

Overcoming windpower conflicts in the Baltic Sea

Two conflicts regarding the location of offshore wind power in Estonia and Poland, show the benefit of including a wide range of stakeholders at an early stage in the planning process.

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New US standard for fine particles to be expected

The US Environmental Protection Agency proposes to tighten national air quality standards for fine particle matter for the first time since 2012.

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Renewables are planable

There is no need for fossil fuels or nuclear power to stabilise our power system. Large power plants rather increase the uncertainty.

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Harvests from rewetted land

To reduce GHG emissions we need to restore huge areas of degraded peatland. Paludiculture can play an important part in stimulating interest among landowners.

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A gift to emitting industries

A new Commission proposal presents carbon dioxide as an alternative to stop emitting CO₂. This may open up large loopholes in EU climate policy.

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Energy savings in buildings

Heating and cooling of buildings is behind a third of CO₂ emissions in the EU. Less than 1% of the stock is renovated each year; member states must step up and increase the pace.

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Global warming alters plankton communities

Plankton are cornerstones in marine food webs. Now research in the Mediterranean Sea shows that even short-term heat waves in the oceans can cause great damage to plankton communities.

Climate change could in many ways alter the functioning of marine plankton communities. Yet descriptions of the effects of climate change on plankton are rarely found outside purely scientific publications,

at least in comparison to reports of the effects on more conspicuous organisms such as fish or corals.

“Plankton are the base of the functioning

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

The oceans are hotter than ever. New records for marine heatwaves seem to be set more or less annually. Last summer, heatwaves in the Mediterranean Sea accompanied the extreme temperatures across Europe. In parallel, surface ocean pH has declined, corresponding to a 30 per cent increase in acidity. The acidification rate is about 100 times faster than experienced in 55 million years. As is the case for the warming, the process of ocean acidification continues.

Global warming, ocean acidification, and accompanying phenomena have severe effects on marine ecosystems. News reports on the effects of climate change on coral reefs, mangroves, distributions and populations of fish, etc. are sadly but rightfully commonplace. Continued reporting of such effects is extremely important – not least as some marine ecosystems, such as tropical coral reefs, are already facing severe consequences.

But the oceans are not only victims of climate change – they also play vital roles in the global carbon cycle and climate systems. The record warming and the increase in acidity are, in a way, symptoms of the capacity of the oceans to absorb excess heat and CO₂. Around 90 per cent of the heat from global warming has been stored in the oceans, while they have absorbed about 25–30 per cent of the CO₂ emissions.

The absorption of heat has weather-related consequences, such as escalating storms, hurricanes, cyclones and extreme rains. The absorption of CO₂ has to some extent mitigated the concentration of this gas in the atmosphere, but the potential is not limitless, nor is the buffering capacity of sea water towards escalating acidification.

Clearly, there is a great need for a continued process to integrate ocean issues and climate policies. Good news is that the UN Biodiversity Conference (COP15) identified among its targets the need to “minimize the impact of climate change and ocean acidification on biodiversity...”. Then there was the “Ocean and Climate

Change Dialogue”, which was coordinated by the UNFCCC last year, following the so-called “Blue COP” in 2019. This dialogue addressed many of the interlinking issues previously mentioned and aimed to influence upcoming climate conferences.

However, the world is still waiting for a truly Blue UNFCCC-COP. Much of the focus of COP27 was on “loss and damage”, which contributed to less attention being given to other issues, including oceans. Without diminishing the importance of “loss and damage”, it is tragic that the underlying problem – i.e. climate change – was

de-prioritised. World leaders must allocate efforts to all vital topics.

The One Ocean Hub were vaguely hopeful when summing up COP27: “... the Sharm El-Sheikh Implementation Plan represents slow progress towards integrating the ocean into the UN climate system, and towards implementing ocean-based climate action at a national level. Nevertheless, the discussions on the sidelines of the COP demonstrated more joined-up thinking about the ocean, climate change, biodiversity and human rights...”.

Another important event, the UN Ocean Conference, was held in Lisbon six months earlier. Despite a majority of government representatives highlighting the link between oceans and climate change in their speeches. There was a lack of ambition in the final declaration, as it didn't include any “...detailed calls about scaling up ocean action under the Paris Agreement and the Glasgow Climate Pact...”, as the One Ocean Hub pointed out

Taken together, there is a build-up of expectations towards an integrated view on oceans and climate that translates into action under relevant treaties. Next up is the UNFCCC COP28. Let it not be wasted. The “sidelines” of COP27 must become “mainlines”.

Marko Reinikainen

“The acidification rate is about 100 times faster than experienced in 55 million years”



Policies for better air quality

A new review sheds light on the effectiveness of policies across the globe in reducing traffic emissions. They studied a total of 1,139 policy scenarios from 376 articles. The studied policy interventions were classified under 21 categories, where alternative fuel technology was the most frequently studied intervention, followed by vehicle emission regulation. A general finding was that while there are several policies implemented or studied in urban areas that are expected to reduce emissions, the associated evidence varies. The authors also note that there are fewer studies of strategies that are more interdis-

plinary in nature, such as behavioural and land-use strategies, in favour of supply-side measures typically implemented by transport authorities. Likewise, it was found that there were relatively few studies in rapidly urbanising middle- and low-income countries, where one could assume that the need for measures is greatest.

The authors have created an open-access interactive tool to enable policymakers to assess the impact of different policies.

The tool can be found here: <https://tableau.tamu.edu/t/TTI/views/SEMDDataVisualizationV2/SEMVisualizationDashboard>



Environmental emission zone in the Netherlands.

South African coal risks almost 80,000 lives

South Africa's state-owned power company, Eskom Holdings SOC Ltd, operates 15 coal-fired power stations. Most of them are located in the Mpumalanga province east of the capital, Johannesburg.

A government-appointed panel has calculated the cost in human lives of continued operation after 2025 until the power stations reach their end of life.

They state that the air pollution from the facilities risks killing 79,500 people during this period, if they are not decommissioned early. However, there are no such plans. And the company has so far been reluctant to comply with existing emission standards.

Report from Centre for Research on Energy and Clean Air: Health impacts of Eskom's non-compliance with minimum emissions standards



The township of Phola is heavily polluted by coal-fired power stations.

Mediterranean Sea will become a low-sulphur fuel area by 2025

The Marine Environment Protection Committee (MEPC) of the IMO met for its 79th session in December 2022. The MEPC adopted amendments to designate the entire Mediterranean Sea as an Emission Control Area (ECA) for sulphur oxides and particulate matter, under the International Convention for the Prevention of Pollution from Ships (MARPOL).

The limit for sulphur in fuel oil used on board ships is 0.10 mass per cent, while

outside such ECAs the limit is 0.50 per cent. The expected date of entry of the amendment is 1 May 2024, and the new sulphur limit would be effective from 1 May 2025.

Contracting Parties to the so-called Barcelona Convention agreed in December 2021 to bring forward the proposal to IMO.

According to the meeting summary of MEPC – “This is the fifth designated Emission Control Area for sulphur oxides and particulate matter worldwide, the others

being: the Baltic Sea area; the North Sea area; the North American area (covering designated coastal areas off the United States and Canada); and the United States Caribbean Sea area (around Puerto Rico and the United States Virgin Islands).”

