 24–49 million livestock units, compared to the current 74 million ruminant livestock units

in the European Union. This means that it should be possible to reduce livestock numbers by one to two thirds while still managing permanent grasslands.

For greenhouse gas emissions, there is a well-defined commitment for 2050 of 80 per cent reductions, as well as intermediate targets for 2030 and 2040, of 40 per cent and 60 per cent respectively. There are however no specific targets for agriculture. One can argue that compared to the combustion of fossil fuels it is not possible to reach zero emissions. But doing nothing or little within the livestock sector would mean that it would occupy the entire emissions space left in 2050. The authors argue that agriculture should contribute as much as other sectors. Compared to current emission levels that have gone down since the base year 1990, it would require emission reductions of 21 per cent, 47 per cent and 74 per cent for the three dates. That would translate to emission reductions of 3.5 per cent annually – a rate that cannot be achieved through efficiency gains alone.

Nitrogen surplus was a much harder nut

Table: Progress in measuring boundaries of the safe operating space for EU livestock

Impact of livestock	What variables to measure impacts?	What defines the (L) lower or (U) upper boundaries?	EU28 result
Human nutrition & health	Human daily intake of animal proteins	(L) National Dietary Recommendations	Lower bound: Meat: 65% of current consumption, milk 80–90%, eggs 80%
Utilisation of pasture, crop by-products & residues	Grazing of permanent grasslands Utilisation of by-product and residue streams	(L) Areas & sustainable grazing densities (L) Product availability & feeding rates	Lower bound: between 1/3rd and 2/3rds of current ruminants
Culture & livelihoods	Culture – not quantifiable Livelihoods, an outcome not a target	(L) Balanced territorial development	
Climate harm	GHG emissions	(U) Paris agreement emission reduction targets.	Upper bound: emission reductions required: 21% by 2030 47% by 2040 74% by 2050
Nutrient flows: water & air pollution	Nutrient balances (N only) Ammonia emissions	(L) Minimum dietary Nitrogen (U) None discovered (U) air pollution targets.	Net N balance reduction required of 62%
Biodiversity & Land degradation	Farm land birds and insects Soil characteristics	Not defined	Not defined
Antimicrobial resistance & zoonoses	Non-therapeutic antibiotic use Disease outbreaks	Not defined	Not defined
Animal welfare	This does not lend itself to quantitative targets	Not defined	Not defined

to crack. Unlike greenhouse gas emissions the negative impact of nitrogen emissions depends on where they happen. This means that allocation of livestock could be an alternative to reducing numbers in order to minimise their negative impact. However, researchers have previously set a global boundary for nitrogen fixation of 62 million tonnes of nitrogen a year, which can be translated into a per capita boundary of 8.6 kg of nitrogen per year. If this is to be transferred to member state level it gives a big allowance to member states with a large population, and vice versa. And this would probably not deliver the ideal situation for nitrogen emissions, since they cause less harm if they are more evenly distributed. However, as a benchmark for the entire European Union they suggest that the net balance for nitrogen should be reduced by 62 per cent.

Although the report fails in its ambition to come up with an unambiguous number on the safe operating space for livestock, it is clear on the direction the European Union needs to take. Fewer numbers are necessary to meet environmental ambitions. And there is space for reductions without compromising on areas of grazed pastures and dietary recommendations. The authors recognise that the lower bound for livestock is more about cultural preferences, which can change over time.

In the last part of the report they explore the options for a shift within the livestock

sector. They list a number of technical interventions that can be made within the livestock industry, such as manure management and introducing new types of animal feed. But they conclude that “the key general actions to deal with these challenges are to reduce wasteful over-consumption of animal products, switch towards plant-based protein and encourage substitution of new and novel protein for animal protein”.

To succeed in this task they believe that the first priority is a campaign to raise public awareness. Though there is a growing awareness in the research community about the problems associated with livestock, this is not reflected in the general debate and certainly not in official documents. They refer to the Commission’s communication on the future modernisation of the CAP and the preamble in the proposed regulations for the new CAP as recent examples of this.

