NO.4, DECEMBER 2022

Acid News

The rare earth element bottleneck

It has never been so important to find ways to overcome the barriers of dependency on rare earth elements for wind power deployment.

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New analysis taking into account rich people's consumption behaviour as well as their investment decisions shows a widening gap in responsibility for the climate crisis between rich and poor.

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Exposure to air pollution can prevent children's organs from developing to full capacity, since they have more sensitive lungs and immature immune systems.

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The Oeko-Institut suggests a number of technical measures that could be used to strengthenthe EU ETS in the coming years.

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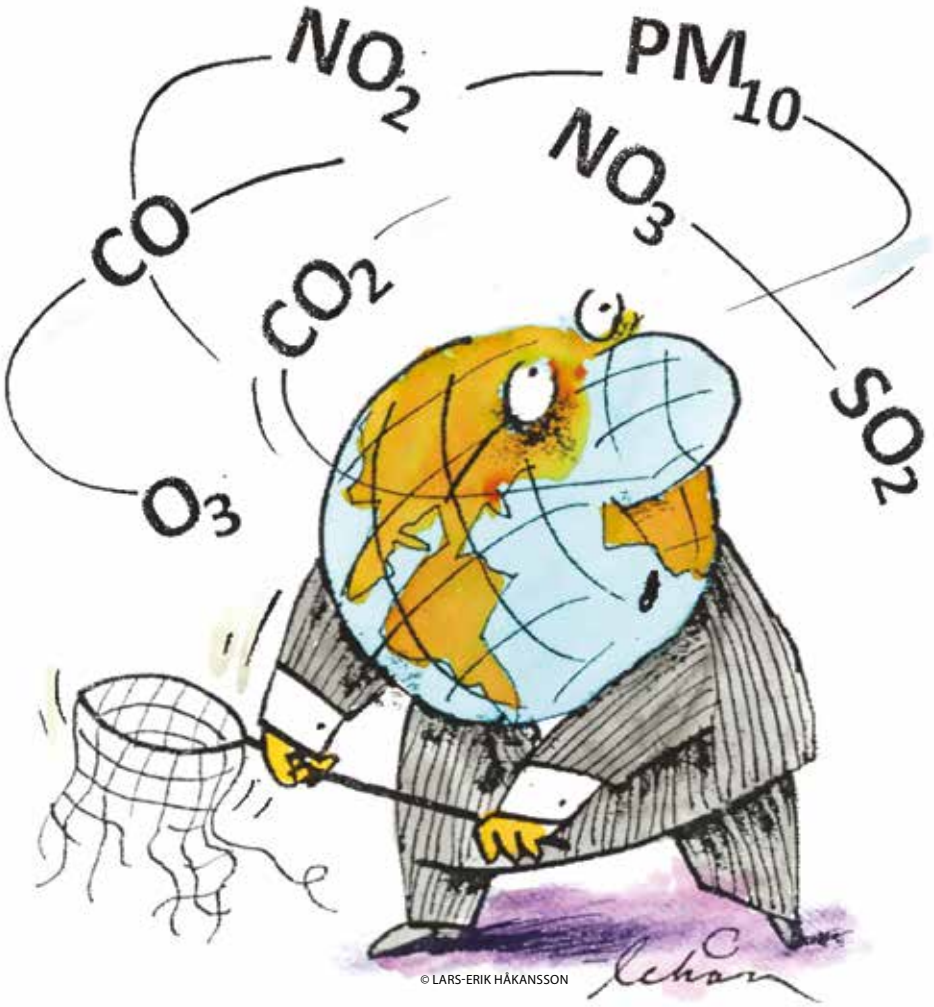

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Greater efforts to improve EU air quality needed

The proposal for a new EU air quality standard is an important step closer to the WHO's guidelines, but there are still health and economic gains in lowering the acceptable levels even further.

On 26 October the European Commission presented its proposal for amending the Ambient Air Quality Directive (AAQD). As can be seen in the table, the annual limit values are stricter than the current directive for NO_2, $PM_{2.5}$ and PM_{10} but still not in line with WHO Air Quality

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Acid News

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

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

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

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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 advocacy 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

AirClim

Air pollution is the leading environmental risk factor affecting public health in Europe. The current EU annual $PM_{2.5}$ ambient air quality standard is relatively lax, and notably higher than similar economies such as Australia, Canada, Japan, Singapore, South Africa and the USA. The European Union is also one of the few economically prosperous regions that lack an air quality standard for short-term exposure to $PM_{2.5}$. The European Commission has presented its Ambient Air Quality Directive (AAQD) proposal as part of the Zero Pollution package and in light of the new WHO Air Quality Guidelines.

"As a result, the burden of disease from air pollution exposure in Europe will remain unacceptably high for an extended period of time."

The new proposal presents annual limit values for $PM_{2.5}$ and NO_2 that are stricter than in the current directive and introduces new daily limit values for $PM_{2.5}$ and NO_2. However, these proposed new limit values are still substantially higher than those recommended by the WHO to provide comprehensive protection from serious health effects for the European population. Instead of aligning with WHO Air Quality Guidelines, the new proposal chose the Interim Target 4 values (twice as high for $PM_{2.5}$ and NO_2) meant for countries with high pollution levels. According to the WHO Air Quality Guideline assessment, Europe and the Americas were the regions that would benefit the least from settling for Interim Targets, compared to other regions of the world. For ozone, instead of a limit value, the proposal still only foresees a target value. Moreover, the proposed AAQD contains loopholes that would make it possible to postpone compliance with the limit values well beyond 2035, depriving people of the ability to obtain legal protection for their right to breathe clean and healthy air. As a result, the burden of disease from air pollution exposure in Europe will remain unacceptably high for an extended period of time. The cost of inaction will lead to new cases of cardiovascular and respiratory disease (including childhood asthma), cancer, mental health disorders, dementia, diabetes and adverse birth outcomes year after year. This will not only mean increased suffering for the individuals and their loved ones, but also put further strain on our already overburdened healthcare systems. Hundreds of thousands of people each year will pay the ultimate price of a premature death for this inaction. Given the seriousness and the urgency of this health problem, we need greater efforts to reduce air pollution effects and a more ambitious path to achieve full alignment with WHO Air Quality Guidelines everywhere in Europe.

The attainability of meeting limit values will depend on political will at national, regional and local levels to introduce mitigation measures. It will also depend on pressure for the right to breathe clean air from citizens and organizations to ensure it remains on the agenda. We urge everyone to keep the health of a loved one in mind when taking action. Lastly, we must remember that the goal of being able to breathe, without risking our health, everywhere in Europe, is worth fighting for and that it can come with huge benefits. With careful consideration of the solutions, we might also end up with cities where children can bike to school, ecosystems no longer suffer from acidification and eutrophication, and have a better chance of reaching climate goals.

Ebba Malmqvist

Air quality directive must include greater efforts to reduce air pollution exposure

Continued from front page

Guidelines. New short-term (24-hour) limit values have been introduced for NO_2, CO and $PM_{2.5}$. One comment on the proposal from health organisations was a wish for closer alignment with WHO Air Quality Guidelines to protect the health of EU citizens.

Prof. Zorana Jovanovic Andersen, Chair of the Environment and Health Committee of European Respiratory Society (ERS), said: "The burden of disease from air pollution exposure remains unacceptably high in Europe. We need greater efforts to reduce air pollution exposure with a more ambitious path to achieving full alignment with WHO Air Quality Guidelines everywhere in Europe."

According to the impact assessment the benefits of achieving limit values in line with current WHO guidelines greatly surpassed the costs (by a ratio of between 6:1 and 18:1). The net benefits amount to more than 38 billion euro, and the corresponding mitigation costs are estimated at EUR 7 billion in 2030. The impact assessment also investigates the social impact. It highlights that air pollution is our largest environmental health threat today, and often has disproportionate impact on member states or individuals with poorer economies, and thus on health costs. The abatement strategy of excluding polluting vehicles from city centres might impact on those with less opportunity to own a cleaner car. On the other hand, many do not have the means to own a car at all and only suffer from bad air.

The analysis showed that 71% of sampling points would need additional efforts at local level to meet limit values in line with WHO Air Quality Guidelines. The Impact Assessment include mainly Technical Measures and many of the indicative measures listed in the proposal are not evaluated, such as Low Emission Zones. Limit values exclude natural sources, and maps are thus included both with and without natural sources to allow for comparison of attainability. In addition to limit values, there are target values for ozone and average exposure reduction obligations for $PM_{2.5}$ and NO_2. For ozone, instead of a limit value there are still only target values proposed. The long-term annual daily 8-hour maximum target value is based on calendar year and not peak season, as recommended by WHO. The target value proposed for ozone further includes a clause about disproportionate costs. By comparison, limit values for ozone are part of the US National Ambient Air Quality Standards.

The Average Exposure Indicator (AEI) is used to examine whether the average exposure reduction obligation is met. The AEI proposed is given as a 3-calendar-year running annual mean urban background concentration averaged over all sampling points at regional (NUTS 1) level, and natural sources are deductible. The AEI should not exceed a level that is 25% lower than its value 10 years previously, until WHO Air Quality Guidelines are reached (5 µg/m^3 for $PM_{2.5}$ and 10 µg/m^3 for NO_2). Concern was raised from environmental and health NGOs

Table: Comparison of current EU Ambient Air Quality standards, the proposed standards, and the WHO Air Quality Guidelines.

	Current EU AAQD	**EU AAQD proposal**	**WHO AIR QUALITY GUIDELINES**	
Pollutants	LIMIT VALUES (µg/m³)		Pollutants	HEALTH BASED (µg/m³)
$PM_{2.5}$ annual	25	10	$PM_{2.5}$ annual	5
$PM_{2.5}$ 24 hours[1]	-	25	$PM_{2.5}$ 24 hours[2]	15
PM_{10} annual	40	20	PM_{10} annual	15
PM_{10} 24 hours[3]	50	45	PM_{10} 24 hours[2]	45
NO_2 annual	40	20	NO_2 annual	10
NO_2 24 hours[1]	-	50	NO_2 24 hours[2]	25
SO_2 24 hours	125	50	SO_2 24 hours[2]	40
CO 24 hours[1]	-	4	CO 24 hours[2]	4
	TARGET VALUES (µg/m³)			HEALTH BASED (µg/m³)
O_3			O_3 Peak season[5]	60
O_3 8-hours[6]	120	120	O_3 8-hours[2]	100

[1]not to be exceeded more than 18 times per calendar year
[2]a 99th per centile (i.e., 3–4 exceedance days per year)
[3]not to be exceeded more than 18 times per calendar year in proposal and current AAQD 35 times
[4]not to be exceeded more than 18 times per calendar year in proposal and current AAQD 3 times
[5]Average of daily maximum 8-hour mean O_3 concentration in the six consecutive months with the highest six-month running-average O_3 concentration.
[6]The maximum daily 8-hour mean concentration not to be exceeded on more than 18 days per calendar year averaged over 3 years

that the exposure reduction obligation approach might increase social inequalities regarding air pollution exposures. As housing in air pollution hotspot areas tends to be cheaper, it is often inhabited by people with lower economic means. Hotspot areas are not covered in AEI, as urban background stations do not cover hotspots, leaving the most vulnerable unprotected. Furthermore, it might be less effective for equal rights to clean air across the EU and fails to show us a clear path to achieving WHO alignment across all member states. Moreover, Average Exposure Reduction Obligations might make public communication and access to justice more complicated, they stressed. By using a mean of all urban background stations in a large regional area, accountability for action might be hard to follow.

The proposal also contains other changes apart from level adjustments. The Commission considers that the collected and reported air quality data is robust and of satisfactory quality. Further policy action to be designed and implemented. There have, however, been some concerns about the comparability of monitoring data from member states due to the location of monitoring stations. It is already stated that air pollution should be monitored in areas where the highest concentrations of air pollutants occur and in other areas that are representative of the exposure of the general population. The definition of the criteria for these areas could be clarified to reduce dependency on the competence of the handling authorities. The new proposal suggests that models, indicative measurements, and documentation on how the selection was made should play a bigger role. Given the technical improvements to air quality models since the last proposal, new possibilities have opened up. Models are now suggested for evaluating air quality plans and to indicate levels where there are no measurements. New supersites (monitoring stations with more measurement equipments) have also been suggested to cover emerging pollutants, such as ultrafine particles, ammonia and black carbon.

Another important shortcoming in the current directive is public information. Results from Eurobarometer surveys indicate that most citizens do not feel well informed about air quality in their countries. The quality of information for the public has been of mixed quality but is now detailed in Annex IX. Member states should in the proposal establish an air quality index that provides hourly air quality updates for the most harmful air pollutants. Alert thresholds for sulphur dioxide, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$) and ozone, and an information threshold for ozone, should be set to trigger the dissemination of information to the public on the risks of exposure. Up-to-date information on concentrations of all regulated pollutants in ambient air, as well as air quality plans and short-term action plans, should also be readily available to the public. The new proposal includes forecasted air quality, which will hopefully enable the public to make informed decisions on protecting their health and allow policy action. Forecast exceedances should, under the new proposal, be accompanied by major source contribution and recommendations to reduce these exposures and emissions.