Source: IMO Marine Environment Protection Committee (MEPC) – 79th session, 12-16 December 2022 <https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/MEPC-79th-session.aspx>



Global warming alters plankton communities

Continued from front page

in marine waters as they are the first link of the marine food chain. Eventually, they nourish fish, marine mammals and birds,” says Dr Francesca Vidussi, researcher at the MARBEC laboratory in Montpellier, a part of the French National Centre for Scientific Research (CNRS), where she co-leads a research group on climate change effects on plankton. “They also contribute to oxygen production and CO₂ sequestration, similarly to forests on land. The ocean is a sink of CO₂ – it absorbs CO₂ and traps it in deep waters. Part of this process is related to plankton. It is important to know the response of plankton to climate change, which can modify the food web structure and diversity. In addition, changes in planktonic communities can compromise the mitigation role exerted by the oceans and impact important element cycles”.

Trying to establish climate change effects on plankton communities is not easy. Effects of warming can be studied in laboratory experiments by exposing plankton species to different temperatures. Such experiments are valuable in identifying, for instance, temperature optima and tolerance levels, but they do not consider interactions within the community. At another extreme, warming effects can be assessed through long-term field observations on the effects of temperature on plankton. Such studies are highly valuable, but due to natural variations in factors other than temperature, it can be difficult to distinguish between the effects of warming and those due to other parameters.

The researchers at MARBEC chose a method that is in between laboratory

experiments and complex field observations. They performed experiments in field enclosures called mesocosms, which are enclosed experimental units that replicate some of the conditions of the natural environment¹. In this case, the mesocosms consisted of transparent bags that were filled with water from the Mediterranean Thau lagoon, in which the bags were also immersed. Prior to the filling of the bags, the water was passed through a 1 mm mesh to remove larger particles and organisms, and the community studied hence consisted of plankton smaller than 1 mm in size, representing almost the whole plankton community in the lagoon.

“The water mass in a natural environment is usually submitted to horizontal and vertical movements. It is hard to study the same plankton communities in natural waters, since the water mass moves, and the populations change”, explains Dr Behzad Mostajir, the other co-leader of the research group. “To study the warming effects on the dynamics of the same plankton communities we need to confine several cubic metres of natural lagoon water, which can be heated in a controlled manner, according to the future scenario of global warming. Mesocosms provide this confinement of the natural water mass and the possibility to heat the water mass and follow associated plankton communities over a period of several weeks”.

Two of the experiments – conducted for slightly less than three weeks in spring and autumn, respectively – investigated the effects of a 3°C temperature increase in

relation to controls. All the bags reflected the natural conditions in the lagoon with its day/night temperature variations etc. The treatment process was intricate, as the temperature was not static. The water temperature in the heated bags was constantly adjusted to follow the natural water temperature variations in the lagoon, but was kept 3°C warmer.

In a third experiment, the researchers mimicked a marine heatwave (a major threat to oceans; see Editorial). As in the studies described above, a 3°C water temperature increase was used. This time the warming was halted halfway (10 days) through the experiment, after which the recovery of the plankton community was investigated for another 10 days.

In all three experiments, the composition of the plankton community was monitored. Several parameters that indicate the overall performance or condition of the plankton community were also measured. These were related to biomass, growth, losses, metabolism etc. of the plankton.

One of the main results of the two warming experiments measuring responses in spring and autumn was that a 3°C warming was enough to depress whichever phytoplanktonic groups dominated the community at the time, and hence changed the entire composition of the plankton community in the two most productive seasons.

Comparing these two experiments showed that warming shifted the production balance in the lagoon from spring to autumn. This resulted from a strong depression of phytoplankton biomass and oxygen production in spring, and an enhancement of the biomass in autumn. Contrary to the natural dynamics, the autumn community was as productive as the spring community. Taken together, the results show that the strong negative effects in spring were only partially



PHOTO: BEHZAD MOSTAJIR

Experimental setup
in the Mediterranean
Thau lagoon.

compensated by the increases in autumn, and the overall effects of warming were negative for oxygen production, respiration, and phytoplankton biomass.

“It is clear that profound changes are expected in marine coastal waters, notably during the spring bloom, which is an important event in temperate waters, just like flowering in spring on land,” says Dr Vidussi. “This is especially important in productive coastal waters like the Thau lagoon, where plankton productivity is not only important for natural species, but also sustains aquaculture. This lagoon is one of the most important aquaculture sites in France – there are a lot of oyster farms. Oysters feed on plankton and the diminishing of plankton during the spring bloom could compromise aquaculture”.

The results from the heatwave experiment² showed that many of the functional processes related to phytoplankton biomass, growth, losses and metabolism were amplified by the heatwave. The effects persisted for several days, and in conclusion the resilience of the community was low. Not all effects were reversible, even if some functions recovered.

“This means that even during a short and not very intense heatwave, persistent effects are expected to occur. These lasted longer than expected, so the changes induced for some important functions in the community are profound”, says Dr Mostajir. And goes on to consider all three experiments: “It seems that with an increase of 3°C the functioning and structure of the plankton community would be

deeply modified. Thus, what we know about its functioning and its related ecosystem services today would not apply in the future. As one example, it is not certain that it would be possible to culture oysters in the Thau lagoon, and this could potentially also apply to other aquaculture and fishing activities in similar productive coastal waters”.

Dr Vidussi sets their results in a global context: “Plankton provide us with half of the oxygen we respire. It contributes to climate regulation and to reducing carbon dioxide in the atmosphere by partly assimilating emissions. All of this is cost-free for us! At the same time, climate change has an impact on plankton. Plankton and oceans are our allies – the best that we can do is of course to reduce our carbon emissions. But we also need to reduce additional stressors, such as pollution and overfishing.”

Marko Reinikainen

¹ Mesocosms also have their own challenges, such as that they are closed, all levels of food chains are hard to include etc. Commonly, it is recommended to approach research topics through a combination of methods.

² Note that this experiment was conducted in a different year and season (May/June) than the two other experiments, so the results are not directly comparable.

This study has received funding from the AQUACOSM-plus project of the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871081.



Sources:

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Tailwinds for new Atlantic ECA

Significant progress has recently been made towards the development of a new Emissions Control Area (ECA) in the Atlantic, i.e. a special area designated by the International Maritime Organization (IMO) that regulates air pollution from shipping. This new ECA would, as

a minimum, cover the EU countries with Atlantic coasts but could eventually cover non-EU coastal countries as well.

“The work is to be led by Portugal, which declared its intentions both during the United Nations Ocean Conference in Lisbon and at COP27 in Sharm El Sheikh,” said Carolina Silva, who represents the Portuguese NGO ZERO.

She adds that “France and Spain have also issued a joint declaration following the XXVII Hispanic-French Summit, which, inter

alia, supports the work to be launched on the Atlantic ECA”.

The International Council on Clean Transportation (ICCT) has been asked to produce a report that will examine the effects of the ECA on emissions, health and economics. The pollutants expected to be addressed by the emission control area include SO_x and NO_x, as well as PM.