They also recognise that the livestock industry itself fails to fully acknowledge the problems that it is causing. To some extent farmers talk about reducing the negative environmental impact, but never so far as questioning the numbers of livestock. But the authors also accept that it might be too much to expect a well-established sector to embrace that degree of self-criticism – especially when consumers and governments are relatively quiet.

The authors also call for more research. And specifically, that the EU should take

on and answer the question that is reflected in the title of the report: What is the safe operating space for EU livestock? And how can it be realised?

Another tool for a shift is implementing existing regulations. They note for example that countries like the Netherlands and Denmark have been more successful at implementing the nitrate directive, having a more forceful stance than France, which chose a more participatory approach. They also argue that the Common Agricultural Policy could assist in the restructuring of farms. They recognise that this will not be a uniform process; within some regions livestock activity will have to contract and disappear, while in other regions it will have to relocate, change size and change management.

Finally, they stress how important it is that the European Union takes the lead in moving towards a safe operating space for livestock: “this can help set the standards and procedures which others will follow”.

Kajsa Pira

What is the Safe Operating Space for EU livestock? by the RISE foundation http://www.risefoundation.eu/images/files/2018/2018_RISE_LIVESTOCK_FULL.pdf

More than 90% of the world's children breathe toxic air every day

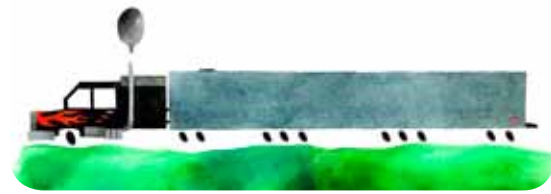
Every day around 93 per cent (1.8 billion) of the world's children under the age of 15 years breathe air that is so polluted it puts their health and development at serious risk. For the year 2016, the WHO estimates that 600,000 children died from acute lower respiratory infections caused by polluted air.

A new WHO report "Air pollution and child health: Prescribing clean air" examines the heavy toll of both ambient (outside) and household air pollution on the health of the world's children, particularly in low- and middle-income countries. It reveals that when preg-

nant women are exposed to polluted air, they are more likely to give birth prematurely, and have smaller children with lower birth weight. Air pollution also impacts on neurodevelopment and cognitive ability and can trigger asthma and childhood cancer. Children who have been exposed to high levels of air pollution may be at greater risk for chronic diseases such as cardiovascular disease later in life.

Source: WHO News Release, 29 October 2018

The report: <http://www.who.int/ceh/publications/air-pollution-child-health/en/>



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EU rules needed to stop truck NOx fraud

The Danish government has called on the European Commission to develop new rules for member states after its testing revealed that lorries equipped with widely available cheating devices have up to 45 times higher NOx emissions than those with a properly functioning cleaning system. Cheating typically occurs when electronic emulator devices are used to disconnect the engine emission reduction system.

James Nix at Transport & Environment said that far more roadside inspections were needed. Data suggests that more than one third of trucks are cheating, often by adding devices to trick the engine control system that NOx abatement fluid has been added, and a stronger EU response is definitely needed, said Nix, adding that trucks now account for more than 50 per cent of NOx in some cities, including London, Berlin and Stockholm.

Source: Ends Europe Daily, 14 November 2018.



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Fighting climate change and fossil fuels improves global health

Tackling climate change would save at least a million lives a year, says the World Health Organization. Reducing the burning of fossil fuels is not only a measure to mitigate climate change, but also cuts emissions of air pollutants.

During COP 24 the WHO published a report on health and climate change, with recommendations for governments on how to maximize the health benefits of tackling climate change and avoid the worst health impacts of this global challenge.

They note that exposure to air pollution causes 7 million deaths worldwide every year and costs an estimated 5.11 trillion USD in welfare losses globally. In the 15

countries that emit the most greenhouse gas emissions, the health impacts of air pollution are estimated to cost more than 4 per cent of their GDP. Actions to meet the Paris goals would cost around 1 per cent of global GDP.