Another important aspect is of course what to do if levels of air pollutants exceed the limit values. According to the new proposal, air quality plans should also be prepared ahead of 2030 if there is a risk that member states will not attain the limit values or ozone target value. Currently, the Air Quality Plans have, unfortunately, in some cases become a delaying game in which inadequate measures have been presented time and time again. The relatively low cost for action (which leads to benefits) as compared to the cost of inaction (which leads to harmful impacts from air pollution) on citizens' health, the economy and society has been presented in many studies by the International Institute for Applied Systems Analysis (IIASA). The new proposal sets clearer guidelines for the Air Quality Plans, including an indicative list of measures and clearly defined and documented responsibility roles, to keep exceedances as short as possible, and to update plans if they are not effective enough. ClientEarth head of clean air Ugo Taddei indicate a weakness of the proposal: The existing rules in the current AAQD state that when exceedances of legal limits occur after the deadline, competent authorities must adopt air quality plans setting out "appropriate measures, so that the exceedance period can be kept as short as possible". This requirement has allowed citizens, NGOs, and the EU Commission to bring enforcement actions. The proposal suggests amending the requirement and specifying that those air quality plans must "keep the exceedance period as short as possible, and in any case no longer than 3 years from the end of the calendar year in which the first exceedance was reported." However, the only consequence for missing this three-year deadline in the proposal is the requirement to update the air quality plan.

The new proposal also expands postponement attainment from NO_2 to $PM_{2.5}$ (while excluding benzene). The conditions for this postponement have also been specified. Site-specific dispersion characteristics, orographic boundary conditions (hills and mountains), adverse climatic conditions or transboundary contributions can allow for postponement of attaining limit values for up to 5 years if an Air Quality Plan is prepared according to the requirements and the Commission is notified. The Commission will assess if postponement conditions are satisfied, which might take nine months. If objections are raised, new or amended air quality plans can be sent in. Lastly, a regular review mechanism is introduced to assess whether the directive needs to be revised to ensure alignment with WHO Air Quality Guidelines by the year 2050 at the latest, based on the latest scientific understanding. Health organisations point out that latest scientific evidence is already available and limit values should align with WHO Air Quality Guidelines by 2030 the latest.

Ebba Malmqvist

The proposal can be found here: https://environment.ec.europa.eu/publications/revision-eu-ambient-air-quality-legislation_en

Nitrogen ruling puts Dutch CCS project on hold

In 2017 the environmental organisation Mobilisation for the Environment (MOB) went to the European Court of Justice to challenge the Dutch system for protecting Natura 2000 areas from nitrogen pollution. In May 2019, the court ruled in their favour and since then the Dutch government has been struggling to find a policy solution that brings nitrogen emissions down to acceptable levels. In July 2021, a new law was passed with the aim of replacing the old permit processes in the short term.

Now MOB has acted again. In a case against Porthos, a planned CCS project in Rotterdam, they have disputed parts of the new law that exempt large construction projects from controls on nitrogen-based pollutants. On November 2, the Netherlands' top administrative court ruled that the exemption was not in line with EU nature protection law.

This does not stop the Porthos' project, but it will likely be delayed up to half a year, a spokesperson told ENDS Europe, the time they estimate is needed for a new permit process.

The intention of the project is to capture the CO_2 emissions of companies in the port of Rotterdam, such as hydrogen producers Air Liquide and Air Products and oil companies such as ExxonMobil and Shell, as well as other major emitters and chemical companies in the Netherlands, and to transport them via an undersea pipeline to an old gas platform twenty kilometres offshore. The CO_2 will then be pumped into an empty gas field and stored at a depth of three to four kilometres. Before the ruling, Porthos aimed to be operational in 2024/2025.

The planned injection of 2.5 million tonnes of CO_2 a year until the site reaches capacity after 15 years was equivalent to just 1.5% of the Netherlands' annual emissions, MOB observed. You could "offset that with 25% fewer cows", MOB president Johan Vollenbroek said.

In addition to delaying the Porthos project, the ruling will have consequences for all sorts of construction projects in the country. Since the general exemption has now been declared invalid, all construction projects must calculate how much nitrogen is emitted both during and after construction.

According to the Council of State, the measures that the Dutch government wants to take to reduce nitrogen emissions ¬– from buying out farmers to using shore power instead of diesel generators for shipping – are too uncertain and have not yet been implemented. That is why they should not be regarded as compensation for the nitrogen released during construction projects.

Kajsa Pira

Source: ENDS daily, 3 November 2022

Change Inc, 2 November 2022 https://www.change.inc/infra/uitspraak-raad-van-state-porthos-project-39131

Ways through the rare earth element bottleneck

It has never been so important to find ways to overcome the barriers of dependency on rare earth elements for the renewable energy transition.

At a time when we have an urgent need to accelerate the transition to renewable energy sources, the accessibility and sustainability of the materials used in this transition are vital. The wind industry's reliance on expensive, supply-constrained rare earth elements has created a challenge to rapid progress. It is of great importance to find sustainable and fair solutions and not let this reliance create a bottleneck in the deployment of renewable energy.

Europe has few or non-existent domestic supplies of the materials needed for the energy transition. Rare earth production is set to spread geographically as Europe reduces its dependence on China, which supplies about 90% of the world's rare earth elements. The EU has targeted these materials as a top priority, as 98% of rare earth permanent magnets are currently imported from China.

In addition, developing an effective and systematic circular approach is essential to achieving a sustainable energy transition. Recycling the materials used will both increase the efficiency of the decarbonisation process and reduce reliance on material imports. In the next few years, recycling waste materials and second-life manufacturing will become a stand-alone business model that drives job creation[1].

It is vital that these needs are reflected in EU policies that concern both rare earth dependency and circularity. According to internal market commissioner Thierry Breton the European Commission has an "ambitious" agenda for raw materials: "It combines more circularity and increased sustainable domestic production with reliable partnerships across the globe, which share our environmental and social standards."

Under the REPowerEU Plan, the EU announced it would prepare a legislative proposal and intensify its work on the supply of critical raw materials.[2] An EU-funded certification scheme using blockchain is being developed for rare earths to ensure that materials used to make magnets are not linked to toxic pollution. The system will set global standards for consumers demanding sustainable products. The Circular System for Assessing Rare Earth Sustainability or CSyARES is due to be ready in about three years, according to the Rare Earth Industry Association (REIA). The system will track rare earths using blockchain tokens, or digital passports, through the complex supply chain from mining to end-of-life. [3]

Of the seventeen rare earth elements, the magnets in a wind turbine generator use about a ton of four of them: neodymium, praseodymium, dysprosium, and terbium. Permanent magnets are important as they make possible small, light, space-saving designs for the gearboxes of wind turbines. They also enhance low-voltage ride-through capability, thus improving a turbine's capacity to remain connected to the grid. However, there is a technological innovation drive to find a substitute for these components.

Recently a milestone in developing a new, lighter, rare-earth-free generator solution has been reached. A new generator for offshore wind turbines that does not require the use of rare earth metals has been developed and approved. Over the past five years, UK-based GreenSpur Wind and Niron Magnetics, based in the US, have developed a rare-earth-free generator. The findings have been verified by ORE Catapult, the UK´s leading technology innovation and research centre for offshore renewable energy.

Earlier versions of the GreenSpur generator were criticised for their weight. Keeping generator mass within the same range as existing machines is crucial, as adding weight requires more structural support, which increases cost. By designing with Niron's Generation 1 Clean Earth Magnet, which has significantly better magnetic performance than its earlier generator designs, GreenSpur has developed a new 15 MW generator. Based upon initial non-optimised results, the new generator delivers a significant 56% reduction in mass. This new technology for wind applications could enable a potentially transformative solution for the wind market's dependency on rare earth elements.

Emilia Samuelsson

[1]Read more about recycling in the clean energy sector in Acid News 2021 #3.

[2]Euractiv, Different mentality needed on raw material domestic mining, says EU body, 25 May 2022.

[3]Euractiv, EU tests blockchain certification scheme for rare earths, EV batteries, 8 February 2022.

Emission Guide for Businesses

A Practical Guide For Business Air Pollutant Emission Assessment is a guide developed by the Stockholm Environment Institute, Climate and Clean Air Coalition and Inter Ikea Group. Members of the Alliance for Clean Air are calling for as many business leaders as possible to join them in using the guidance for their value chains. The aim of the guide is to quantify the air pollutant emissions from key sectors along their value chains, including electricity generation, transport, industrial processes, agriculture and waste. The guide is available for companies to create air pollution emission inventories

https://www.sei.org/publications/air-pollutant-emission-assessment/

Clean air in courts

When scientists announce that the air you're breathing is far more dangerous than previously understood, and your government does nothing, what do you do? For these German and Belgian residents, the answer is to take the countries' leadership to the highest national court. The plaintiffs are parents and children, some of whom suffer with asthma and respiratory conditions, and they are vying to formally establish a right to clean air in the lawbooks in collaboration with ClientEarth.

https://www.clientearth.org/latest/latest-updates/news/i-m-doing-this-for-my-children-the-germans-headed-to-court-for-cleaner-air/

Climate change will worsen air quality

Scenarios show that global warming will increase the formation of ozone in densely populated regions, and forest fires can affect particle levels far away from the fires.

Ground-level ozone is an air pollutant that can harm human health, but also lead to reduced harvests and destroy ecosystems. Levels of ground-level ozone are partly affected by levels of precursor pollutants, through emissions of nitrogen dioxides and VOCs (volatile organic compounds), and partly by changes in the weather/climate. This is because ozone is formed through a photochemical reaction and needs sunlight for the reaction to take place. Nitrogen dioxides and VOCs are formed through combustion, for example, and if combustion increases or decreases as a result of fossil fuels and forest fires, the levels of ground-level ozone also change. They are also affected by the changing climate, as hot dry periods often involve a lot of sunlight, which means that the opportunities for photochemical reactions increase.

A changing climate thus leads to an increase in heatwaves, which increase the formation of ground-level ozone. Heatwaves are also often associated with periods of stagnant weather, which means less wind, and in turn means that other air pollutants (for example, small particles $PM_{2.5}$) increase locally as there is not as much atmospheric mixing of air. As a result, heatwaves are usually combined with higher levels of air pollution, which affects the health of vulnerable groups in particular.

Climate change can also lead to warmer air, which often leads to more water vapour and cloud formation, which could lead to less ozone formation. However, it is believed that this effect will occur mainly over the seas and to a small extent over land, so the effect on human health will be minimal.

In a scenario where we do not manage to limit our emissions and the average temperature increases by 3 degrees during the second part of this century, ozone levels would rise by 20% over areas with poor air quality, mainly in Asia (Pakistan, Northern India, and Bangladesh), and by 10% over eastern China. The main contributor would be increased emissions of fossil fuels but a fifth of this increase would be due to climate change and the increased frequency of weather favouring photochemical reactions. Even if it is only a small part of the world in terms of land mass that will be affected, it must be remembered that a quarter of the world's population lives in these areas, so the health effects will be great. If, on the other hand, we reduce our emissions from burning fossil fuels, we also reduce the gases (nitrogen dioxides, methane, VOCs) that can affect ozone formation.

Having said that, we can still be affected by the climate changes that have already happened and forest fires can also increase these emissions. Even in a scenario where we act against climate change, the climate will be changed by the emissions we have already released and the risk of forest fires will increase, but we can reduce the risk level by adhering to a low-emission scenario. Forest fires can affect particle levels even far away from the fires. Particles are harmful to health and the dark particles (soot) can affect the local climate by settling on snow. The lighter particles (for example sulphur) can reflect the sunlight and lead to a reduced greenhouse effect. Thus particles can both increase and decrease climate change. One can therefore sometimes say that there is a trade-off between the climatic effects and health effects of reducing particles. Reducing the burning of fossil fuels (and methane from animal production) generally has a positive effect on both decreasing climate and health impact. If you reduce emissions, you also get less deposition of nitrogen and sulphur, both of which have negative effects on ecosystems.

Ebba Malmqvist

The effect of climate on air pollution is summarised in the latest bulletin from WMO: https://public.wmo.int/en/our-mandate/focus-areas/environment/air_quality/wmo-air-quality-and-climate-bulletin-no.2

The remaining global carbon budget leaves little headroom for Europe

As the world fails to reduce emissions fast enough, the remaining carbon budget is shrinking rapidly, as shown by recent studies on carbon budgets for Germany and for Europe.

A recent paper published by AirClim[1] calculates the carbon budget for 42 European countries. Based on the remaining carbon budget to limit temperature rise to 1.5°C with a 66 per cent likelihood, the paper provides an overview of domestic emission reductions needed, and indicates how much funding richer European countries would need to provide to poorer countries within and outside Europe so that they can make similar efforts to stay within the very limited carbon budget that is left.

The results of the AirClim paper largely agree with a similar exercise made by the German Environment Advisory Council (SRU)[2]. The SRU concludes that the remaining carbon budget for Germany is around 2 $GtCO_2$ for the period starting from 2022. With emissions in Germany in 2020 and 2021 around 0.7 Gt/year, the SRU foresees the German carbon budget for 2020 to 2050 to be 3.4 Gt, while the AirClim paper foresees a budget of 3.8 Gt.