A group of NGOs from the countries involved in the ECA is closely monitoring the progress under the lead of ZERO.

Information on current ECAs can be found here: <https://www.imo.org/en/OurWork/Environment/Pages/Special-Areas-Marpol.aspx>





Overcoming windpower conflicts in the Baltic Sea

Two conflicts regarding the location of offshore wind power in Estonia and Poland, show the benefit of including a wide range of stakeholders at an early stage in the planning process.

If managed in accordance with Sustainability Development Goals (SDGs), the Baltic Sea can make a crucial contribution to addressing multidimensional sustainability challenges. But the Baltic Sea is in decline. Marine spatial planning has been introduced to address the mounting pressure on finite marine resources driven by climate change, over-exploitation, pollution, and the increasing number of competing activities. Conflicts about how to harness benefits from marine resources in the Baltic Sea are widespread and intensifying.

A key factor to successfully address conflicts is to acknowledge them early, so as to mitigate future challenges. Several conflicts found in the Baltic Sea reveal challenges facing existing ocean management methods. These are important to address to adopt a multidimensional sustainability approach and effectively manage deep-rooted struggles over rights, ownership, access, benefits, and human-nature relationships.

Our study, built on ongoing international research, highlights emerging conflict and related environmental and social justice concerns in the context of offshore wind energy planning and marine spatial planning in the Baltic Sea, with

insights from Estonia and Poland. We also suggest pathways toward collaborative marine spatial planning and conflict transformation.

The offshore wind energy conflict in Hiiumaa, Estonia, began in 2009 and is still ongoing. It revolves around the potential effects of the offshore wind energy project on the environment, social values, tourism, aesthetics and human health, as raised predominantly by a local environmental group. The conflict quickly evolved from requests for a detailed environmental impact assessment (EIA) and studies on social impacts, to a series of legal oppositions, which resulted in a 2018 Supreme Court verdict invalidating the offshore wind energy project due to an insufficient EIA. While the developer revised the project's EIA in 2019, the local group is not satisfied. Other institutional stakeholders (e.g., defence, nature conservation) also continue to raise concerns about the project's impact. The list below summarises our recommendations to move forward:

- An ecosystem approach to offshore wind energy siting/planning can reduce environmental impact and enable comprehensive dialogue on risks/benefits.

- A social impact analysis and collaborative offshore wind energy planning with locals can better identify community concerns and relationships to the sea/coast, enable social learning and build trust.
- Development of benefit-sharing mechanisms with local communities can enable buy-in.
- Engage ornithologists and local bird enthusiasts in bird surveys and offshore wind energy EIAs.
- The existing energy crisis related to Russia generates conditions that place increased pressure on offshore wind energy opponents to adopt a more favourable sentiment toward the offshore wind energy project. However, steps should be taken to ensure that greater expediency sought to develop offshore wind energy is not harmful to democracy, nature, and human wellbeing.

In the context of climate change and the importance of growing interests in the Baltic Sea as a key contributor to the region's post Covid-19 economic recovery, a key challenge facing ocean planners is integration of coastal groups.

In Poland, we found that planners struggled with rendering marine spatial



An offshore wind power project is planned off the coast of Hiiuma island, Estonia. But the project has been opposed by locals, who believe that not enough consideration is given to wildlife, aesthetics and tourism.

© ASKHAT GILYAKHOV & PETER ALEKSANDROV / SHUTTERSTOCK.COM

planning processes and decisions just and fair for coastal groups, especially small-scale fisheries and youth. A key reason is that marine spatial planning regulation confers special rights to stakeholders from industry and the defence sector, but not to others (e.g., coastal municipalities and community groups, youth etc.). For instance, stakeholders from industry were active in the early stages of marine spatial planning, thereby heavily shaping the agenda of marine spatial planning. Local actors were only consulted at the later stages of marine spatial planning, when there was little or no possibility to redefine the scope and direction of marine spatial planning. This led to small-scale fisheries “feel[ing] like small, irrelevant users of the Baltic Sea who simply have to remove themselves and make room for huge amounts of money”, explained a fishing cooperative worker. Other factors included the failure of planners to adapt MSP communication to targeted audiences. It is vital to enable stakeholder inclusion and integration early in marine spatial planning processes to minimise these conflicts.

How to address marine spatial planning conflicts in Poland:

- Communicate about marine spatial

planning at an early stage and in less technical terms.

- Enact policies that recognise and protect territorial user rights for small-scale fisheries.
- Engage more directly with heterogeneous small-scale fisheries to understand and consider different contexts, claims and needs.
- Develop alternative modes of communication and participation i.e., localise and digitalise marine spatial planning communication/participation e.g., through the use of social media platforms (Facebook, Twitter, WhatsApp) and local newspapers. This can address obstacles to participation of youth and small-scale fisheries in marine spatial planning (e.g., time, logistics, power inequalities).
- Planners need to assess marine spatial planning outcomes in terms of whether or not they close the gap between science and lay knowledge, land and sea, national and coastal needs, present and future generations.

To be able to sustainably use the benefits of the Baltic Sea, such as those generated by offshore wind energy, it is important to learn from and address conflicts such

as those described above. While it is challenging to address multidimensional sustainability goals, marine spatial planning needs to move toward addressing conflict proactively. In addition to recognising a broader range of actors, particularly coastal community actors’ knowledge, experiences, concerns and needs, marine spatial planning processes need to actively consider justice-related distribution.

Ralph Tafon, Fred Saunders
& Michael Gilek

Further Reading

Tafon R., Glavovic B., Saunders F. & Gilek M. (2022) Oceans of Conflict: Pathways to an Ocean Sustainability PACT. *Planning Practice & Research*, 37:2, 213-230, DOI: 10.1080/02697459.2021.1918880

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OCEANS PACT project <https://oceanspact.eu/>

The long-term goal is 1.5°C

UN and G20 summits reaffirm that limiting global warming to 1.5°C requires global CO₂ emissions to be reduced by 45% by 2030 relative to the 2010 level and to net zero by 2050

During the COP 27 UN climate convention conference in Egypt in November 2022, negotiations over the second periodic review (PR2) of the long-term global goal under the convention and of overall progress towards achieving it were finalised. The PR2 process is one of the tools used by the climate convention to transfer and integrate the latest climate science facts into the political negotiations. One example of these facts are the ten conclusions of the synthesis report from three climate science hearings held as part of PR2 during 2020–2022 and which are now presented in the COP 27 decision. During the PR2 hearings the latest climate science reports from the

IPCC 6 assessment cycle were assessed, along with those from other UN bodies such as UNEP and WHO. The 10 key messages of the PR2 synthesis report¹ are:

1. At 1.1°C warming, the world is already experiencing extreme climate change
2. Knowledge has improved significantly since the first periodic review but important gaps remain
3. Climate impacts and risks, including the risk of irreversible impacts, increase with every increment of warming
4. It is still possible to achieve the long-term global goal with immediate and sustained emission reductions
5. The window of opportunity to achieve climate-resilient development is rapidly closing

6. The world is not on track to achieve the long-term global goal
7. Despite some progress on mitigation and adaptation, more efforts are needed
8. Equity is key to achieving the long-term global goal
9. Key enablers of climate action are not aligned with the urgency of a rapid and equitable low-carbon transition
10. Knowledge, technology and resources are needed to transform global systems in line with low-emission pathways and climate-resilient development

The COP decision states that the impacts of climate change will be much lower at a temperature increase of 1.5°C than they would be at 2°C, and acknowledges that limiting the global average temperature increase to 1.5°C above pre-industrial levels with no or limited overshoot would avoid increasingly severe climate change impacts, stressing that the severity of impacts will be reduced with every increment of global warming avoided. The UN decision expresses alarm and utmost concern that human activities have caused a global average temperature increase of around 1.1°C above pre-industrial levels to date and that impacts are already being felt in every region and will escalate with every increment of global warming. It reaffirms that limiting global warming to 1.5°C requires

Civil society action at COP 27.