"The Paris Agreement is potentially the strongest health agreement of this century," said Dr Tedros Adhanom Ghebreyesus, Director-General of WHO. "The evidence is clear that climate change is already having a serious impact on human lives and health.



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"The Paris Agreement is potentially the strongest health agreement of this century," said Dr Tedros Adhanom Ghebreyesus, Director-General of WHO.

It threatens the basic elements we all need for good health - clean air, safe drinking water, nutritious food supply and safe shelter - and will undermine decades of progress in global health. We can't afford to delay action any further."

WHO Press release, 5 December 2018

<https://www.who.int/news-room/detail/05-12-2018-health-benefits-far-outweigh-the-costs-of-meeting-climate-change-goals>

European lunches leave carbon footprints overseas

Around 30 per cent of greenhouse gases from EU food consumption are emitted in other regions, mainly Latin America, Asia and Africa.

The issue of exported greenhouse gas emissions has been receiving more and more attention. Although the UNFCCC accounting system only attributes emissions to the producer country, to achieve true emission reductions it is vital that we make sure that lower emissions in one country don't lead to more emissions somewhere else in the world.

A recent study estimates the climate footprint of EU food consumption. The footprint was found to vary considerably from 610 kg CO₂ eq per capita per year in Bulgaria, to 1460 kg CO₂ eq in Portugal. The EU average value is 1070 kg CO₂ eq per capita per year.

To get accurate figures for the climate impact of imported food and feed, the researchers followed trade flows and attributed specific emission factors to each crop in each country. On average, around 30 per cent of the greenhouse gas emissions from EU diets were emitted outside Europe. Most of these emissions occurred in Latin America, but there were also significant shares in Asia and Africa. Of the EU member states, the Netherlands had the highest share at around 50 per cent, and Poland the lowest at around 20 per cent.

The largest source of emissions abroad was land-use change in Latin America, predominantly caused by expanding soy production. Soy is mainly used as feed

for animals. Somewhat surprisingly, imported meat did not have a particularly high climate footprint in this study, which can be explained by the accounting method they use. In countries such as Brazil the area occupied by grazing animals is not growing. So even if cattle grazing takes place on the edge of the rainforest, it is crop production that it is assumed to be the driver behind deforestation and is assigned the related emissions. On the other hand, imported beverages and stimulants, most notably coffee, made a significant contribution, causing 13 per cent of the food-related emissions.

Although it is important to understand and track emissions caused in other countries, the study showed no strong link between the share of exported emissions and total climate impact. The factor that showed the clearest correlation with total greenhouse gas emissions, as shown in several other studies, was the total number of calories from animal