The AirClim paper further identifies the remaining carbon budget for the EU to be around 20 Gt, with the EU also needing to provide 188 bn euro per year to support climate action in other countries, of which 133 bn should be directed towards developing countries. For Germany, its climate finance contribution should be 50 bn per year, of which 36 bn would be directed towards developing countries.

All the above is based on a robust scientific understanding that global temperature rise is almost linearly proportional to the total amount of CO_2 that the world emits (and removes). This knowledge has led to the development of the global carbon budget concept, which identifies the cumulative amount of CO_2 that can be emitted – between pre-industrial times and the moment net cumulative CO_2 emissionsare achieved – to stay within a certain temperature limit. Deducting the amount of CO_2 already emitted from the total carbon budget provides an estimate of the remaining carbon budget.

The contribution of IPCC Working Group I (WG1) to AR6 from August 2021[3] provides an estimate of the remaining carbon budgets to limit temperature rise to 1.5°C, 1.7°C and 2°C, with likelihoods between 17% and 83% (see table SPM.2 below). The lower the temperature target and/or the higher the likelihood, the lower the remaining budget. In the AirClim paper the remaining carbon budget is defined by our objective to limit temperature rise to 1.5°C with a likelihood of 66%. This limits the estimated remaining carbon budget for the period 2020 to 2050 to 400 $GtCO_2$.

The paper then divides the remaining carbon budget across 42 European countries, taking into account that the carbon budget only relates to CO_2 emissions (and thus not to the other greenhouse gases) and that at a global level recent numbers for CO_2 emissions and removals from land-based activities (agriculture, forestry) are rather shaky. The paper basically used two methodologies for dividing the carbon budget:

- Per capita: whereby countries are assigned a slice of the remaining budget on the basis of their share of the global population;
- Equity: whereby countries are assigned a slice of the remaining budget taking into account their historical emissions (and responsibility for the climate crisis).

These methodologies are then used to:

A. define countries' domestic carbon budgets by using a per capita division of the remaining global carbon budget; and

Table SPM.2 | Estimates of historical carbon dioxide (CO_2) emissions and remaining carbon budgets. Estimated remaining carbon budgets are calculated from the beginning of 2020 and extend until global net zero CO_2 emissions are reached. They refer to CO_2 emissions, while accounting for the global warming effect of non-CO_2 emissions. Global warming in this table refers to human-induced global surface temperature increase, which excludes the impact of natural variability on global temperatures in individual years.

Global warming between 1850–1900 and 2010–2019 (°C)		Historical Cumulative CO_2 Emissions from 1850 to 2019 ($GtCO_2$)					
1.07 (0.8–1.3; likely range)		2390 (± 240; likely range)					
Approximate global warming relative to 1850–1900 until temperature limit (°C)[a]	Additional global warming relative to 2010–2019 until temperature limit (°C)	Estimated remaining carbon budgets from the beginning of 2020 ($GtCO_2$) *Likelihood of limiting global warming to temperature limit*[b]					Variations in reductions in non-CO_2 emissions[c]
		17%	33%	50%	67%	83%	
1.5	0.43	900	650	500	400	300	Higher or lower reductions in accompanying non-CO_2 emissions can increase or decrease the values on the left by 220 $GtCO_2$ or more.
1.7	0.63	1450	1050	850	700	550	
2.0	0.93	2300	1700	1350	1150	900	

Table from IPCC Assesment report 6 Working group 1, Summary for Policy makers: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

B. define countries' financial obligations to support emission reductions abroad (both within Europe and outside) by using the Climate Equity Reference Calculator[4] to define a country's responsibility and deduct its domestic effort, as defined under (a), to identify how much support the country should give to other countries (or, for countries with a responsibility below their domestic efforts, how much support they should receive from their European neighbours).

A country's equitable share of the remaining global carbon budget is thus expressed as a domestic carbon budget plus a climate finance obligation (or need).

To identify the domestic carbon budget for each country, we divide the remaining carbon budget of 400 $GtCO_2$ on the basis of the average of each country's total population in 2020 and its estimated population in 2050. This means, for example, that the EU27 has a responsibility to reduce emissions by 111 $GtCO_2$ as compared to BAU (while the EU would emit only 83 $GtCO_2$ in the BAU scenario). By limiting its domestic carbon budget to 20 $GtCO_2$, the EU would make a domestic contribution of 63 $GtCO_2$ towards reducing emissions. This represents a bit more than half of its responsible share of global emission reductions and needs to be complemented by financial support to emission reduction activities abroad.

It should be clear that to stay within the limit set by the Paris Agreement, substantial and transformative action in all parts of the world will be needed, as the remaining global carbon budget is very small. This challenge can only be met if all countries accept their fair share of responsibility, not only by reducing their own greenhouse gas emissions but also by supporting poorer countries and communities to do the same.

Wendel Trio

[1]Trio, W (2022) Policy Implications of Europe's Dwindling Carbon Budget. AirClim. www.airclim.org/publications/policy-implications-europes-dwindling-carbon-budget

[2]SRU (2022) Wie viel CO_2 darf Deutschland maximal noch ausstoßen? Fragen und Antworten zum CO_2-Budget. www.umweltrat.de/SharedDocs/Downloads/DE/04_Stellungnahmen/2020_2024/2022_06_fragen_und_antworten_zum_CO_2_budget.pdf?__blob=publicationFile&v=15

[3]IPCC WG 1 (2021). Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group 1 to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

[4]www.calculator.climateequityreference.org

Limited environmental benefits with Euro 7 proposal

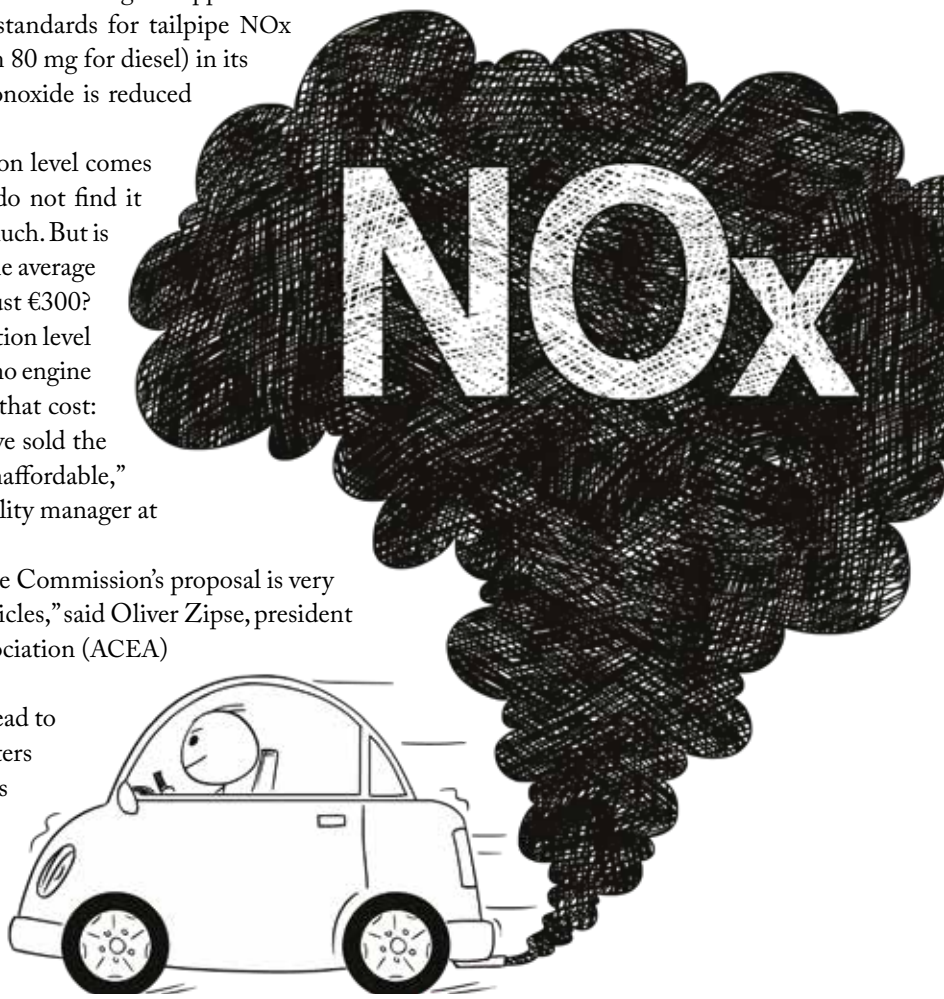
For many, the publication of the long-awaited Euro 7 was a large disappointment. The proposal suggests maintaining the Euro 6 standards for tailpipe NOx emissions of 60 mg/km for petrol cars (down from 80 mg for diesel) in its updated standards. Only the limit for carbon monoxide is reduced (from 1000 to 500 mg/km).

One of the main arguments for a lower ambition level comes from the car industry lobby group ACEA. They do not find it economically viable to stop polluting our cities as much. But is it unaffordable when the impact assessment puts the average cost per vehicle to cut toxic emissions by 50% at just €300? The Impact Assessment also shows that this reduction level is achievable with existing technology and requires no engine hardware change. Here are some observations on that cost:

"Despite enjoying record profits, carmakers have sold the Commission a lie that an ambitious Euro 7 is unaffordable," said Anna Krajinska vehicle emissions and air quality manager at NGO Transport & Environment (T&E).

"Unfortunately, the environmental benefit of the Commission's proposal is very limited, whereas it heavily increases the cost of vehicles," said Oliver Zipse, president of the European Automobile Manufacturers' Association (ACEA) and chief executive of BMW.

T&E has estimated that the new proposal will lead to 100 million new cars sold from when Euro 7 enters into force in 2025 until the ban on ICE vehicles takes effect in 2035. These cars will stay on the roads, polluting our cities for decades to come. This makes even a small contribution per car a massive health problem for years to come, stunting children's lungs and impacting mortality.



Richest 1% of the world responsible for 17% of emissions

New analysis taking into account rich people's consumption behaviour as well as their investment decisions shows a widening gap in responsibility for the climate crisis between rich and poor.

The quest for climate justice has been a core driver for the climate movement from the very start, resulting in the integration of the equity concept in the 1992 UN Framework Convention on Climate Change (UNFCCC). Despite this, inequality has grown and climate injustice has continued. This is partly because climate justice and equity have been predominantly defined from a perspective of rich versus poor countries (which is logical in the context of the UNFCCC, where countries negotiate with each other). Unfortunately, climate injustice and inequality not only exist between countries, but it is also important to look at inequality within countries. Some would even argue that the gap between the global rich and the global poor (across all countries) is more important than the division between rich and poor countries. A new study by Lucas Chancel from the Global Inequality Lab, published in Nature Sustainability[1], provides some useful additional data to this debate. The author assessed not only the impact of individuals' greenhouse gas emissions through their consumption behaviour, but also looked at the impact of their investment decisions. The findings indicate that when calculating the impact of the global rich on climate change, their investment decisions are actually more important than their consumption behaviour.

Here we highlight some of the findings of this interesting study through four graphs.

Table 1. Global emissions inequality in 2019: summary table

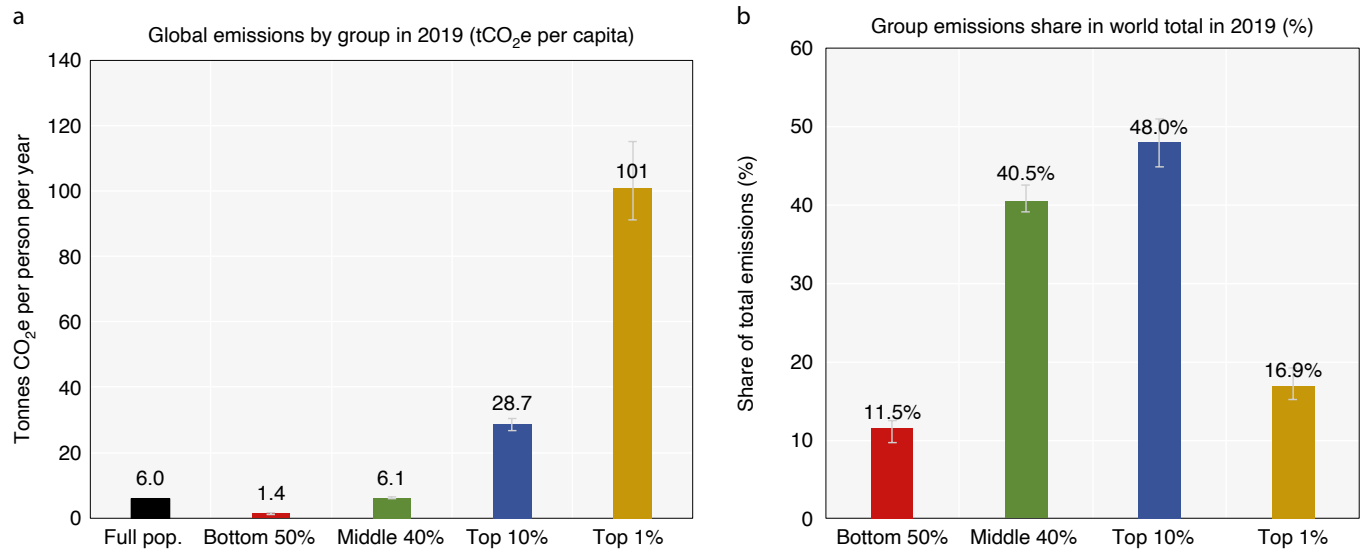
	Number of individuals (million)	Average (tonnes CO_2 per capita)	Threshold (tonnes CO_2 per capita)	Share (% total)
Full population	7,710	6	<0.1	100%
Bottom 50%	3,855	1.4	<0.1	11.5%
incl. bottom 20%	1,542	0.7	<0.1	2.3%
incl. next 30%	2,315	1.8	1.1	9.2%
Middle 40%	3,084	6	2.8	40.5%
Top 10%	771	29	13	48%
incl. top 1%	77.1	101	47	16.9%
incl. top 0.1%	7.71	425	125	7.1%
incl. top 0.01%	0.771	2,332	566	3.9%

1. Global emissions by income group

Figure 1 shows the average per capita emissions of different global income groups (left), the total share of emissions of each income group (right) and table 1 provides with a further breakdown of these numbers. It shows that the poorest 50% of the world population emitted 12% of global emissions in 2019, whereas the richest 10% emitted 48% of the total, and the top 1% was responsible for 17% of all emissions. It is clear that global carbon emissions inequality is huge; close to half of all emissions are released by one-tenth of the global population, and just one-hundredth of the world population (77 million individuals) emits about 50% more than the entire bottom half of the population (3.8 billion individuals). The conclusion is clear: in the short term the biggest reductions will have to be made by the richest 10% of the global population, wherever they live.