Flickr.com/UN CLIMATE CHANGE CC BY-NC-SA

The nitty-gritty of 1.5°C

When they adopted the 2015 Paris Climate Agreement¹ our governments committed to “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C”. The Paris Agreement thus went beyond what was agreed in the 2009 Copenhagen Accord² (which called to “hold the increase in global temperature below 2°C” while also agreeing to consider strengthening the long-term goal to 1.5°C by 2015) by adding “well below” to the 2°C target and linking this with the 1.5°C target. The Paris Agreement did however lead to some ambiguity, as some decision-makers interpreted the agreement as offering an option to choose between 1.5°C or (well below) 2°C as the long-term goal that frames their climate action. Many others felt that the Paris Agreement’s long-term goal should be seen as complementary, allowing temperature rise to (slightly)

overshoot 1.5° but arriving at 1.5°C by 2100. This view has now been confirmed by the outcomes of COP27³ (November 2022), the G20 Leaders’ Summit⁴ in Bali (Indonesia) and the G7 Leaders’ Summit⁵ in Schloss Elmau (Germany), all committing explicitly to limit temperature rise to 1.5°C. Instrumental to these decisions was a rather obscure process with a long technical name: the Periodic Review of the long-term global goal under the Convention and of overall progress towards achieving it (PR2)⁶.

Wendel Trio

Link to AirClim Briefing: <https://www.airclim.org/publications/no-further-discussion-needed>

¹ https://unfccc.int/sites/default/files/english_paris_agreement.pdf

² <https://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf#page=4>

³ https://unfccc.int/sites/default/files/resource/cop27_auv_2_cover%20decision.pdf

⁴ www.g20.org/content/dam/gttwenty/gtwenty_new/about_g20/previous-summit-documents/2022-bali/G20%20Bali%20



[Leaders%27%20Declaration,%2015-16%20November%202022.pdf](https://www.unfccc.int/sites/default/files/resource/Leaders%27%20Declaration,%2015-16%20November%202022.pdf)

⁵ <https://www.g7germany.de/resource/blob/997532/2153142/960bf29ddb2253fca0c3bf8f983e7/2022-12-12-g7leadersstatement-data.pdf>

⁶ <https://unfccc.int/topics/science/workstreams/periodic-review>

rapid, deep and sustained reductions in global greenhouse gas emissions, including reducing global carbon dioxide emissions by 45 per cent by 2030 relative to the 2010 level and to net zero around mid-century, as well as deep reductions in other greenhouse gas emissions.

Climate Action Network International said at the start of COP 27 that²:

- even limiting warming to 1.5°C is NOT safe and that there is no escaping the hard science on 1.5°C;
- at 1.1°C warming, the world is already experiencing extreme climate change;
- achieving the long-term global goal without overshooting the 1.5°C limit is imperative in order to avoid the most catastrophic impacts;
- it would reduce the risk of crossing tipping points and triggering potentially irreversible changes in the climate system;
- climate impacts and risks, including the risk of irreversible impacts, increase with every increment of warming;
- it is still possible to achieve the long-term global goal of 1.5°C with immediate

and sustained emission reductions;

- rapidly falling costs of renewable energy present new opportunities for pre-2030 emission reductions;
- the window of opportunity to achieve climate-resilient development is rapidly closing;
- the world is not on track to achieve the long-term global goal;
- equity is key to achieving the long-term global goal;
- during the hearings the IPCC emphasised that immediate rapid reduction in fossil-fuel-based emissions is a prerequisite to climate-resilient development pathways;
- CAN therefore wants to draw attention to the need for a rapid phase-out of fossil fuels and is reminding governments of the call by UN Secretary-General António Guterres for an “end to our global addiction to fossil fuels”.

In the G20 summit of the 20 largest economies in the world, covering 80% of people on the Earth, just before COP 27, the following decision was taken concerning the long-term climate goal³:

“Noting the IPCC assessment that the impact of climate change will be much lower at a temperature increase of 1.5°C compared with 2°C, we resolve to pursue efforts to limit the temperature increase to 1.5°C. This will require meaningful and effective actions and commitment by all countries, taking into account different approaches, through the development of clear national pathways that align long-term ambition with short and medium-term goals, and with international cooperation and support, including finance and technology, and sustainable and responsible consumption and production as critical enablers, in the context of sustainable development.”

In summary: the global long term goal is 1.5.

Reinhold Pape

¹ https://unfccc.int/sites/default/files/resource/sb2022_03E.pdf

² <https://eco.climatenetwork.org/cop27-eco1-4/>

³ https://www.g20.org/content/dam/gttwenty/gtwenty_new/about_g20/previous-summit-documents/2022-bali/G20%20Bali%20Leaders%27%20Declaration,%2015-16%20November%202022.pdf

CO₂ from the cement industry can be reduced without CCS

There are good opportunities to reduce emissions from cement production, which now amount to some 7 per cent of global carbon dioxide emissions.

A previously published discussion paper advocated for opportunities to eliminate emissions from cement, which now amount to some 7 per cent of global CO₂ emissions. Here follows a short summary of the discussion paper. The core process to produce cement drives out CO₂ from the limestone (a carbonate) to create cement clinker. CO₂ is also produced from fossil fuels that are used to heat the limestone.

One thing that has not cut emissions is CCS. Though widely hyped since at least 2007, by Cembureau and others, there is still no cement plant in the world that uses CCS. Heidelberg Cement aims to capture 0.4 million tons per year at its Norcem plant in Norway by 2024, 0.4 per cent of the cement emissions in the ETS.

An alternative policy to CCS might be that Portland cement¹ has to go the same way as other forms of fossilised carbon; just stop using them.

Research for alternative binders – the cements that glue sand and pebbles together to make concrete – is not pursued with enough vigour. When promising research is produced, it is not implemented.

The reason is simple. The current cement producers want to do what they do: mine limestone at their quarries, burn limestone in their kilns, mill it into the grades the construction industry is fa-

miliar with and transport the cement to more or less the same customers as now. Change is always difficult. For a cement quarry/kiln/harbour it means scrapping existing capital and investing in something completely different somewhere else.