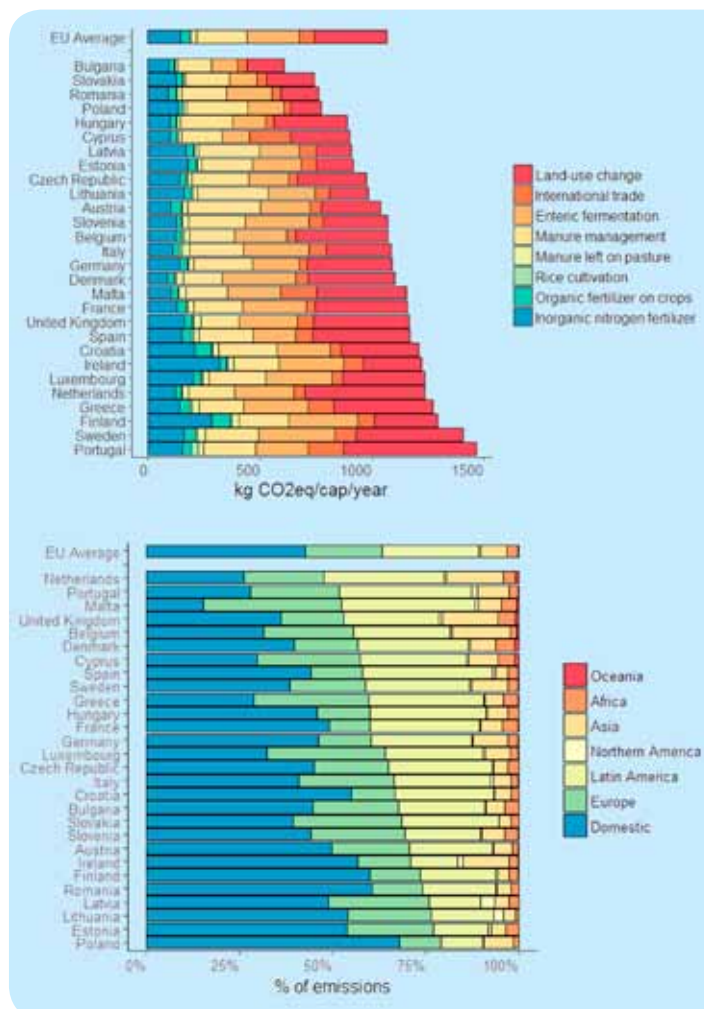


Figure: (above) Production- and trade-related dietary emissions of the average diets in EU countries. (below) Dietary emissions presented in production regions.

products in the diet. The study found that meat and dairy account for more than 75 per cent of the impact from EU diets.

Fish and seafood were not included in the study because of lack of data on trade flows, which of course skew the results somewhat. In general, the climate footprints from fish are on a par with poultry meat, but vary considerably between species and origins.

Kajsa Pira

The role of trade in the greenhouse gas footprints of EU diets, by Vilma Sandström et al. Global Food Security Volume 19, December 2018, Pages 48–55 <https://doi.org/10.1016/j.gfs.2018.08.007>

Meat and dairy account for more than 75 per cent of the climate impact from EU diets.



1.5°C is the new 2°C

In the wake of the IPCC publishing their 1.5°C report the global press calls for quick action.

The UK magazine Guardian Weekly highlighted the new IPCC 1.5°C report published on 8 October 2018 with the conclusion that “it is now clear that 1.5°C is the new 2°C. While 2°C was regarded as the threshold in the 1990s when dangerous climate change would occur, the summary of new scientific research comes to the judgement that this could happen at 1.5°C and above.” The Guardian Weekly adds that “climate scientists make it very clear that unless the planet manages to curtail global warming at 1.5°C – the bottom end of what was agreed in the Paris climate accords – then the impact on everything from sea levels to the survival of coral and insects will be far greater than anticipated. The world’s leading climate scientists have warned there is only a dozen years for global warming to be kept to a maximum of 1.5 °C, beyond which even half a degree will significantly worsen the risks of drought, floods, extreme heat and poverty for hundreds of millions of people. Carbon pollution would have to be cut by 45 per cent by 2030 and come down to zero by 2050.”

The New York Times writes that “half a degree may not sound like much. But as the report details, even that much warming could expose tens of millions more people worldwide to life-threatening heat waves, water shortages and coastal flooding. Half a degree may mean the difference between a

world with coral reefs and Arctic summer sea ice and a world without them.”

According to the Times of India, the IPCC concludes that “limiting warming to 1.5 degrees C is possible and calls for quick action”. The newspaper adds that the “report clearly shows how half a degree of warming makes a big difference, adversely impacting global population and overall ecosystem through intense heat waves, sea level rise, melting of Arctic, erratic rainfall, reduction of farm yield and vanishing of living species. In fact, limiting warming to 1.5°C rather than 2°C could result in 420 million fewer people being exposed to severe heat waves”.

The Times of India writes that the report claims it’s possible to meet the new warming target, provided nations together take “rapid and far-reaching” transitions over the next 10 to 20 years in land use, energy, industry, buildings, transport and cities to cut emissions and reach “net zero” around 2050.

“The new report from the IPCC has served as a final warning that we must get our act together – now and quickly,” said Sunita Narain, director general of the Centre for Science Environment (CSE) while asking the global communities to build a coalition to support the massive transformation required to achieve the 1.5-degree target.

The IPCC’s report was accepted by all countries, including India. Though the United States, which moved to withdraw from the Paris Agreement, too accepted the report, it has not endorsed it.