(Per-capita emissions include emissions from domestic consumption, public and private investments, and imports and

Figure 1. Global emissions by group in 2019. Per-capita emissions include emissions from domestic consumption, public and private investments as well as imports and exports of carbon embedded in goods and services traded with the rest of the world.



exports of carbon embedded in goods and services traded with the rest of the world.)

2. Per capita emissions for different income groups, by region

Figure 2 shows average per capita emissions for different income groups across different regions, and shows that for most regions (except Africa) the 10% richest have higher per capita emissions than the developed countries' middle class (except for North America). North America tops the range for all income groups and strikingly even the poorest half is responsible for per capita emissions of 10 ton, which matches the per capita emissions of the middle group in Europe despite the latter being substantially richer. The sharpest contrast is in East Asia where the poorest half is responsible for on average 2.9 ton of emissions, while the middle 40% emits nearly 8 ton, and the top 10% almost 40 ton.

3. Emissions growth for different income groups between 1990 and 2019

In figure 3 global polluters are ranked from the least emitting to the highest on the X axis, while their per-capita emissions growth rate between 1990 and 2019 is presented on the Y axis. Since 1990, average global per capita emissions grew by 2.3%. The per-capita emissions of the bottom 50% grew faster than the average (26%), while per capita emissions of the middle 40% fell by about 5–15% for per centiles p75 to p95. This segment of the world population largely corresponds to the lower- and middle-income groups of the rich countries, which have seen their emissions fall due to economic changes (de-industrialisation) and climate policies. The same trend is not visible for the top 1%, whose per-capita emissions have grown immensely and are responsible for a quarter of the global growth in emissions since 1990.

4. Growing emissions inequality between vs. within countries

In figure 4, a schematic overview is given of the inequality dynamics since 1990. Global carbon inequality dynamics are governed by two forces: the evolution of average emission inequalities between countries and the evolution of emission inequalities within countries. In 1990, emissions inequality was mostly (62%) due to differences between countries. Back then, the average citizen of a rich country polluted unequivocally more than the rest of the world, and income inequalities within countries were on average lower than today. The situation has entirely changed since then. Within-country emission inequalities now account for nearly two-thirds of global emissions inequality. This does not mean that important inequalities in emissions between countries and regions have disappeared, but points instead to the fact that on top of the inequality in carbon emissions between countries, there are even greater emission inequalities between individuals within countries. Both elements must therefore be taken into account when developing global approaches and all of the big emitters need to contribute to stringent emission reduction efforts. No member of the top 1% should be allowed to shirk their responsibility on the basis of between country inequalities.

Figure 2. Per-capita emissions (tCO2) in 2019, of the top 10%, middle 40%, and bottom 50% if emitters, grouped by region.

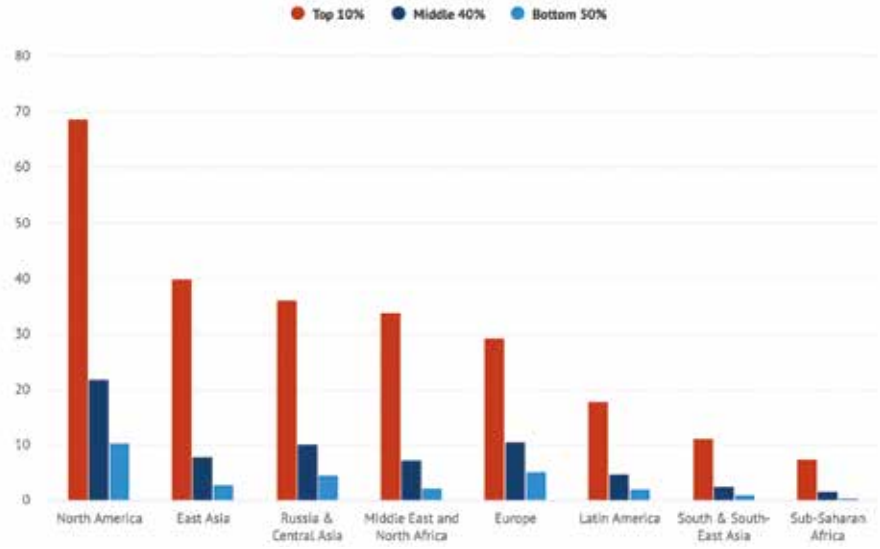


Figure 3. Emissions growth by percentile over 1990-2019.

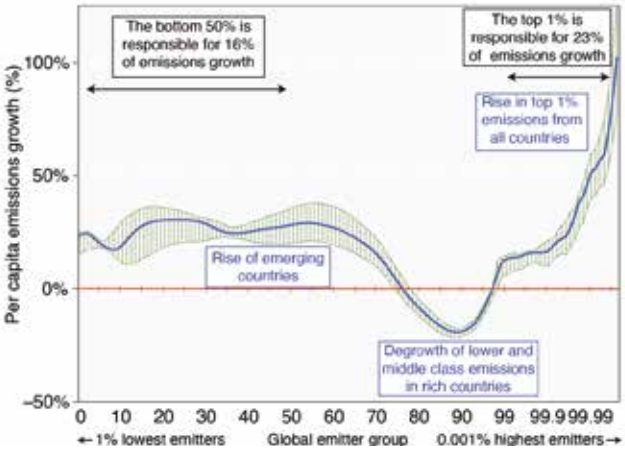
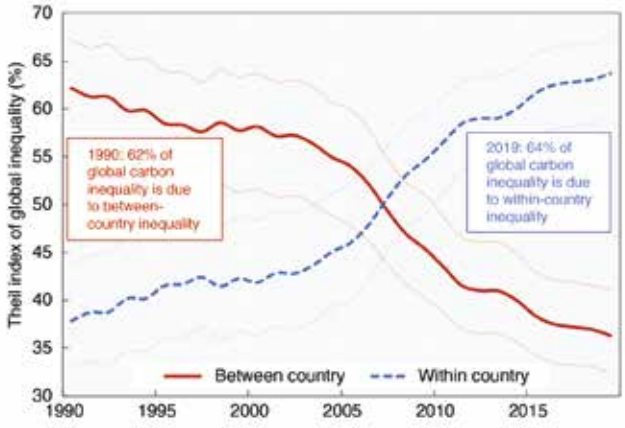


Figure 4: Global emissions inequality between vs within countries.



Wendel Trio

[1]Chancel, L. (2022) Global Carbon Inequality over 1990-2019. Nature Sustainability. www.nature.com/articles/s41893-022-00955-z

Health effects of extreme high temperatures

The effects of climate change are becoming increasingly clear, and the impact of high temperatures is felt universally. AirClim has co-published a report about the health effects of extreme high temperatures. The objective is to give a concise summary of heat-related health effects, the most vulnerable populations, the regions that are most exposed to extreme heat, and different future scenarios of global warming.

It stresses that without action, a very different future awaits many of us. In some regions around the world the rising temperatures will result in summers with even more frequent and severe heatwaves and limitations on what today are seen as normal outdoor activities. In other regions, populations risk facing year-round deadly heat if no mitigation efforts are put in place, according to the Intergovernmental Panel on Climate Change (IPCC).

The effects of anthropogenic climate change are already noticeable, as global warming of around 1°C has generated an increase in heat-related morbidity and mortality around the world. The most affected populations are those that are already marginalised, with limited access to adaptive capacities to cope with temperature rises.

To protect planetary and human health as much as possible it is vital to act – urgently. Keeping global warming at 1.5°C would reduce climate hazards and health risks, but cannot eliminate them all. Hence it is, even in the best future scenario, necessary to prepare for increased exposure to extreme heat. At the current pace of global decarbonisation we are, however, unlikely to meet the Paris Agreement ambitions to keep global warming well below 2°C. Instead, we are heading towards a future that endangers the health of us all. Nevertheless, there is still time to change direction – there is still time to act.

Hanna Slogén

Link to briefing: https://www.airclim.org/sites/default/files/documents/extreme-temperatures-a-threat-to-human-health.pdf

Over 20,000 died in western Europe's summer heatwaves, figures show

The Guardian reports that more than 20,000 people died across western Europe in this summer's heatwaves, in temperatures that would have been virtually impossible without climate breakdown, figures show.

Analysis of excess deaths, the difference between the number of deaths that happened and those expected based on historical trends, reveals the threats posed by climate change-induced global heating, scientists said.

During the summer heatwaves, temperatures exceeded 40°C in London, areas in south-west France reached 42°C and Seville and Córdoba in Spain set records of 44°C. Analysis from the World Weather Attribution group of scientists found that such high temperatures would have been "virtually impossible" without the climate crisis.

In England and Wales, 3,271 excess deaths were recorded between 1 June and 7 September, according to the Office for National Statistics – 6.2% higher than the five-year average.

In France, there were 10,420 excess deaths reported during the summer months, according to data released by Santé Publique France, the government health agency.

One in four of these deaths, or 2,816, happened during one of the three intense heatwaves that hit the country. The excess deaths were 20% higher in regions where extreme temperature red alerts had been issued.

In Spain, the state-backed Carlos III Health Institute estimates there were 4,655 heat-attributable deaths between June and August.

The Robert Koch Institute, the German government health agency, estimates 4,500 people died in the country during the summer months specifically due to extreme temperatures.

Dr Friederike Otto, a senior lecturer in climate science at the Grantham Institute for Climate Change and the Environment, Imperial College London, said: "Heatwaves are one of the biggest threats posed by climate change. High temperatures are responsible for thousands of deaths across the world every year, many of which go underreported. "Despite this overwhelming evidence, there is still little public awareness of the dangers that extreme temperatures present to human health."

The summer of 2022 was the hottest on record, according to the EU's Copernicus climate change service.

https://www.theguardian.com/environment/2022/nov/24/over-20000-died-western-europe-heatwaves-figures-climate-crisis

Air pollution can damage children for life

Exposure to air pollution can prevent children's organs from developing to full capacity, since they have more sensitive lungs and immature immune systems.

Children are unable to choose their environment and cannot link the sensation of illness to a specific exposure or a certain environment, thus they are powerless to remove themselves from harmful exposures. It is therefore up to us as guardians and adults to shelter them from these exposures. To highlight the topic of children and why they need extra protection from polluted air, I have on behalf of AirClim written a booklet on the issue and explain why children need clean air, as well as the health effects of exposure to pollution. I will here only cover the why which is independent on geographic region, but the booklet as a whole can be found at Airclim.org.

Why children need clean air

Cells are the basic building blocks of our body's organs. For our organs to function, and for children to grow and develop healthily, our cells need three fundamental things:

1. Water
2. Energy – from food
3. Oxygen – from the air we breathe.

Without enough oxygen, our bodies will cease to function optimally. For children, a lack of oxygen means that their organs will not develop properly and grow to their full capacity. Thus, the function of these organs might be chronically reduced. This is alarming, as the functioning of our organs and our ability to oxygenate our bodies is vital to remain healthy throughout our lifespan.

Children's lungs are not yet fully developed at birth. It is not until three years of age that children's lungs and airways will resemble a small version of the adult respiratory system. As children grow, their lungs and airways mature and expand. The lungs continue to grow until a child's early teenage years, but their exact size and volume will vary from child to child. Damage to children's lungs during this period might cause irreversible impairments, and the younger the child, the worse the damage.

Air pollution particles tend to stick to children's lung tissues to a greater extent than they do in adults, with a difference of 10–20 per cent per breath. This is of great concern as children also breathe and ingest more air pollution in relation to their body weight than adults. The concentrations of air pollutants in children's bodies and respiratory systems will therefore be much higher than in those of adults.