Magnesium cement or geopolymers could replace Portland cement for many applications, but this would require new quarries with new machinery, and new marketing channels.

The cement industry is resistant to change. It can resist because it is oligopolistic, with Holcim and Heidelberg near-monopolies in many parts of Europe.

There are many different alternatives to carbon-emitting cement, for example:

- Less cement per volume of concrete, as so much cement is not needed everywhere
- Less concrete through better design
- Other binders for concrete: fly-ash, slag, volcanic ash, crushed lava, rice husk and barley husk ashes, silica fume, crushed limestone (not burnt, not CO₂-emitting), and clay-based geopolymers. Some of them are already used extensively. The remaining potential is still big. Volcanic cement use “is abundant in certain locations and is extensively used as an addition to Portland cement” in Italy, China and Greece. Some of the alternative binders have a negative cost according to a McKinsey report.

The IPCC WG3 report says that calcinated clay and limestone alone have a 40–50 per cent GHG reduction potential at near-zero cost, and that this could take place “today”. Calcinated clay is a very common mineral.

The IPCC also says that “magnesium or ultramafic cements” may cut GHG to negative by 2040, but at unknown cost. Ultramafic means minerals with high alkalinity.

- Better aggregates, i.e. the sand and pebbles that the cement binds together.

If aggregates are “multi-sized and well dispersed”, less cement is needed. The IPCC WG3 says this can cut emissions by up to 75 per cent at near-zero cost, and can be done “today”.

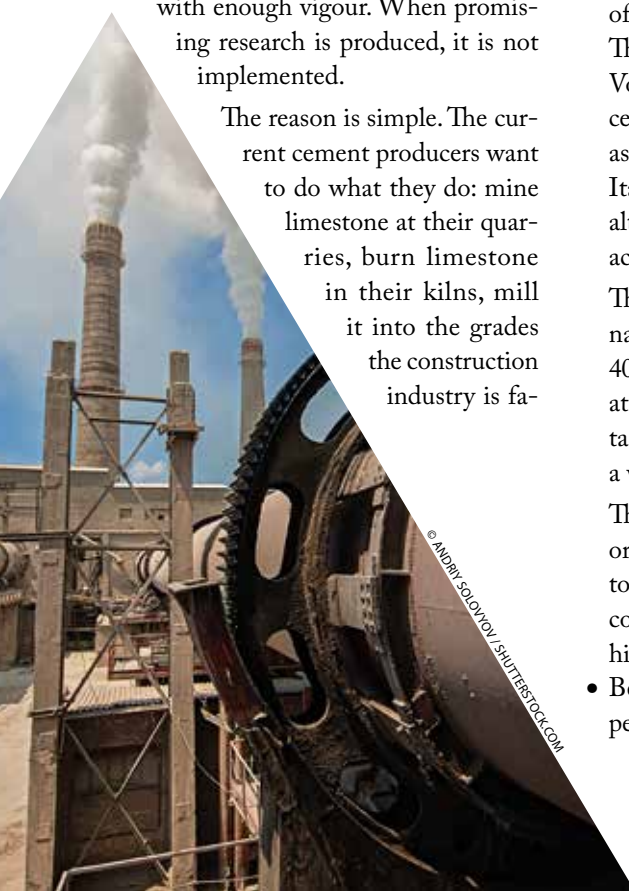
- A concrete building reabsorbs some CO₂ during its lifetime, and this is often used as a climate selling point by the cement industry. It is presently not credited against emissions in the IPCC guidelines. Industry-sponsored research has asked the IPCC to “update” its guidelines in this respect, but the world will not be saved by creative accounting.
- Alternative reinforcement for reinforced concrete: by using ceramics, glass polymer (plastic) fibres, stainless steel, or even graphene. If a lower pH can be accepted (as those materials do not rust, less cement is needed. If the carbon-intensive iron rebars are replaced with such fibres it would reduce emissions significantly).
- Other materials can replace concrete, some for niche applications in buildings, others more generally: wood, brick, stone (e.g. granite, for foundations), glass, steel, foam glass (for foundations), aerogel, MgO boards, and asphalt.

Wood alone could substitute for concrete and steel as building materials and “could provide a technical mitigation potential of 0.78–1.73 Gt CO₂” per year in a study quoted by the IPCC. Obviously, the availability of wood is limited, but there is some potential. The International Code Council now allows for construction of wood buildings up to 18 storeys tall.

Fredrik Lundberg

¹ Portland cement is the most common type of cement.

Link to discussion paper: <https://www.airclim.org/sites/default/files/documents/strengthening-eu-climate-policies.pdf> p15ff





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Member states fail to limit ammonia emissions

The European Commission published its regular package of infringement decisions in January 2023. With regards to air quality, the Commission calls on 14 member states to reduce emissions of one or more air pollutants, as required by the National Emission Ceilings Directive. The member states are Bulgaria, Denmark, Ireland, Spain, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Austria, Poland, Portugal, Romania and Sweden. Ammonia is the pollutant for which most of these member states do not comply with their obligations. Estonia has an infringement regarding bringing its national legislation fully in line with EU laws on air quality, for instance those related to sampling points, quality assurance and quality control systems and documentation of the site selection.

Source: European Commission 26 January 2023
https://ec.europa.eu/commission/presscorner/detail/en/inf_23_142

NGOs want the ice in the Arctic to be white, not black

Black carbon (soot particles) often present in diesel exhaust has an albedo reducing effect when it deposits on snow and ice. Shipping emissions in the Arctic can thus have an impact in areas already heavily affected by global warming caused by green house gases. Environmental NGOs are stressing the importance of not removing the European Parliament's proposal to specifically mention the potential inclusion of black carbon emissions in the proposed FuelEU Maritime Regulation.

Sian Prior, lead advisor to the Clean Arctic Alliance has stated that "Cutting any mention of doing so in the future is not only deplorable, it makes a complete mockery of the EU's own commitments made in its 2021 Arctic Strategy to lead the world on reducing arctic ship pollution," she said.

Source: ENDS Europe 14 February 2023

Soot should be included in the FuelEU Maritime Regulation.



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Measuring ozone the right way