“By refusing to endorse the findings of the IPCC’s 1.5 degree Celsius report, the US has again given a clear signal that it would continue with its climate-regressive agenda, which includes obstructing the work of the UNFCCC and promoting fossil fuels like coal and gas,” said Chandra Bhushan, deputy DG of the CSE.

China Daily says that the approved report is calling for efforts to limit global warming to 1.5°C, instead of 2 degrees above the pre-industrial level, in order to avoid extreme climate impacts such as drought and floods around the world and that it would require rapid, far-reaching and unprecedented changes in all aspects of society in order to reach that goal. China Daily then added that the report’s stark warning had not moved the Trump administration, and in an interview with The Associated Press published two days after the release of the 1.5°C report, Trump said he is not willing to “sacrifice the

Climate demonstration in Melbourne, Australia 8 December 2018.



economic wellbeing of our country for something that nobody really knows". The White House clearly has a new talking point for denial these days. Speaking after visiting the damage caused by Hurricane Michael in Georgia, Vice-President Mike Pence said the causes of climate change have "yet to be seen". "This is nothing but a lie told in front of those who felt the hurricane's wrath," writes China Daily. "It betrayed the conclusion by most climate scientists that warming waters are connected to the strong storms. A NASA report found that 97 per cent or more of actively publishing climate scientists agree that climate-warming trends over the past century are extremely likely due to human activities."

The US is by far the largest carbon polluter in history. It is now the second-largest carbon emitter in the world after China, but its per capita emissions are still more than twice that of China. And it is irresponsible to say the least for the current US administration to choose to absent the country from the global fight against climate change."

The Independent reported just before the publishing of the 1.5°C report that French President Emmanuel Macron promised that France won't sign trade deals with countries that do not comply with the Paris accord. This is something

that other countries should insist on when they go into trade negotiations with the Trump administration. Emmanuel Macron has announced that France will no longer accept "commercial agreements" with countries that do not "respect" the Paris Climate Accord during a fiery speech at the United Nations General Assembly. The French president called for the upholding of trade rules that "guarantee fair competition on equal footing" after a meeting with Trump. Mr Macron appeared defiant towards Mr Trump, suggesting he'd no longer negotiate trade deals with the US after its withdrawal from the climate agreement last year. The US is now reportedly the only nation in the world which remains opposed to the Paris Agreement, after Mr Trump decided to pull out of the accord in 2017.

Just a week after the release of the 1.5°C report the Guardian Weekly commented again on the report, this time with the message that "last week the UN's inter-governmental panel on climate change published a devastating report on the need for humans to take action to save the planet within the next 12 years. A week or so later and the biggest news story of our age has drifted off the news agenda".

Compiled by Reinhold Pape

The Guardian, 8 October 2018, We have 12 years to limit climate change catastrophe, warns UN, <https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report>

New York Times, 7 October 2018, Why Half a Degree of Global Warming Is a Big Deal, <https://www.nytimes.com/interactive/2018/10/07/climate/ipcc-report-half-degree.html>

The Times of India, 9 October 2018, IPCC: Limiting warming to 1.5 degree C possible, calls for quick action, <https://timesofindia.indiatimes.com/india/ipcc-limiting-warming-to-1-5-degree-c-possible-calls-for-quick-action/articleshow/66125078.cms>

China Daily, 20 October 2018, Leverage trade deals for US return to climate accord, <http://www.chinadaily.com.cn/a/201810/20/WS5bca827ba310eff303283804.html>

The Independent, 25 September 2018, Macron rejects trade deals with countries outside Paris climate accord, <https://www.independent.co.uk/news/world/macron-paris-climate-accord-agreement-trade-deal-us-trump-un-nicaragua-a8554916.html>

Dutch men encouraged to eat less meat

The Netherlands Nutrition Center, a government-funded agency, has launched a campaign to encourage men to reduce their meat consumption. The headline is "Er is meer dan vlees", which translates to "There is more than meat".