Inhaling air pollutants will provoke an inflammatory response and, in the case of particles, also congest the lung tissue, which decreases the body's ability to oxygenate. These effects will cause our body's immune system to react. However, if the concentrations of inhaled air pollution are high and the exposure is persistent, the immune system will not be able overcome these harmful effects. Because they have less-developed and weaker immune systems, children are particularly susceptible. To compensate for a lower concentration of oxygen in our blood, the heart must work harder to circulate a larger amount of blood per minute to our cells. Consequently, air pollution exposure also increases the burden on our cardiovascular system. Children who grow up in areas with constantly elevated levels of air pollutants thus experience a chronic level of bodily stress due to inflammatory responses and decreased ability to oxygenate. This may prevent their organs from developing to full capacity and mean that their future health as grownups could be fundamentally impaired.

Emilie Stroh, Lund University, expert on children andenvironmental exposures.

EU avoids €11bn in gas costs thanks to solar and wind

A new study by E3G and Ember shows that wind and solar produced 25% of EU electricity since the Russian invasion of Ukraine. Given the rampant inflation mainly caused by the high price of gas, the growth in renewables since last year alone avoided €11 billion in gas imports. However, the EU still spent an estimated €82 billion on fossil gas during this period to supply 20% of its electricity.

Dr Chris Rosslowe, senior analyst at Ember stated, "Wind and solar are already helping European citizens," and added "But the future potential is even greater."

Solar and wind generated a record 24% of EU electricity from March to September this year (345 terawatt hours), growing by a record 39 TWh year-on-year, up from 21% the same period last year. 19 EU member states have achieved a wind and solar record, including France (14%), Italy (20%), Poland (17%) and Spain (35%).

However, the report shows that past policy choices that increased the EU's dependency on gas and held back the EU's renewable and energy efficiency ambition are the main driver of Europe's record-high inflation now. The report states that "Betting on gas as a bridge fuel and holding back on expanding renewable capacities are the main causes of Europe's energy crisis".

The conclusion highlights that the European Commission's RePowerEU ambition has the potential to reduce Europe's exposure to costly gas imports significantly and quickly. To make this happen, RePowerEU needs to be supported by EU member states and the European Parliament and put into legislation, currently subject to negotiations.

Artur Patuleia, Senior Associate at E3G, commented "governments need to support the clean energy ambition of RePowerEU, making it a core element of the energy price crisis response".

Based on the briefing of the report found here. https://ember-climate.org/press-releases/eus-record-growth-in-wind-and-solar-avoids-e11bn-in-gas-costs-during-war/

New guidance document for nitrogen management

A new guidance document "Nitrogen Opportunities for Agriculture, Food & Environment", officially adopted by the Air Convention, was published in November 2022. In contrast to previous documents prepared by the Taskforce on Reactive Nitrogen, which have only focused on ammonia, the intention here is to take a comprehensive approach to nitrogen losses. In addition to ammonia emissions, this has meant considering emissions of nitrogen oxides and nitrous oxide into the air, as well as nitrate and other reactive nitrogen losses to water.

The Nitrogen Guidance Document focuses on agriculture in the context of the food system and environment. It identifies the principles of integrated sustainable nitrogen management, followed by measures to reduce nitrogen losses from livestock housing and manure storage, including measures to promote nutrient recovery. It then identifies measures to reduce nitrogen losses from organic and inorganic fertilisers, and measures that focus on landscape and land-use management, finishing by considering coherent "measures packages".

Nitrogen Opportunities for Agriculture, Food & Environment. UNECE Guidance Document on Integrated Sustainable Nitrogen Management. November 2022. https://unece.org/environment-policy/publications/guidance-document-integrated-sustainable-nitrogen-management

Europe, China and the US could decarbonise 84% of global shipping emissions without IMO

A recent briefing from Transport & Environment (T&E) shows that Europe, China and the US could decarbonise 84% of all global shipping emissions without falling foul of the virtual lack of progress of the International Maritime Organization (IMO). The point is that even if China, Europe and the US only account for 40% of shipping emissions, the vast majority of ships call at one of their ports. If these three economies agree on measures to reduce their maritime emissions including carbon markets, pollution taxes, energy efficiency targets and zero-emission fuel standards they would create a de facto global regulatory regime bypassing the IMO.

Jacob Armstrong, sustainable shipping officer at T&E, said: "Efforts to decarbonise shipping at the IMO have so far been miserable. The need for consensus at the global level has brought us nowhere. But there is a much easier way to do it. With the vast majority of ships passing through Europe, China and the US, these leading economies can unilaterally regulate emissions without relying on the ineffective IMO."

The Marine Environment Protection Committee (MEPC) will met on 12–16 December.

Source: https://www.transportenvironment.org/discover/europe-china-and-us-could-decarbonise-84-of-global-shipping-emissions-without-imo/

Proposal to integrate maritime transport in the EU ETS

In July 2021, the European Commission proposed, as part of the Fit-for-55 package, to amend the Emissions Trading Directive by including maritime transport in the EU ETS. The Fit-for-55 package also includes other proposals that address the maritime sector, such as the FuelEU Maritime Initiative. The Oeko-Institut has prepared an overview of the proposal in a briefing for AirClim and the Life ETX Consortium. It also outlines the importance of addressing maritime transport emissions, evaluates the proposal and sets it in context with developments at a global level. It also formulates three key recommendations.

First of all, expanding the EU ETS to include maritime transport is an important step towards introducing carbon pricing in this sector and signalling the relevance of its emissions to the EU's overall emissions and to the economy.

Second, the current proposal could be improved by:

- including all relevant GHGs (CO_2, CH_4 and N_2O), and possibly also black carbon; considering a stepwise inclusion of ships over 400 GT in a timely manner;
- considering whether an expansion of the geographical scope is politically feasible given the experience with the aviation ETS;
- abolishing the transitional phase for surrendering allowances;
- adding emphasis or detail on how EU ETS revenues will be used to decarbonise the maritime sector (e.g., CCfD through a dedicated fund).

Finally, the inclusion of international maritime transport in the EU Nationally determined contributions (NDCs) with the geographical scope of the maritime EU ETS could underscore the EU's ambition to reduce emissions and strengthen links between efforts under the IMO and UNFCCC. The EU's forerunner role could serve as an incentive and proof-of-concept for an international policy.

Nora Wissner, Martin Cames
Oeko-Institut

Link to the briefing on the proposal to integrate maritime transport in the EU ETS:

https://www.oeko.de/fileadmin/oekodoc/Oeko-Institut_2022_ETS-shipping-briefing_paper.pdf

First Forum for International Cooperation on Air Pollution

The first Taskforce Meeting of the Forum for International Cooperation on Air Pollution (FICAP) under the UNECE Convention on Long-Range Transboundary Air Pollution was held on the 11th and 12th of October 2022 as a hybrid meeting. The new task force aims to provide a platform for global cooperation on transboundary solutions to air pollution and is co-chaired by Sweden and the United Kingdom. Many prominent speakers discussed possibilities, challenges and lessons learnt to work across borders on the issue of air pollution. Among the possibilities mentioned was sharing methods and technology such as emission inventories and models, international research collaborations and the importance of human interactions. The next meeting will be in Gothenburg, Sweden on 16 March 2023.

EU must phase-out coal and gas and promote plant-rich diets to deliver on methane

The draft Methane Action Plan mostly lists existing policies and proposals. To fulfill its 30% reduction commitment the EU must include action to slash the use of fossil fuels and reduce meat consumption.

At last year's climate summit in Glasgow (COP26) a range of countries, including the EU and its member states, subscribed to the Global Methane Pledge. Through this voluntary pledge, the EU committed to reduce methane emissions by 30% between 2020 and 2030. While the EU has substantially reduced its methane emissions already (-36% between 1990 and 2020), it does not (yet) have the policies in place to fulfil this commitment under the Global Methane Pledge. If the EU is serious about this pledge it would need to adopt much more stringent policies to a) phase out coal (by 2030) and fossil gas (by 2035), and b) substantially reduce meat production and consumption. The EU Methane Action Plan, identifying the EU's contribution to the Global Methane Pledge, should be the opportunity to do so.

It is clear that in order to prevent dangerous climate change all greenhouse gases need to be substantially reduced. To achieve the 2015 Paris Agreement's target to limit temperature rise to 1.5°C, it is assumed that all greenhouse gases in the EU would need to be reduced by at least 65% by 2030 (as compared to 1990) and reach net zero by 2040. This will be a challenge for all greenhouse gases and thus any action focusing on reducing methane emissions should ensure it also contributes to stringent reductions of CO_2 and other greenhouse gases.

At the moment, the assessment is that future reductions in methane emissions will be harder than those for other gases. The draft EU Methane Action Plan foresees that while implementing all measures proposed in the Fit for 55 package and the European Green Deal, methane emissions in 2030 will be close to 50% of 1990 emissions, requiring a reduction in methane emissions of 23% between 2020 and 2030. One would thus expect that the Methane Action Plan would go beyond just providing an overview of existing policies and proposals (which include the Commission's Methane Strategy and the proposed Regulation on Methane Emissions from the Energy Sector).

Most of the reductions described in the Action Plan will happen in the energy and waste sectors, while the biggest gains in reducing methane emissions are actually to be made in the agricultural sector. Currently this sector is responsible for 54% of all methane emissions while the waste management and energy sectors are responsible for 27% and 17% of emissions respectively (see graph below).

Methane emissions from the energy sector have been reduced by 60% already and are scheduled to be reduced by another

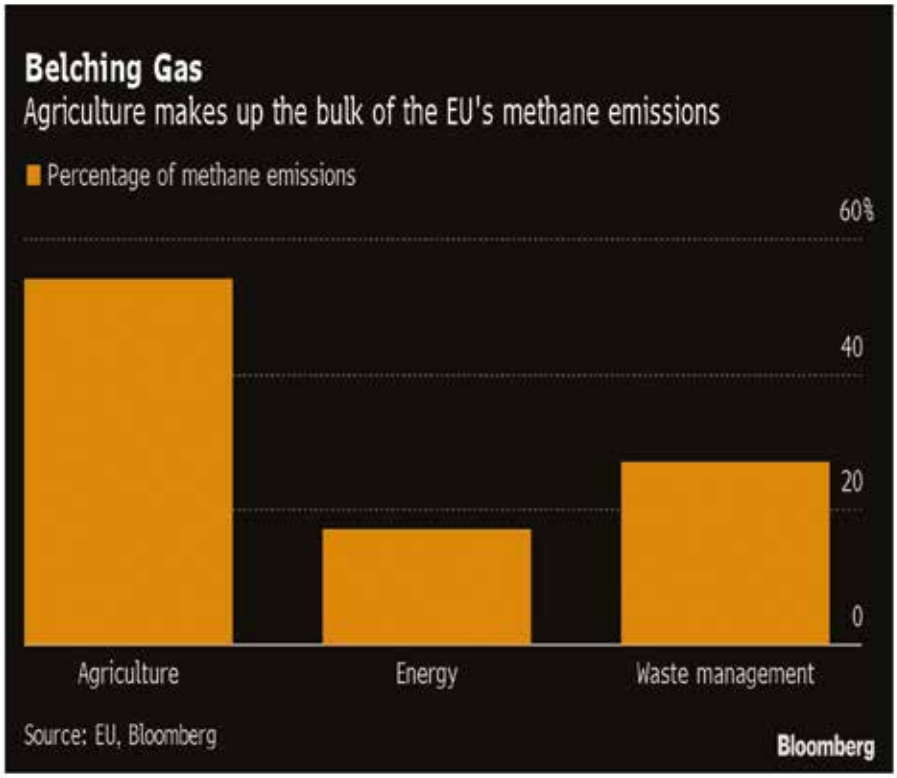
30% (between 2020 and 2030). However as the bulk of the energy sector's methane emissions are linked to the extraction of coal and to the production and distribution of oil and gas, much more than 30% can be achieved by ensuring a full phase-out of coal use in the EU by 2030 and the phase-out of gas and oil by 2035 and 2040 respectively. In other words, by developing and implementing EU-wide fossil fuel phase-out strategies the EU could probably reduce methane emissions in the energy sector close to zero within the next decade.

EU methane emissions from the agricultural sector, which almost all stem from livestock, have not reduced over the last 10 years. This needs to change. The Methane Action Plan thus needs to provide additional incentives to reduce methane emissions in the livestock sector, in particular by ensuring reductions in meat and dairy consumption and production. Only substantial changes in people's diets will allow the EU to fulfil its obligations under the Global Methane Pledge.

This is also one of the recommendations of the IPCC's 2020 Special Report on Climate Change and Land: "Balanced diets, featuring plant-based foods, such as those based on coarse grains, legumes, fruits and vegetables, nuts and seeds, and animal-sourced food produced in resilient, sustainable and low-greenhouse gas emission systems, present major opportunities for adaptation and mitigation while generating significant co-benefits in terms of human health. By 2050, dietary changes could free several million square kilometres of land and provide a technical mitigation potential of 0.7 to 8.0 $GtCO_2eq$ per year, relative to business as usual projections."

It is high time the EU integrates these IPCC recommendations into its agricultural policies.

Wendel Trio



Air pollution major cause of death in Africa

A new report on the state of the air in Africa has been released. It shows that the African continent suffers from some of the worst air pollution and health consequences relative to the rest of the world. In 2019, air pollution was the second leading risk factor for death across Africa after malnutrition. Three quarters of the population in Sub-Saharan Africa still relies on solid fuels for cooking and are exposed to extremely high levels of household air pollutants. In addition, Africa is rapidly urbanising and is on track to have 13 megacities (cities with more than 10 million residents) by 2100. While economic development could raise the economic quality of life for many, it is important that air pollution sources are not allowed to grow unchecked to further add to the existing air quality problem. The big potential for clean energy, such as solar, will be crucial in determining Africa's air quality future as well as improved public health.