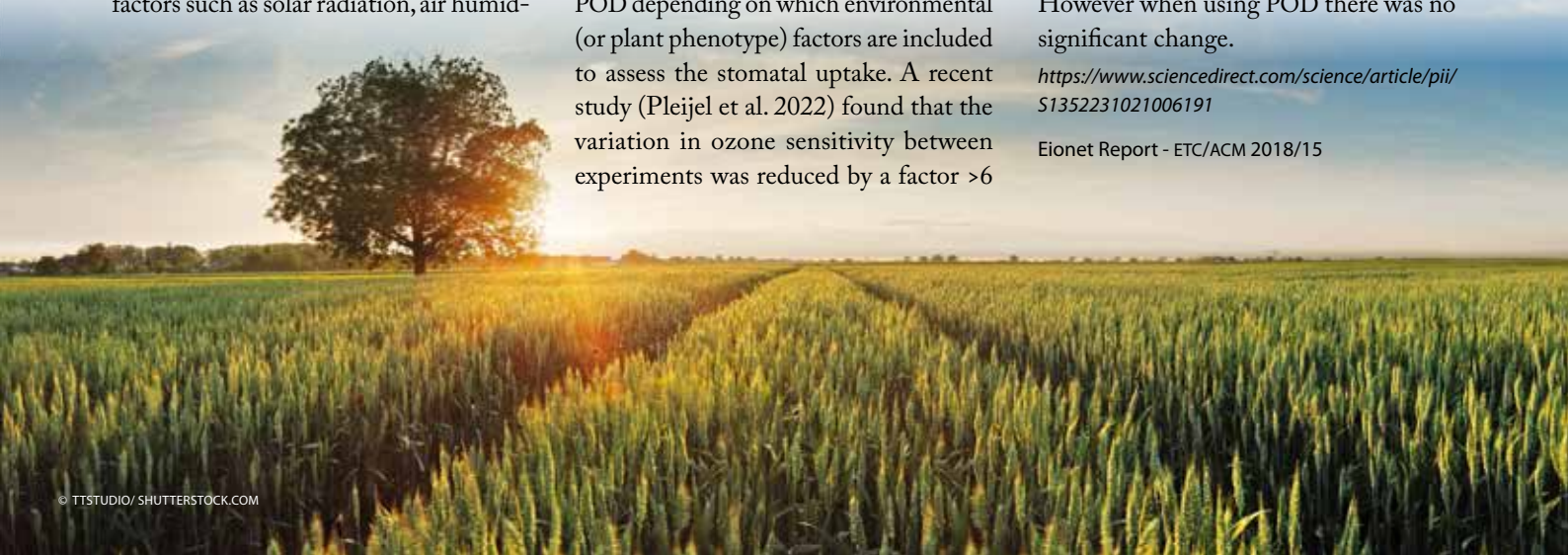
Ground-level ozone affects our crop yields, with wheat being the most sensitive. Various indices can be used to express the ozone exposure of crops. The most common is the daytime average exceedances of 40 ppb ozone (AOT40). Another exposure index is the Phytotoxic Ozone Dose (POD), accounting for not only the atmospheric concentrations but also the stomatal uptake of ozone, since it includes environmental factors such as solar radiation, air humid-

ity and temperature and sometimes also plant specific factors. The development of POD started 20 years ago in an effort to find a physiologically more relevant dose, with accumulated evidence for different plant types. While no exposure index will perfectly reflect the effective dose, the POD has been shown to be more accurately associated with O₃ effects on vegetation. There are different models for POD depending on which environmental (or plant phenotype) factors are included to assess the stomatal uptake. A recent study (Pleijel et al. 2022) found that the variation in ozone sensitivity between experiments was reduced by a factor >6

when using a POD6 index compared to AOT40. It can therefore be stated that environmental variables, such as solar radiation, air humidity and temperature, can explain a substantial part of the variation in O₃ response. The significance of choosing the right index is seen in a report by Eionet. When using AOT40 they found a significant decrease in the crop yield impact between 1990 and 2010. However when using POD there was no significant change.

<https://www.sciencedirect.com/science/article/pii/S1352231021006191>

Eionet Report - ETC/ACM 2018/15



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New US standard for fine particles to be expected

The US Environmental Protection Agency (US EPA) proposes to tighten national air quality standards for fine particle matter (PM_{2.5}) for the first time since 2012.

The US EPA proposes to lower the annual average standard for PM_{2.5} to between 8–11 µg/m³, from the current 12 µg/m³. The US EPA is tasked to set two types of National Ambient Air Quality Standards (NAAQS). The standard that they want to update is a so called “primary standard,” which is a health-based standard that should consider the health of sensitive or at-risk groups, with an adequate margin of safety. There are also “secondary standards” that aims to protect public welfare in general. The US EPA states in their review that they do not want to change their secondary standards. Neither the primary 24-hour PM_{2.5} standard, currently set at the level of 35 µg/m³.

As part of its review, the US EPA, enlists the help of a committee of independent scientists known as The Clean Air Scientific Advisory Committee (CASAC). In a document to the US EPA, CASAC express their agreement on the inadequacy of the current annual PM_{2.5} standard (12 µg/m³), “all CASAC members agree that the current level of the annual standard is not sufficiently protective of public health and should be lowered”. However, there was some disagreement about how much it should be lowered. The majority of CASAC members “judge[d] that an annual average in the range of 8–10 µg/m³” was most appropriate. Worth noting is that they also recommended that the level of the current primary 24-hour PM_{2.5} should be revised to within the range of 25 to 30 mg/m³, while a minority recommended retaining the current standard. Here the US EPA deviates in its proposal from CASAC's recommendations.

As a basis for its proposal, the US EPA has produced two reports: the Integrated Science Assessment (ISA) for Particulate Matter published in 2019 and the Supplement to the original report pub-

lished three years later. It is solid work based on thousands of scientific articles. Both have since been evaluated and commented on by CASAC.

The first report identified causal relationships, such as that between long- and short-term exposures to PM_{2.5} and cardiovascular effects, respiratory effects, nervous system effects and cancer, as well as adverse health effects at levels below the current annual PM_{2.5} standard level. The Supplement provides more in-depth studies of the identified health effect categories. CASAC, notes that there is a progression going from the previous Integrated Science Assessment published in 2009 to the more recent reports indicating continued strengthening of the causal health endpoints relationship with PM_{2.5}. This reflects the growing body of literature that show strong associations with health effects, even though concentrations of PM_{2.5} in the air have been decreasing over time.

In the latest reports, PM_{2.5} was also found to unequally affect minority populations and populations with low socioeconomic status. The studies continue to provide evidence indicating that associations with PM_{2.5} are independent of other air pollutants and factors that also could influence the association such as lifestyle factors. It further concluded that epidemiological studies conducted to date do not identify a population-level threshold below which it can be concluded with confidence that PM_{2.5}-related effects do not occur. Human exposure studies also support the causality. Accountability studies, where we can study the effect of a policy or closure of industrial facilities and corresponding reduction in the number of cases, also play an important part in assessment. Here, too, analyses find significant associations with reduced exposure to PM_{2.5}, even below the current standards, and decreased health effects.

CASAC has provided consensus advice on the need to revise the level of the primary annual PM_{2.5} standard to a level below the current standard to provide additional protection from PM_{2.5}-related health effects. To enhance protection of air quality, especially in overburdened and vulnerable communities where there are environmental justice concerns due to disproportionate air pollution risks, the EPA is proposing to modify the PM_{2.5} monitoring network design criteria to include an environmental justice factor. The agency is also proposing changes to the Air Quality Index (AQI) to reflect the proposed changes to the primary annual PM_{2.5} standard and reflect recent science on PM_{2.5} and health.