The reason why the campaign is specifically directed towards men is that many Dutch males exceed the nutrition recommendations for meat considerably.

"On average, men can eat at least 400 grams less meat a week," says Corné van Dooren, sustainable food expert at the agency. For Dutch women it is around 100 grams.

Men tend to worry about not getting enough proteins, but there is no reason: "These useful substances are also found in egg, nuts and legumes". And the climate benefits from a shift are great: "the climate footprint of legumes is less than 20 times lower than that of beef".

The Netherlands Nutrition Center, Press release 21 November 2018



Poster for the campaign. T-shirt says "never been so happy".

EU auditors critical of CAP proposal

The proposed reform of the Common Agricultural Policy after 2020 falls short of the EU's ambitions for a greener and more robust performance-based approach, according to an Opinion published by the European Court of Auditors (ECA) in November.

On climate tracking, the ECA doubts the Commission's methodology for establishing that 40 per cent of the CAP budget would go to climate action. The estimates of the CAP's contribution to EU climate change objectives appears unrealistic, they conclude.

Opinion No 7/2018: concerning Commission proposals for regulations relating to the Common Agricultural Policy for the post-2020 period

<https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=47751>



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A 1.5°C target is needed to save the Mediterranean region

Climate change is a threat to the Mediterranean sea and surrounding countries. This is featured in a recent short documentary produced by AirClim and SEE.NET.

The Mediterranean region is expected to see “particularly strong increases in dryness” in a 2°C world compared to a 1.5°C world and is threatened by ocean acidification, says the new IPCC 1.5°C report. Several other scientific reports show that the region will suffer from 1–2°C global warming and that climate change is already a security risk. An expert group including the Stockholm International Peace Research Institute (SIPRI) – warns of security risks as a result of the effects on more than 50 million people in Iraq and Syria due to prolonged heat waves, erratic precipitation, higher than average temperatures and increased disaster intensity. Similar threats exist for many countries around the Mediterranean sea, e.g. in Turkey and in Spain. Other scientists from the region warn that if global CO₂ emissions into the atmosphere continue unabated, future ocean acidification and increased water temperatures pose a threat to the Mediterranean Sea and will negatively impact its biodiversity and productivity, and in turn impact key social and economic services it provides to human communities in the region (e.g. shellfish aquaculture, fisheries and tourism). Another recently published study warns of rising sea levels threatening some of the planet’s most valuable historic sites that are located in the region and could by

2100 face damage or outright destruction in a warming world. The scientists who surveyed 49 world heritage sites in the Mediterranean report that 47 of them are at some degree of risk from future sea level rise.

The IPCC 1.5°C special report confirms many of these threats for the region: “the level of ocean acidification due to increasing CO₂ concentrations associated with global warming of 1.5°C is projected to amplify the adverse effects of warming, and even further at 2°C, impacting the growth, development, calcification, survival, and thus abundance of a broad range of species, e.g., from algae to fish”. For 39 plant species in the Mediterranean region, shifts in phenology, range contraction, health decline have been observed because of precipitation decrease and temperature increase. The report finds that only if global warming is constrained to 1.5°C can biome shifts unprecedented in the last 10,000 years be avoided – whilst 2°C warming results in a decrease of 12–15 per cent in the Mediterranean biome area.

Environmental NGOs in south-eastern Europe are very concerned about the effects of climate change in the region. Friends of the Earth Croatia (Zelena Akcija) is cooperating closely with SEE.NET, a network of south-eastern European

environmental CSOs on natural resources, energy and transport, which includes most environmental organisations in the Balkan region. In a short film produced by AirClim/SEE.NET, members of SEE.NET express their concerns and demands about climate change during a seminar at Zelena Akcija’s Solar Academy on the island of Šolta in Croatia, and two marine biologists from the University of Barcelona and Split explain in the film the threats to fisheries from ocean acidification and climate change.