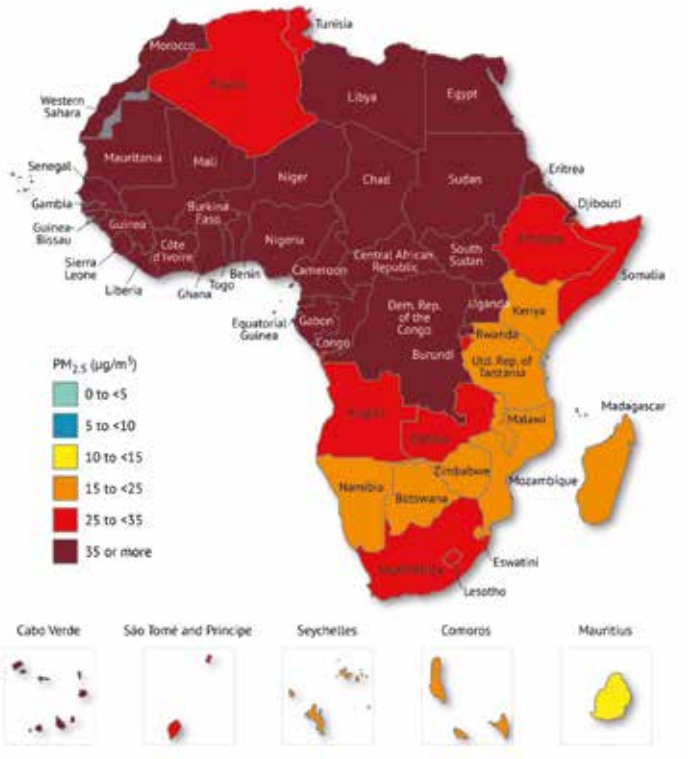


Figure: Population-weighted $PM_{2.5}$ exposure in African countries (The State of Air Quality and Health Impacts in Africa, 2022).

Reference: Health Effects Institute. 2022. The State of Air Quality and Health Impacts in Africa.

Whole of Europe must do more to align with the Paris Agreement's 1.5°C target

New scientific report presents technically feasible, 1.5°C compatible energy and emissions pathways for the group of 46 countries that make up the whole of Europe.

The modelling work of Climate Analytics started with analysing global 1.5 pathways which were than downscaled to the EU 27 and the whole Council of Europe region, comprising 46 countries. Global action remains insufficient to meet the Paris Agreement's long-term temperature goal. Increasing the ambition of the 2030 climate targets and accelerating emission reductions in this decade are essential. The report1 presents technically feasible, 1.5°C compatible energy and emissions pathways for the group of countries that make up the Council of Europe (CoE), and assesses whether CoE member states' current 2030 climate targets (the Nationally Determined Contributions, NDCs) are collectively aligned with limiting warming to 1.5°C.

The report finds that, to be 1.5°C compatible, Council of Europe member states would need to cut their domestic emissions faster than currently planned. Pathways compatible with 1.5°C and filtered to meet sustainability constraints were analysed in this report. These pathways show that countries within the Council of Europe can feasibly:

- Reduce their collective greenhouse gas (GHG) emissions between 63 and 68% below 1990 levels excluding land use, land use change and forestry (LULUCF). Assuming the minimum LULUCF sink within the CoE region, this corresponds to a 68–73% reduction by 2030, relative to 1990 levels.
- Reach net-zero GHG emissions between 2041 and 2054.
- Limit their total cumulative CO_2 emissions to 27–35 Gt CO_2 from 2020 until mid-century (incl. LULUCF).

If each CoE member state achieved its current individual 2030 NDC target, the total mitigation effect would be a 44% reduction of emissions below 1990 levels. The analysis therefore suggests that the current 2030 mitigation ambition of the Council of Europe region cannot be seen as compatible with 1.5°C. There is an emissions gap of 1457–1746 Mt CO_2e in 2030 between the CoE member states' aggregated NDCs and 1.5°C compatible domestic pathways.

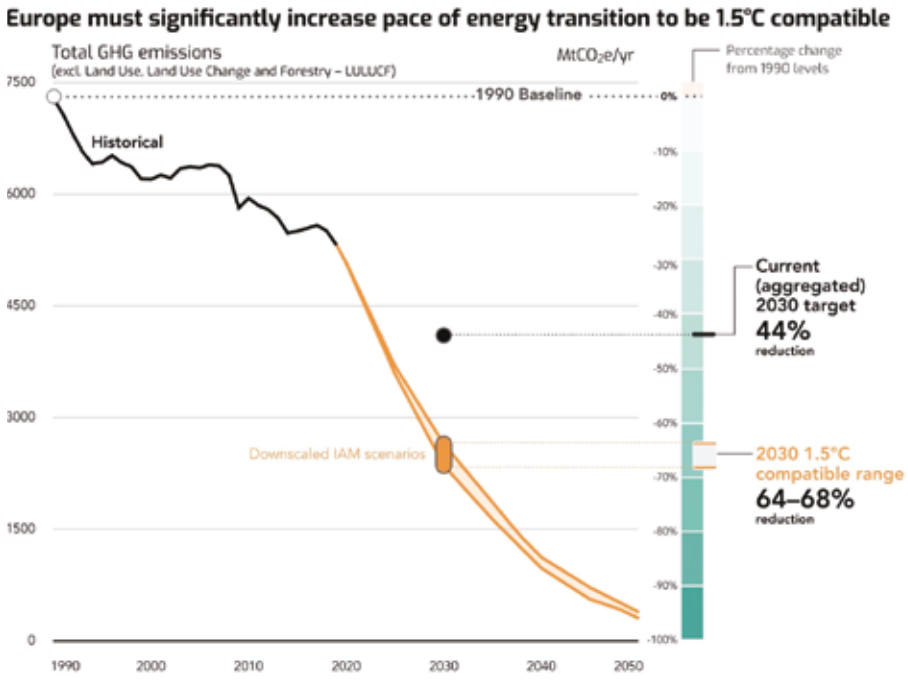


Figure. Domestic 1.5°C compatible GHG emissions for the CoE region, compared to the expected pathway under the current aggregated Nationally Determined Contribution (NDC) of CoE member states. The CoE's combined NDCs do not currently align with 1.5°C, as assessed in this report. These emissions pathways do not include LULUCF emissions, which could enable all CoE member countries to reach net-zero GHG emissions by as early as 2041. Historical data from PRIMAP (Gütschow, Günther, and Pflüger 2021).

The report also demonstrates how CoE member states could achieve these 1.5°C compatible benchmarks through a rapid transition to an efficient energy system powered by renewable energy sources (see figure). It focuses on three illustrative pathways, the HighRE, SSP1 and SusDev scenarios. All three are downscaled versions of Integrated Assessment Model (IAM) pathways taken from the IPCC's latest assessment report (AR6). They represent different possible 1.5°C compatible futures: the HighRE scenario focuses on renewables deployment and electrification, the SSP1 scenario represents a world in which there are broader shifts towards a more sustainable and equitable society, and the SusDev scenario explicitly focuses on meeting the sustainable development goals alongside the 1.5°C goal. This diversity of pathways improves the robustness of the report's results.

In the analysed pathways, electricity provides 57–66% of final energy in 2050. There are also strong and sustained reductions in final energy demand, which means that by 2050, total energy demand in the CoE region can be up to 45% lower than in 2019. Overall, renewables provide 39–46% of final energy demand in 2030, rising to 82–91% by 2050.

Fossil fuels are rapidly displaced from the energy system in 1.5°C compatible pathways for the CoE area. In the most ambitious pathways, coal is phased out of

the energy system by 2030, and fossil gas by 2050 at the latest. Although residual oil demand remains in 2050, this is concentrated in non-energy demand in the transport, industry and aviation sectors.

Synthetic fuels and feedstocks (which are not represented in the illustrative pathways) could further reduce oil consumption in these sectors.

There is a particularly strong effect in the power sector, where rapid deployment of wind and solar is the cornerstone of the energy transition. Key milestones for the power sector in these illustrative pathways include:

- Coal phased out of power generation by 2030 and fossil gas by the mid-2030s
- A 99% fossil-fuel-free electricity mix by 2035
- Electricity generation more than doubling by 2050

In addition to strengthening domestic climate action, rich member states of the CoE (e.g., the EU27, United Kingdom, and Switzerland, among others) also have an obligation, under the fair share and equity considerations embedded in the Paris Agreement, to assist less wealthy countries to accelerate sustainable economic development and take climate action. Without such assistance, the global effort required to limit warming to 1.5°C could be distributed unfairly and will likely not be enough.

It is clear that member states of the CoE can do more to align with the Paris Agreement's 1.5°C target and provide global leadership on the climate crisis. By providing updated NDCs that collectively cut emissions by at least 68% (including LULUCF) by 2030, by committing to fossil-free electricity by the mid-2030s, and by rapidly reducing demand for fossil fuels, CoE countries can drive ambitious climate action and help keep 1.5°C alive.

Neil Grant, Ryan Wilson, Aman Majid, Lara Welder, Jonas Hörsch, Claire Fyson & Bill Hare

[1] 1.5°C Pathways for the Council of Europe: accelerating climate action to deliver the Paris Agreement, September 2022, by Climate Analytics for AirClim. Link: https://www.airclim.org/publications/15%C2%B0c-pathways-council-europe-accelerating-climate-action-deliver-paris-agreement

CAN Europe – 1.5°C pathways for Europe:
The science is more than clear: We need to cut greenhouse gas emissions immediately to respect the Paris Agreement's objective of limiting global temperature increase to 1.5°C. But how exactly should the European Union and its member states contribute to this objective?

- For a quick overview of what the 1.5°C objective means for the EU, please check our short video.

In our project '1.5°C pathways for Europe', together with professional climate modellers from the renowned institute Climate Analytics, we develop 1.5°C compatible scenarios. By uniting researchers and NGOs, we use the latest evidence from science that it is possible for the EU to cut its emissions by at least 65% by 2030 and reach net-zero emissions by 2040.

- Read Climate Analytics' report '1.5°C pathways for Europe. Achieving the highest plausible climate ambition', published in October 2021.
- Watch the webinar recording with Climate Analytics' presentation of the key findings from their '1.5°C pathways for Europe' report from October 2021.
- Download the presentation by Michiel Schaeffer, Lead Science Advisor at Climate Analytics on key findings from the report launch webinar in October 2021.

The scenario in Climate Analytics' 1.5°C pathways for Europe report builds on the key assumptions of CAN Europe's previously published Paris Agreement Compatible (PAC) energy scenario.

- Learn more about CAN Europe's PAC scenario.

What does it mean at the national level?
Together with our national member organisations from nine EU countries, we have also translated the EU-wide 1.5°C pathway into country-specific 1.5°C pathways. Nine country fact sheets summarise the findings and illustrate the feasibility of quick emission reductions with details for the countries' energy, electricity and industry sectors.

- Download the country fact sheets for Denmark, France, Germany, Italy, Poland, Portugal, Romania, Spain and Sweden.

In September 2022, we published an updated EU report by Climate Analytics integrating recently published Integrated Assessment Models from the IPCC's 6th Assessment Report.

- the 2022 report "1.5°C pathways for the EU27: accelerating climate action to deliver the Paris Agreement"
- the CAN Europe press release

https://caneurope.org/climate-action/

The higher the energy efficiency target, the greater the benefits

A new report by Cambridge Econometrics quantifies the benefits resulting from higher levels of ambition for the 2030 energy efficiency target.

EU-wide energy saving goals have been in place for the past decade but these have been voluntary and yielded disappointing results. Despite energy efficiency investments, energy use fell by only 4% between 2010 and 2019 and over this period dependency on imported energy increased. Thus, new legislation on energy efficiency, building renovation and efficient products makes it essential to ramp up efforts quickly.

Intense trilogues between the European Commission, the European Parliament and the Council of the EU are currently taking place concerning the revision of the Energy Efficiency Directive (EED). For more than a year, EU citizens and businesses have been severely impacted by rising energy prices. The war in Ukraine is putting at risk energy availability and the climate crisis is causing extreme weather conditions. Saving energy makes an important contribution to resolving these problems.

While most EU countries support energy efficiency in principle, many delegations expressed concerns at the last revision of the EED about overall ambition level. Arianna Vitali from the Coalition for Energy Savings, said at the time "many member states seem willing to water down the Commission proposal, disregarding the benefits [of energy savings] for their own economies". The report highlighting the benefits of a higher energy efficiency target is therefore timely[1].

The report models three levels of ambition for the energy efficiency target that are currently being negotiated. The Council's general approach is 9%, the Commission's proposal in the REPowerEU plan is 13% and finally the European Parliament supports 14.5%.