The EPA judgments are today often considered as requisite (i.e., neither more nor less stringent than necessary) to protect public health with an adequate margin of safety. According to a ruling in the Supreme Court in 2001, known as *Whitman v. American Trucking Associations, Inc.*, the EPA cannot consider costs when setting or revising NAAQS. Similar judgments have ruled that neither economic nor technological feasibility should be considered when setting air quality standards. The absence of any provision requiring consideration of these factors was no accident; it was the result of a deliberate decision by Congress to subordinate such concerns to the achievement of health goals. In the preparatory work for the Clean Air Act, it had been determined that 1) the health of people is more important than the question of whether the early achievement of ambient air quality standards protective of health is technically feasible; and 2) the growth of the pollution load in many areas, even µg/ with the application of available technology, would still be deleterious to public health. In the *Lead Industry vs EPA* (1980) case



A tightening of the annual $\text{PM}_{2.5}$ standard to $8 \mu\text{g}/\text{m}^3$ would remove the differences in exposure between different ethnic groups.

this was further investigated. “Subclinical” effects, that is, symptoms that are only detectable by physical examination or laboratory test, should not be considered as adverse health effects that are clearly harmful unless this has been proven, but an adequate margin of safety was allowed.

In the decision of proposing new standards, CASAC chose a conservative approach. Instead of looking at the lowest levels of detecting health effects, they focused on the study-reported mean of the $\text{PM}_{2.5}$ air quality distribution limited to US multi-city or multi-state studies. They noted that there is no specific point in the air quality distribution of any epidemiologic study that represents a “bright line” at, and above which effects have been observed and below which effects have not been observed. Naturally, the bulk of the health events (high data density in the middle portions of the distributions) in each study have been observed, generally at or around the mean concentration. The mean exposure in the chosen US studies were between $8\text{--}17 \mu\text{g}/\text{m}^3$. They did report that they identified effects at lower levels (6 and $9 \mu\text{g}/\text{m}^3$), in US studies that

provided data also on effects at the lowest quarter of exposure. One study reported effects even lower ($5 \mu\text{g}/\text{m}^3$). Looking at Canadian studies with lower means of exposure, effects were identified between $6\text{--}10 \mu\text{g}/\text{m}^3$. The proposed limit values, however, reflect the mean of US studies. The requirement to provide an adequate margin of safety was intended to address uncertainties associated with inconclusive scientific and technical information and to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety has not been clearly assessed and the EPA welcomes comments on including effects seen at lower levels or international studies that have been able to study effects in low exposure areas.

When this evaluation was done a health risk assessment was conducted to look at what impact different policy options between $8\text{--}12 \mu\text{g}/\text{m}^3$ would have on the population. Although the EPA cannot consider costs in setting or revising NAAQS, they nevertheless analyse the benefits and costs of implementing the

standards for the purpose of informing the public. Compared to the current annual standards, air quality adjusted to meet the alternative level of $8 \mu\text{g}/\text{m}^3$ had a four times larger reduction in mortality than the alternative level of $11 \mu\text{g}/\text{m}^3$.) Under the hypothetical air quality scenarios, disparities exist between different ethnicities with regards to both $\text{PM}_{2.5}$ exposures and $\text{PM}_{2.5}$ -attributable mortality risk rates under the current PM NAAQS. When considering the lowest alternative annual standard evaluated – an alternative annual standard of $8 \mu\text{g}/\text{m}^3$ – disparities in exposure are virtually eliminated. The public is now welcome with comments to the proposal of primary annual and 24-hour $\text{PM}_{2.5}$ standards.

Ebba Malmqvist

Proposed Decision for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (PM) Link: <https://www.epa.gov/pm-pollution/proposed-decision-reconsideration-national-ambient-air-quality-standards-particulate>



Low-cost modal filter aka bollard.

Planters and bollards improve air quality

So called, Low Traffic Neighbourhoods (LTN) were, in a recent study, shown to have the potential to substantially reduce air pollution and traffic in target areas. This without increasing air pollution or traffic volumes in surrounding streets. These results provide sound arguments in favour of LTNs to promote health and wellbeing in urban communities. LTNs are small-scale area-based interventions that use low-cost modal filters (planters, bollards or camera gates) to restrict through traffic and limit vehicle speeds on residential streets. Some stakeholders have raised concerns about the possibility of traffic and air pollution displacement to surrounding areas. However, in a well-designed study using the difference-in-differences method in a dense area of London they found no evidence of displacement of traffic on the roads surrounding LNTs.

Source: <https://doi.org/10.1016/j.trd.2022.103536>

Scrappage scheme paves the way for expanded ULEZ

The Mayor of London has launched a new scrappage scheme totalling £110 million to help prepare for the expansion of the Ultra-Low Emission Zone (ULEZ) from 29 August 2023. The ULEZ expansion is predicted to reduce levels of NO₂ and PM_{2.5} from cars by removing the most polluting vehicles. Mayor Khan said the scrappage scheme was designed to offer help to individuals and businesses struggling most with the increased cost of living. He said: "I took the difficult decision to expand the ULEZ because it will save lives, help tackle the climate crisis and reduce congestion. We have made huge progress in central and inner London but there is much more to do in outer London."

The new scrappage scheme is targeted at Londoners on low income or benefits, small businesses and charities. It is likely to benefit up to 30,000 car owners, which can get a £2,000 scrapping grant to scrap or replace a vehicle that does not comply with the ULEZ exhaust emissions rules. If the car owner prefers, he can instead receive a reduced grant and up to two annual bus passes. Grants of £5,000 are available for non-compliant vans. Up to £9,500 is available for charities wanting to switch to an electric minibus. Retro-fitting grants are also available.

Source: Evening Standard 30 January 2023 <https://www.standard.co.uk/news/transport/ulez-scrappage-scheme-greater-london-expansion-apply-online-sadiq-khan-b1056473.html>



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Air quality advice differs across Europe

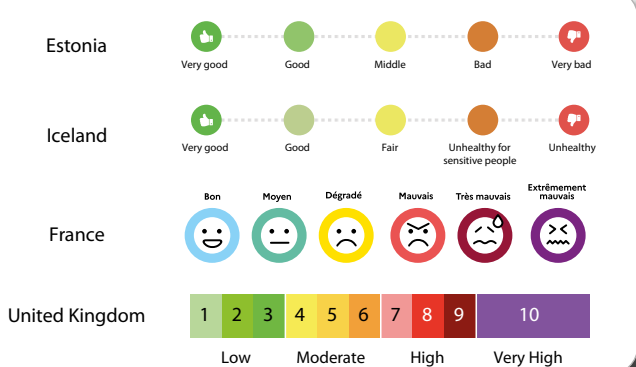
A recent WHO report found tremendous variations in the way that air quality is communicated to citizens. Most countries in the WHO European Region use their own country-specific air quality index (AQI) instead of the uniform index provided by the European Environmental Agency

(EEA). There was also a large variation in the accompanying health messages of the AQI. There are benefits to a uniform AQI, but generalisation of an AQI could cause problems in countries at both ends of the spectrum of air pollution. Countries with lower levels might have experienced documented health effects even on days when the AQI is reported as good. Countries with high levels might experience many days with fair or poor air quality. They may want a reasonable number of days, when they call on residents to take specific actions, such

as change timing or location of outdoor exercise, turn on air filtration without extra energy expenditure, or modify commuting or leisure behaviour. From a health perspective the bands of the AQI should represent WHO recommendations, but some are instead based on limit values, and few have not yet updated their bands to the new WHO (2021) recommendations.