Reinhold Pape

Link to film: <http://airclim.org/medsea-film-1>

Source:

Climate news network, 12 November 2018, Iraq’s climate stresses are set to worsen, <https://climatenewsnetwork.net/iraqs-climate-stresses-are-set-to-worsen/>

Climate news network, 25 October 2018, Historic sites face risk from rising seas, <https://climatenewsnetwork.net/historic-sites-face-risk-from-rising-seas/>

Spiegel online, 17 October 2018, Versinken Ferrara und Venedig im Meer? <http://www.spiegel.de/wissenschaft/natur/unesco-welterbe-staetten-durch-klimawandel-bedroht-a-1233680.html>

Impacts of ocean acidification in a warming Mediterranean Sea: An overview <https://www.researchgate.net/publication/290392146>

Natural gas is as bad for the climate as diesel, petrol and marine fuel

Using natural (fossil) gas for transport is as bad for the climate as using petrol, diesel or conventional marine fuels, according to a new study by Transport & Environment (T&E). Burning fossil gas in cars also emits as much air pollution as petrol, and the limited advantage over compliant diesel cars could be eliminated by planned new standards. For ships, liquefied natural gas (LNG) has clear air pollution benefits compared to heavy fuel oil, although NO_x after-treatment systems and further desulphurisation of marine fuels can achieve similar results.

When taking into account the effects of leakage of methane, fossil gas could increase greenhouse gas (GHG) emissions by up to 9 per cent or decrease them by a maximum of 12 per cent across all trans-

port modes. In cars, the GHG impact of compressed natural gas (CNG) is similar to diesel, while in trucks it mirrors closely that of best-in-class diesel lorries. In shipping, the GHG impact of LNG is close to that of marine gas oil, but these figures are highly dependent on engine methane slip and upstream leakage.

Jori Sihvonen at T&E, said: "Gas cars, trucks and ships have no benefits for the climate and they're a distraction from our real objective, zero-emission transport. Governments should resist the gas lobby's offensive and stop wasting precious public money on gas infrastructure and tax breaks for fossil gas."



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Stop wasting precious public money on gas infrastructure and tax breaks for fossil gas, says T&E.

Source: T&E press release, 24 October 2018. Link to the press release and report in English, French, Italian and Spanish: <https://transenv.eu/2AnBfqP>

A 1.5°C world increases chances for coral reefs

Tropical coral reefs face high risks of becoming unsustainable if warming exceeds 1.5°C.

The recently published IPCC 1.5 report states that "global warming of 1.5°C is projected to shift the ranges of many marine species, to higher latitudes as well as increase the amount of damage to many ecosystems". It is also expected to drive the loss of coastal resources, and reduce the productivity of fisheries and aquaculture (especially at low latitudes). The risks of climate-induced impacts are projected to be higher at 2°C than those at global warming of 1.5°C. Coral reefs, for example, are projected to decline by a further 70–90 per cent at 1.5°C with larger losses (>99%) at 2°C.

The risk of irreversible loss of many marine and coastal ecosystems increases with global warming, especially at 2°C or more. A 1.5°C world is better for coral reefs than a 2°C world, in which coral reefs mostly disappear. Even with the current level of warming, a substantial

proportion of coral reefs have experienced large-scale mortalities that are causing them to rapidly contract. In the last three years alone, large coral reef systems such as the Great Barrier Reef (Australia) have lost as much as 50 per cent of their shallow-water corals.



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Coral-dominated reefs are found between latitudes 30 °S and 30 °N along coastlines where they provide habitats for over a million species. They also provide food, income, coastal protection, cultural context, and many other services for millions of people along tropical coastal areas. Ocean warming and acidification can also slow growth and calcification, making corals less competitive to other benthic organisms such as macro-algae. As corals disappear, so do fish stocks, and many other reef-dependent species, directly impacting industries such as tourism and fisheries, as well as coastal livelihoods for many,

often disadvantaged, people. These impacts are exacerbated by increasingly intense storms and by ocean acidification which can weaken coral skeletons, contribute to disease, and slow the recovery of coral communities after mortality events.

Achieving emission reduction goals consistent with the ambitious goal of 1.5°C under the Paris Agreement will result in the further loss of 90 per cent of reef-building corals compared to today, with 99 per cent of corals being lost if warming reaches 2°C or more above the pre-industrial period.