The most ambitious option – 14.5% by 2030 – would deliver the following environmental, economic and social benefits;

- **Reduction of household energy costs by 120 billion euros:** Energy efficiency decreases household energy and transport bills because it reduces energy consumption and lowers energy prices. A 14.5% energy efficiency target would on average reduce household expenditure on energy by 10.3% and save 8.5% on transport in 2030. This would equate to a saving of 120 billion euro in energy and transport expenditures for the whole EU. This works out as an average saving of 609 euro for each European household. The study shows that energy poverty is addressed, as the poorest households benefit more from energy efficiency measures and would experience a larger cut in their bills compared to the richest households.
- **Reduction of fossil fuel imports, saving 38 billion euros:** Saving energy boosts EU energy security by reducing reliance on imports and the impacts of possible supply disruptions. A 14.5% energy efficiency target would cut EU spending on fossil fuel imports by 12.2% in 2030, leading to savings of about 38 billion euro, equivalent to about 40% of EU spending on energy imports from Russia in 2021. In particular, the greatest reduction in monetary terms is achieved for oil and gas imports, a saving of 24 billion euros.
- **Decrease in GHG emissions by 12.2% (315 Mt CO_2eq):** By reducing energy consumption, energy efficiency measures also reduce energy-related GHG emissions. With a 14.5% energy efficiency target, the EU's GHG emissions would

be reduced by an additional 12.2 % in 2030 (about 315 Mt CO_2eq in absolute terms). This is equivalent to the GHG emissions of Spain in 2019. It would bring the EU significantly closer to its Climate Law objective to reduce GHG emissions by 55% in 2030 and set the EU on a credible path towards its climate neutrality goal.

- **Decrease in air pollution by 19% for PM_{10} and SO_2 and by 13% for VOC and NOX:** The combustion of fossil fuels for space heating, hot water provision, transportation and electricity production leads to an increase in emissions of air pollutants, which ultimately affect air quality. Energy efficiency measures also contribute to reducing adverse impacts arising from air pollution that is generated from the use of fossil fuels, as well as inefficient heating systems and modes of transport. In 2030 the largest impacts come from damage costs associated with coarse particulate matter (PM_{10}) and sulphur dioxide (SO_2), which would be reduced by 19% in the 14.5% scenario. This is mainly driven by a fall in the extraction and manufacturing of fuels and the reduced energy supply, which are the main source of SO_2 emissions. Similarly, the reduction in air pollution damage caused by coarse particulate matter (PM_{10}) is driven by a fall in energy consumption from residential, commercial and institutional activities, which are the principal sources of PM_{10} emissions. Despite the lower magnitude, significant improvements are also associated with reductions in damage due to volatile particulate matter (VOC) and nitrogen oxides (NOX) of 13% in the 14.5% scenario.
- **Creation of 752,000 jobs:** Investments in energy efficiency increase employment due to higher levels of production in the economy and a shift in production towards more labour-intensive sectors. Moreover, there are positive "multiplier effects" from higher consumer expenditure, which result in more economic activity and therefore job creation. The study finds that a 14.5% energy efficiency target would create 752,000 jobs in 2030 (an increase of 0.4% in the economy-wide employment rate), with the largest increase in sectors producing energy efficiency goods and services, such as construction, manufacturing and utilities. This is equivalent to three times the current number of workers in coal mining and related activities in 2018.
- **Increase in Gross Domestic Product (GDP) by 94 billion euro:** Energy efficiency improvements also lead to a positive impact on the overall economic activity of the EU, with the creation of additional wealth and therefore GDP growth. A 14.5% energy efficiency target would increase the EU's GDP by 0.6% in 2030, which represents the creation of 94 billion euro in monetary wealth. This is roughly equal to the GDP of Slovakia in 2021.

Niels Fuglsang, MEP, who defends a 14.5% energy efficiency target for 2030 writes:

"For years, some of us have been saying that the safest, cleanest and cheapest energy is that which we don't use. With the Ukraine war and rapidly falling gas supplies coming from Russia, this is truer than ever. But Europe has been sleeping at the wheel".[2] He adds that "One of the reasons Europe is so dependent on Russian energy is that, over the past decade, gas was aggressively marketed as a transition fuel. It seemed simpler to switch from coal to gas than to go all-in on energy efficiency and renewables. We have to learn from this, or sleepwalk into another crisis."

Measures to reduce energy consumption tend to be neglected in favour of more visible policies like the deployment of renewables, but change is possible. The EU's climate chief said energy savings were the surest way out of the crisis in the short term. "The era of cheap fossil fuel is over. For good. It will not come back," according to Franz Timmermans, European Commission vice-president. And while the "era of cheap renewable energy is real" and coming fast, "it's not coming fast enough to solve the problems this year or perhaps next year," he conceded.

So in the meantime, "saving energy, not using energy, is the cheapest energy obviously," he said in a speech at the European Energy Efficiency Day 2022.[3]

It must be emphasised that even the highest level of ambition in the study, the 14.5% target, represents only moderate ambition, as the cost-effective energy savings potential for the EU stands at least at 19%, given high energy prices. The EU institutions are therefore discussing levels of ambition that are below what is technically feasible and economically viable.

Emilia Samuelsson

Article based on the report *2030 EU energy efficiency target: The multiple benefits of higher ambition*, found here: https://www.camecon.com/what/our-work/2030-eu-energy-efficiency-target-multiple-benefits-higher-ambition/

[1]Energy efficiency law ´too ambitious´for some EU member states, by Frédéric Simon, EURACTIVE, 1st December 2021, https://www.euractiv.com/section/energy/news/energy-efficiency-law-too-ambitious-for-some-eu-member-states/

[2]Why Europe needs an ambitious energy efficiency target, by Niels Fuglsang, Euractiv, 14 September 2022. https://www.euractiv.com/section/energy/opinion/why-europe-needs-an-ambitious-energy-efficiency-target/

[3]Not using energy is the cheapest energy´. EU climate chief insists, by Nikolaus J. Kurmayer. Euractiv, 20 October 2022. https://www.euractiv.com/section/energy/news/not-using-energy-is-the-cheapest-energy-eu-climate-chief-insists/

Regulating the most polluting livestock farms is justified

Revising the Industrial Emissions Directive to include cattle and lower the size threshold to 150 Livestock Units will only affect 13% of the EU's largest commercial farms.

In April 2022 the Commission proposed to amend the Industrial Emissions Directive (IED) to increase its effectiveness in reducing emissions of industrial pollutants that are harmful to human health and the environment.

The Directive seeks to ensure that installations operate using Best Available Practices. Installations covered by the IED are required to operate in accordance with a permit which sets conditions in line with the principles of the IED.

Around 52,000 installations are currently covered by the IED, of which 23,000 are large pig and poultry farms. One of the revisions proposed by the Commission is to extend the scope of the IED to include large cattle (dairy and beef) farms and to lower the size threshold for the inclusion of pig and poultry farms.

With a proposed threshold of 150 Livestock Units (LSU), this would increase the number of farms covered by the IED to around 185,000. This revision is motivated by the fact that the EU livestock sector is responsible for 54% of EU emissions of methane and 67% of ammonia emissions. In contrast to other pollutant emissions, ammonia and methane emissions have fallen by much less or not at all since 2005.

This revision has been strongly opposed by all political groups (with the sole exception of the Left group) in the European Parliament's AGRI Committee. The draft Opinion presented in October 2022 by the Committee's rapporteur on the file, Benoît Lutgen (EPP), sets out two main objections.

One is that is it an "outrage" that farms are included in the scope of a directive dedicated to industrial emissions. The argument is that the European agricultural model is based on family-run farms that guarantee the production of quality food in a secure, sustainable and strategic manner.

The problem is that these farms, regardless of their ownership structure, are responsible for significant emissions of harmful pollutants. Appealing to the family ownership of farms is not a justification for ignoring any damage to health and the environment they may be responsible for.

The other objection raised by AGRI Committee members is that the extended IED regulation will disproportionately affect the smallest farms and that the Commission proposal will lead to a higher concentration of production and a reduction in the number of small farms.

The question of size needs to be kept in perspective. The 185,000 farms that would be covered by a threshold of 150 LSUs would represent 13% of the EU's largest commercial farms. For commercial farms with more than 10 LSU, it is proposed to regulate emissions of ammonia and methane on the largest 10% of cattle farms, 12–15% of poultry farms and 18% of pig farms. It is hard to see these as small farms in the European context. All holdings with less than 10 LSU are totally excluded.

There would be additional costs for the farms that are regulated, including administrative costs for seeking the permit and costs for complying with the permit requirements. The impact analysis accompanying the Commission proposal showed that the benefits from reduced emissions in terms of health and environment would exceed these costs several times.

Further, the Commission proposal recognises farms as small and medium sized enterprises (SMEs) and proposes a tailored (i.e. simplified) permitting approach to reduce the administrative costs.

Finally, the proposed changes would not become effective until 2029, giving a sufficiently long transition period for farms to adjust to the new requirements. Given the importance of acting to reduce emissions, the Commission proposal seems a justified first step.

Alan Matthews is Professor Emeritus of European Agricultural Policy at Trinity College Dublin, Ireland.

Western Balkans to receive a €500 million energy support package

In late October, commission chief Ursula von der Leyen announced that the European Union has pledged €500 million to improve the energy sector in the Western Balkans. It starts with €80 million in immediate budget support for North Macedonia to help address the impact of the high energy prices.

"There are €500 million in grants for the whole region to invest in energy connections, energy efficiency and of course renewable energy," von der Leyen presented, underlining the importance of removing dependency on Russian fossil fuels. North Macedonia's Prime Minister, Dimitar Kovacevski stated that "Energy and economic crisis caused by the war in Ukraine have united Europe. Only united we can handle with the lack of energy and food,"

The announcement is of great importance, as the domestic electricity production of countries in the Western Balkans meets only two thirds of their annual needs.

From EURACTIV, EU announces €500 million energy support package for Western Balkans, 27 October 2022. https://www.euractiv.com/section/enlargement/news/eu-announces-e500-million-energy-support-package-for-western-balkans/

EU must reform the ETS to make it an effective instrument

The Oeko-Institut suggests a number of technical measures that could be used to strengthen the EU ETS in the coming years.

The successful reform of the EU ETS is crucial for the implementation of the objectives of the European Green Deal. As reported in AN2/2022, the Oeko-Institut has done modelling work on how to improve the European Union Emissions Trading System (EU ETS), which is a central element of EU climate policy. Reforms are required in the following four aspects of the EU ETS.

The first aspect is that the cap on the EU ETS is a key element of the climate policy architecture and has a strong impact on the design of other commitment mechanisms (e.g. the Effort Sharing Regulation) if the emission reduction targets that are binding under EU and international law are to be achieved.

Second, in order to achieve the targets set with the EU ETS cap under real-world conditions, the EU ETS must be designed as an incentive instrument in such a way that the cap-based targets for 2030 can also be effectively achieved.

Third, the definition of the EU ETS cap via the Linear Reduction Factor1 (LRF) also raises awareness and sends a clear signal to the market about the time frame in which climate neutrality is to be achieved.

Fourth, the EU ETS is an important instrument for generating financial resources for the transition to a decarbonised society and economy, as well as the necessary accompanying measures.

However, in view of the large surpluses of emission allowances in the market and the huge uncertainties about the baseline emissions trends and the market behaviour of specific market participants (hedging providers, long-term banking by industry), limiting the reform to the cap adjustment will lead neither to a robust framework for the EU ETS, nor to the achievement of the emission targets for 2030.

Thus, there is a high priority to combine the cap adjustments with a further reform of the Market Stability Reserve2 (MSR) of the EU ETS since the withholding and cancellation mechanisms of MSR have an impact on the overall level of allowances that are available for compliance purposes. An important measure for strengthening the MSR mechanism and thus the EU ETS in general would be to adjust the MSR thresholds over time (e.g. in parallel with the contraction of the cap or, even more ambitiously, by adjusting them to zero in 2030). The modelling exercises by the Oeko-Institut show that an isolated analysis of a few reform options for the cap and for the MSR can easily lead to less robust results in view of the various uncertainties. The integrated analysis of the largest possible number of options and their combinations (e.g. with a view to baselines, caps, MSR design, demand for hedging and/or long-term banking) as well as the relevant uncertainties is an important prerequisite for a sufficiently robust assessment of the upcoming reforms.

Felix-Christian Matthes
Oeko-Institut

Link to the modelling study – The Revision of the European Union Emissions Trading System Directive: Assessing Cap and Market Stability Reserve Reform Options: https://www.oeko.de/fileadmin/oekodoc/Revision-of-the_EU-ETS-Directive.pdf

[1]The Linear Reduction Factor determines the rate of emission reductions under the EU Emissions Trading System, by reducing the total number of emission allowances each year.

[2]The Market Stability Reserve (MSR) is a rule-based mechanism that enables the delivery of allowances to respond to changes in demand, thus maintaining the balance of the EU ETS.

European research infrastructures for climate change and air pollution policies

Behind the acronyms of European research infrastructures there are some useful resources. Here is an overview of some of the most significant ones.

There are several research infrastructures in Europe that are of importance for the production of new scientific knowledge needed to develop climate and environment policy. From a societal point of view, it is important that this new knowledge is not only produced, but also finds its way into relevant policy processes and the documents that support these processes. Such documents can, for example, include reports by the IPCC that are used to guide the United Nations Framework Convention on Climate Change for the fulfillment of the Paris Agreement, publications within the United Nations Environment Programme, and reports intended to guide international treaties on emission control areas for shipping, as well as other treaties on air pollution.