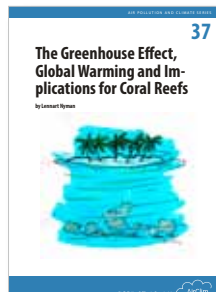
Given the sensitivity of corals to heat stress, even short periods of overshoot (i.e. decades) will be very challenging for coral reefs. Losing 90 per cent of today's coral reefs, however, will remove resources and increase poverty levels across the world's tropical coastlines, highlighting the key issue of equity for the millions of people that depend on these valuable ecosystems.

Compiled by Reinhold Pape

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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, Hilda Winne, Stefan Åström, Erik Fridell.



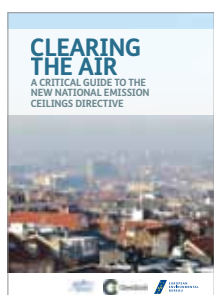
A vision for zero emissions in the Nordic-Baltic region by about 2030 (March 2018). By Fredrik Lundberg. A scenario for the electricity, heat and industrial sectors.



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



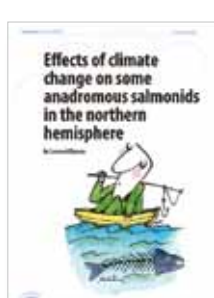
What will it take to phase out greenhouse gas emissions from road traffic in the Nordic-Baltic region by 2030-2035? (March 2018). By Mats-Ola Larsson. A conceivable scenario.



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 CO₂ 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 salmonids can be predicted.

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Coming events

EU Environment Council. Brussels, Belgium, 20 December 2018. Information: www.consilium.europa.eu/en/press/calendar/

EU second stakeholder workshop to support the Fitness Check of the Ambient Air Quality Directives. Brussels, Belgium, 15 January 2019. Information: https://ec.europa.eu/info/events/second-stakeholder-workshop-support-fitness-check-eu-ambient-air-quality-directives-2019-jan-15-0_en

IMO PPR 6 (Sub-Committee on Pollution Prevention and Response). London, UK, 18 -22 February 2019 Information: www.imo.org

EU Environment Council. Brussels, Belgium, 5 March 2019. Information: www.consilium.europa.eu/en/press/calendar/

IMO Intersessional Working Group on Reduction of GHG emissions from ships. London, UK, 6 - 10 May 2019. Information: www.imo.org

IMO MEPC 74 (Marine Environment Protection Committee). London, UK, 13 - 17 May 2019 Information: www.imo.org

EU Green Week high-level summit. Brussels, Belgium, 15 - 17 May 2019. Information: https://ec.europa.eu/info/events/eu-green-week-2019_en

23rd International Transport and Air Pollution (TAP) Conference. Thessaloniki, Greece, 15 - 17 May 2019. Information: www.tapconference.org

EU Informal Environment Council. Romania, 20 - 21 May 2019. Information: www.consilium.europa.eu/en/press/calendar/

CLRTAP Working Group on Strategies and Review. Geneva, Switzerland, 21 - 24 May 2019. Information: www.unece.org/env/lrtap/welcome.html

UNFCCC SB50. Bonn, Germany, 17 - 27 June 2019. Information: <http://unfccc.int/>

EU Environment Council. Luxembourg, 26 June 2019. Information: www.consilium.europa.eu/en/press/calendar/

CLRTAP EMEP Steering Body and the Working Group on Effects. Geneva, Switzerland, 9 - 13 September 2019. Information: www.unece.org/env/lrtap/welcome.html

18th IUAPPA World Clean Air Congress. Istanbul, Turkey, 23 - 27 September 2019. Information: www.wcac2019.org

UNFCCC COP25. 11 - 22 November 2019. Information: <http://unfccc.int/>

EU Clean Air Forum. Bratislava, Slovakia, 28 - 29 November 2019. Information: https://ec.europa.eu/info/events/eu-clean-air-forum-2019-nov-28_en