Despite the importance of research infrastructures, it is not self-evident that they are known to the public or even to policymakers. Here I will briefly describe some of the infrastructures that are particularly relevant with regards to climate change and air pollution, and some of the services they provide.

Descriptions of the legal and financial statuses of the infrastructures go beyond the scope of this article, and this is even more true for an analysis of their performance. Nevertheless, it is worth noting that these infrastructures have gained significant economic support from the EU and/or nationally, even if many of them originate from bottom-up collaboration between university departments, field stations or individual researchers (and still have such constituents). Some of the infrastructures have long-term financing in place, whereas others do not.

Marko Reinikainen

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The infrastructures:

ACTRiS

The Aerosol, Clouds and Trace Gases Research Infrastructure ACTRIS is a European infrastructure that produces data and information on short-lived atmospheric constituents and examines the variability of these constituents. ACTRIS has fixed, land-based observational platforms and long-term data on aerosols and trace-gases are also produced using highly advanced remote-sensing techniques. ACTRIS provides the opportunity to use its facilities via transnational access calls, which means that researchers can gain access to and get support for a visit to facilities via transnational access calls. Two calls were open on the homepage of ACTRIS when this article was written. Virtual access can also be provided. Other services that are found in the online service catalogue of ACTRIS include Access to Data, and Science and User Access Forum. The ACTRIS homepage also contains a section dedicated to describing its relevance for stakeholders, including a sub-section concerning policymakers.

More information can be found here: *https://www.actris.eu*

AnaEE

AnaEE stands for Analysis and Experimentation on Ecosystems. This infrastructure covers experimental facilities that aim to understand the interactions between global change drivers on terrestrial and freshwater continental ecosystems in Europe. According to its homepage, the research is intended to provide a foundation for evidence-based adaptation and mitigation strategies for ecosystem health, and research can be carried out in areas such as land-use change, agricultural practices, biochar & crops, pests, and monitoring of GHG emissions and nutrients in subsurface drainage water. AnaEE also provides online analytical and modelling facilities that are coordinated with the experimental approach. These facilities can be accessed by stakeholders via the homepage of AnaEE.

More information can be found here: https://www.anaee.eu

AQUACOSM-plus
The acronym stands for a network of leading ecosystem-scale experimental AQUAtic mesoCOSM facilities connecting rivers, lakes, estuaries and oceans in Europe and beyond. This research infrastructure aims to strengthen a network of mesocosm facilities in aquatic environments. Mesocosms are enclosures where parts of the natural environment can be contained and experimented on. AQUACOSM-plus features joint research initiatives, capacity building and standardisation.It also enables transnational access to a selection of mesocosm facilities or installations. One of the transnational access calls was open on the homepage of the infrastructure when this article was published. There was also an open survey with the opportunity to be invited to an international expert workshop. Access to metadata (information about available data) is provided, together with environmental data that show the diversity of ecosystem conditions found within the infrastructure. The study of grand challenges such as those related to climate change are central to the work of this infrastructure.

More information can be found here: https://www.aquacosm.eu

DANUBIUS-RI
The DANUBIUS-RI works with the River to Sea system. It aims to conduct and facilitate science in these systems, as well as providing research infrastructure and integrated knowledge. Ultimately, the aim is to ensure healthy River to Sea systems by 2050. To achieve this, the RI wants to provide science-based solutions to societal risks that are caused by e.g. climate change, extreme events and other adverse human impacts on River to Sea systems, and the consequences of these impacts for biodiversity and ecosystem functioning. Experts can access the DANUBIUS-RI Data Portal, which provides a set of services and open access to data.

More information can be found here: https://www.danubius-ri.eu

EMBRC
EMBRC stands for the European Marine Biological Resource Centre. This infrastructure is dedicated to work regarding marine biological resources. The EMBRC partnership largely consists of marine stations around Europe, with a capacity to work on long-term data and experimental studies. EMBRC provides access to ecosystems and experimental facilities. It has a catalogue of several services which in addition to providing access to conduct studies also includes access to marine biological materials such as living or preserved organisms. Access to datasets is also possible. Ultimately the aim of the services is to tackle societal issues.

More information can be found here: https://www.embrc.eu

ICOS
The Integrated Carbon Observation System, ICOS, is a leading infrastructure for measurements of carbon dioxide and other greenhouse gases in terrestrial, aquatic and atmospheric systems and in relating them to the carbon cycle in the systems mentioned above. As well as the vast quantity of measurements at different scales that is provided, its services include advanced possibilities to visualise and analyse data. The data products of the ICOS data portal are arranged in four categories, i.e. ICOS Near Real Time Observational Data, ICOS Final Fully Quality Controlled Observational Data, Historic Observational Time Series For ICOS and Non-ICOS Stations, and Elaborated Data Products.

More information can be found here: https://www.icos-cp.eu

JERICO-RI
The JERICO-RI (Joint European Research Infrastructure of Coastal Observatories: Science, Service, Sustainability) aims to enable an understanding of the responses of coastal marine systems to natural and anthropogenic stressors. To do so, the JERICO-RI adopts a systematic approach to monitor, observe, explore and analyse coastal marine systems in order to provide reliable information on their structure and function in the context of global change. The services of the JERICO-RI have included transnational access via three calls in 2020–2022, which means that scientists have been able to physically access infrastructures and practical services. Virtual access is still ongoing, offering the possibility of virtual use of 20 European coastal ocean services. This access is free of charge and open to all stakeholders and users. Apart from data, it offers other services, such as taxonomic imaging tools.

More information can be found here: https://www.jerico-ri.eu/about

LTER
The Long Term Ecological Research Network consists of hundreds of individual sites globally, as well as larger platforms. The network and its sites are dedicated to collect, analyse and store long-term data. Sites can belong to the network without explicit funding for this purpose. In Europe, part of the network is currently organised as eLTER, and globally as ILTER. An important component of LTER is data storage and availability. An enormous amount of searchable long-term ecological data sets can be found in the DEIMS database, alongside information on research sites and activities.

More information can be found via the following sources: *https://www.ilter.network,* https://elter-ri.eu, and https://deims.org

LifeWatch
LifeWatch is an e-infrastructure for biodiversity and ecosystem research. According to its homepage it addresses "...the pressing need for increasingly diverse data, larger and more advanced models, open data and open science clouds, making it possible to explore new frontiers in ecological science and support society in addressing planetary challenges". The virtual services are categorised as thematic services, a catalogue of virtual labs, an EcoPortal (a repository of semantic resources for ecology), and a metadata catalogue.

More information can be found here: https://www.lifewatch.eu

Financial support for fertiliser industry

On 9 November the European Commission presented a communication on "Ensuring availability and affordability of fertilisers". It was announced as late as September in response to the current high cost of fertilisers. It opens the door for member states to subsidise the price of fertiliser in a number of ways, potentially drawing on the 450-million-euro Common Agriculture Policy reserve. The Commission also proposes to suspend import tariffs on ammonia and urea from a handful of countries until the end of 2024, as well as enabling member states to prioritise the fertiliser industry in a potential situation of fossil gas rationing.

Green groups have been highly critical of the proposal, which largely counteracts the ambitions of the Green Deal and the Farm to Fork strategy to halve nutrient losses and reduce the use of artificial fertilisers by at least 20 per cent. The communication also risks frustrating the long-planned Integrated Nutrient Management Action Plan, which was originally intended to be published by the end of this year, but has now been postponed until March next year.

The communication: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52022DC0590(01)

Delhi choking again

During the first week of November, New Delhi's air quality index was 472 with some areas recording values exceeding 800, according to the Delhi Pollution Control Committee, a regulatory body. New Delhi's 20 million residents weren't breathing air so much as smoke. A survey of 19,000 Delhi residents indicated that 80% suffered from pollution-related ailments and symptoms were so severe that one in five had to visit a doctor or hospital.

4 in 5 Delhi NCR families have someone with pollution related ailments (localcircles.com)

Europeans worried about air pollution

A new Eurobarometer survey published at the end of October shows that Europeans worry about air pollution. For those that had heard about the AAQDs, a majority want a strengthened Directive. In addition, most respondents do not think that industry, fossil-fuel-based energy producers, employers and authorities do enough to ensure good air quality.

Commissioner for Environment, Oceans and Fisheries Virginijus Sinkevičius said: "People tell us that they want clean air to breathe. People living in cities, asthma sufferers and those living near industrial plants, they are all worried and they are asking us to act."

The special Eurobarometer survey was conducted between 21 March and 20 April 2022. Some 26,509 respondents from different social and demographic groups were interviewed in their mother tongue, on behalf of the European Commission.

European Commission Press release, 24 October 2022

https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6307in-eu-climate-action/

Carbon certification proposal risks climate action

On the last day of November, the EU Commission launched its proposal for certifying removals of carbon dioxide from the atmosphere, as part of its efforts to reach zero emissions by 2050. Commission Vice-president Frans Timmermans argued for the need for the proposal during a press briefing on the same day: "Deep and drastic emission cuts will always be the core of our efforts but it's impossible to bring all of our emissions down to zero, so we will need carbon removals as well through technology or natural carbon sinks".

However, the proposal has sounded alarms among climate justice and environment campaigners, food, farm, development, and faith-based groups, and experts across Europe and beyond. Over 200 organisations have signed Real Zero Europe's statement, calling for the EU to "deliver real, deep, emissions cuts now," instead of generating false confidence in unproven future [carbon dioxide removal] CDR. They argue the proposal will delay real action and cause governments to miss the rapidly-closing window to keep global temperatures below 1.5 degrees of warming by locking in fossil fuels for decades to come.

Lucy Cadena, the coordinator of the Real Zero Europe campaign, said: "Every ton of future promised carbon removals represents a delay in emissions cuts today, bringing us deeper into climate chaos. COP27 revealed the corporate greenwash of 'net zero,' with a fossil fuel phaseout omitted from the final outcome. Now, we are bringing this fight home – we cannot let historical polluters like the EU off the hook."

The proposal: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13172-Certification-of-carbon-removals-EU-rules_en

Pressrelease from the Real Zero Europee campaign, 28 November 2022: https://www.ciel.org/news/real-zero-europe/

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1.5°C Pathways for the Council of Europe: accelerating climate action to deliver the Paris Agreement (September 2022). By Aman Majid et al.

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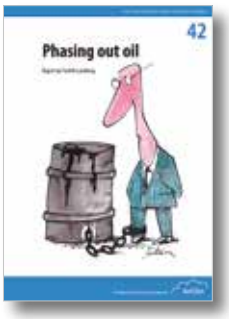

Phasing out oil (May 2022). By Fredrik Lundberg. This report is on oil, what it is used for and how to phase it out in Europe.

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Coming events

UN Biodiversity Conference (COP 15). Montreal, Canada, 7–19 December 2022. Information: https://www.unep.org/events/conference/un-biodiversity-conference-cop-15

IMO Marine Environment Protection Committee (MEPC 79). London, UK, 12–16 December 2022. Information: www.imo.org

CLRTAP Executive Body, 42nd session. Geneva, Switzerland, 12–16 December 2022. Information: www.unece.org/env/lrtap/welcome.html

EU Transport, Telecommunications and Energy Council. Brussels, Belgium19 December 2022. Information: https://www.consilium.europa.eu/en/meetings/tte/2022/12/19/

EU Environment Council. Brussels, Belgium, 20 December 2022. Information: https://www.consilium.europa.eu/en/meetings/calendar/

The 7th Saltsjöbaden Clean Air Workshop 2023. Gothenburg, Sweden, 13–15 March 2023. Information: https://www.ivl.se/projektwebbar/saltsjobaden-air-science-and-policy-wor...

Forum for International Cooperation on Air Pollution. Gothenburg, Sweden, 16 March 2023. Information: https://unece.org/info/events/unece-meetings-and-events/air-pollution

EU Environment Council. Brussels, Belgium, 16 March 2023. Information: https://www.consilium.europa.eu/en/meetings/calendar/

CLRTAP Working Group on Strategies and Review. Geneva Switzerland 11–14 April 2023. Information: https://unece.org/info/events/unece-meetings-and-events/air-pollution

CLRTAP Meeting of the Task Force on Measurement and Modelling. Warsaw, Poland 10–12 May 2023. Information: https://unece.org/info/events/unece-meetings-and-events/air-pollution

UNFCCC Climate Conference. Bonn, 5–15 June 2023. Information: https://unfccc.int/conference/first-sessional-period-2023

EU Transport, Telecommunications and Energy Council. Luxembourg, Belgium, 19 June 2023. Information: https://www.consilium.europa.eu/en/meetings/tte/2022/12/19/

IMO Marine Environment Protection Committee (MEPC80). London, UK, 3–7 July 2023. Information: www.imo.org

CLRTAP Ninth Joint Session of the EMEP Steering Body and Working Group on Effects. Geneva Switzerland, 11–15 September 2023. Information: https://unece.org/info/events/unece-meetings-and-events/air-pollution

International Action Week Against Ocean Acidification. 3–11 June 2023 Information: https://www.airclim.org/ocean-acidification-working-group

50th World Environmental Day. Everywhere, 5 June 2023. Information: https://www.un.org/en/observances/environment-day

World Ocean Day, 8 June 2023. Information: https://www.un.org/en/observances/oceans-day