To be able to make informed decisions a forecast model of air pollutants might be more relevant for planning activities. Several countries had forecast models that could predict high-pollution episodes if these are normally triggered by meteorological factors.

Source: WHO report, Risk communication of ambient air pollution in the WHO European Region: review of air quality indexes and lessons learned, <https://apps.who.int/iris/handle/10665/365787>



Examples of different air quality indexes in use across the WHO European Region.

Renewables are planable

There is no need for fossil fuels or nuclear power to stabilise our power system. Large power plants actually increase uncertainty, since the effects are so great when they fail to deliver.

For the past few years solar and wind power have offered the cheapest new electricity almost everywhere in the world, according to global surveys by knowledge brokers such as Bloomberg New Energy Finance.¹ In some countries the total cost of new solar and wind power is lower than the cost of continuing to operate existing nuclear reactors and coal-fired plants, as demonstrated in an analysis by Lazard a couple of years ago².

This has wonderful consequences for the ambitions to reduce greenhouse gas emissions and air pollution globally. Reductions in the use of fossil fuels may happen as a result not only of actions by idealists but also through the actions and investments of those who seek economic profits. The IEA now expects most of the new electricity production in the world until 2025 to come from renewable energy³.

But some groups will lose money and power as a consequence: the owners of oil, gas, uranium and coal resources, and the power plants that use these sources, as well as the largely taxpayer-financed nuclear technology scientists who fear that the demise of nuclear energy will rob them of an income.

One of the countries with the most to lose is Russia. Unlike the countries in the Middle East that are developing the world's cheapest solar electricity and combining these investments into industrial strategies for the future, Russia has no alternative. Russia's trade balance and about half of its state budget depend on exporting oil, fossil gas, coal and nuclear fuel.

Those who delay renewable development claim that you need something that they call "baseload", "dispatchable", "stable", or "planable" power, which usually means nuclear or fossil-fuelled generation.

But what we need instead is an ensemble of generating facilities that use different energy sources which, together with flexible demand, can keep the electricity grid in balance. All requirements can be economically met with renewable energy.

When solar and wind increase production

they replace fossil fuels, resulting in lower demand for fuels and lower fuel prices. This has the consequence that electricity generation becomes cheaper even when the wind is not blowing or the sun is not shining. Fossil fuels are easily stored, even gas can be stored in storage facilities in Europe. In Scandinavia, energy from wind turbines is stored in water reservoirs in the hydropower system, increasing supply and lowering prices even when the new renewable sources produce less.

Short-term balancing does not need rotating energy from large synchronous generators. It can be achieved at lower cost with batteries and power electronic installations, as demonstrated in South Australia⁴, and explained by NREL⁵.

These stabilising installations are required because of fluctuations in the supply of power when large nuclear reactors or fossil-fuel plants shut down for unpredicted technical reasons. This may also happen when large power lines fail for technical reasons. Some of the most reliable grids in the world are those with a high share of solar and wind. The reason is that these sources are predictable, and technical failures do not disturb the grid to the same extent as failures in nuclear and large coal plants.

Those who suggest that nuclear is "stable", "planable" or "dispatchable" should be reminded of the real performance around the world. Numerous, sudden and unpredicted shutdowns of nuclear reactors have occurred in Sweden in recent years. The Ringhals 4 reactor in Sweden was supposed to restart following routine maintenance in August 2022, but following several postponements it will not restart until March 2023⁶ at the earliest. In France, unintended problems reduced nuclear generation by 80 TWh



Some of the most reliable grids in the world are those with a high share of solar and wind.

during 2022⁷, turning France from the world's largest net exporter of electricity into a net importer and contributing to record-high prices in Europe during 2022.

Germany managed to compensate for phasing out its own nuclear reactors by generating more renewable electricity and decreasing consumption. Its fossil-based electricity generation increased by 3 TWh and the export of electricity by 6 TWh⁸. Only Sweden exported more electricity than Germany during 2022.

Tomas Kåberger

¹ <https://www.bloomberg.com/news/articles/2020-04-28/solar-and-wind-cheapest-sources-of-power-in-most-of-the-world?leadSource=verifywall>

² <https://www.lazard.com/media/451881/lazards-levelized-cost-of-energy-version-150-vf.pdf>

³ <https://www.iea.org/reports/electricity-market-report-2023/executive-summary>

⁴ <https://eandt.theiet.org/content/articles/2022/07/south-australia-battery-to-deliver-world-first-inertia-services/>

⁵ <https://www.youtube.com/watch?v=b9JN7kj1tso&t=133s>

⁶ <https://umm.nordpoolgroup.com/#/messages/52b6c17e-401f-442b-bf20-13f81f3d46be/10>

⁷ <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/122922-french-nuclear-output-to-start-2023-at-record-low-amid-long-term-outages-fuel-savings-stops>

⁸ <https://ag-energiebilanzen.de/daten-und-fakten/zusatzinformationen/>

Harvests from rewetted land

To reduce greenhouse gas emissions we need to restore huge areas of degraded peatland. Paludiculture can play an important part in stimulating interest among landowners.

One approach when restoring drained peatlands is to “rewet and forget”. Another is to restore the water level but still find ways to use the land for production. Paludiculture is the fancier term for the latter. It is more precisely defined as “the productive use of wet and rewetted peatlands that preserves the peat soil and thereby minimises CO₂ emissions and subsidence”.

And the restoration of peatlands needs to accelerate, as it has been identified as a cost-effective mitigation measure. Within the European Union, the large-scale drainage and overexploitation of peatlands

accounts for roughly 5 per cent of total greenhouse gas emissions. On the other hand, peatlands – if untouched, restored or sustainably maintained – can act as important carbon sinks. The European Union could reduce up to 25 per cent of greenhouse gas emissions from agriculture and agricultural land-use by rewetting just 3 per cent of the land (see figure).¹

Paludiculture can be done in numerous ways. Releasing livestock to graze or to harvest fodder might be one of the most straightforward forms of paludiculture (see case study). It has also been practised since ancient times, but less so in the last couple of decades as more and more peatlands have been drained and animal husbandry has become more efficient.

Another traditional type of paludiculture is harvesting reeds and using them as building materials, mainly for roofing. As interest grows in building conservation and traditional

techniques, there is an increased, and in some places even unsatisfied, demand for reeds for rooftops.

Paludiculture can also provide more innovative products. One example from Germany is boards made from reeds that can be used to construct interior walls and furniture, much in the same way as chipboard. Another example comes from a project in Estonia, where they harvest the sphagnum mosses that form the top layer of a bog and use it as a growing medium in horticulture.

However, the sustainability of paludiculture has also been disputed. When compared to completely untouched peatlands, paludiculture is a worse alternative in terms of carbon storage and biodiversity. Instead, it should be seen as an alternative to business-as-usual farming on drained land. The benefits of an individual restoration project then depend on the initial greenhouse gas emissions, the choice of plant species and the water table level.

So far paludiculture is just a niche activity in the European Union. Although there are several ways for member states to support paludiculture under the CAP, according to a report from EEB and BirdLife

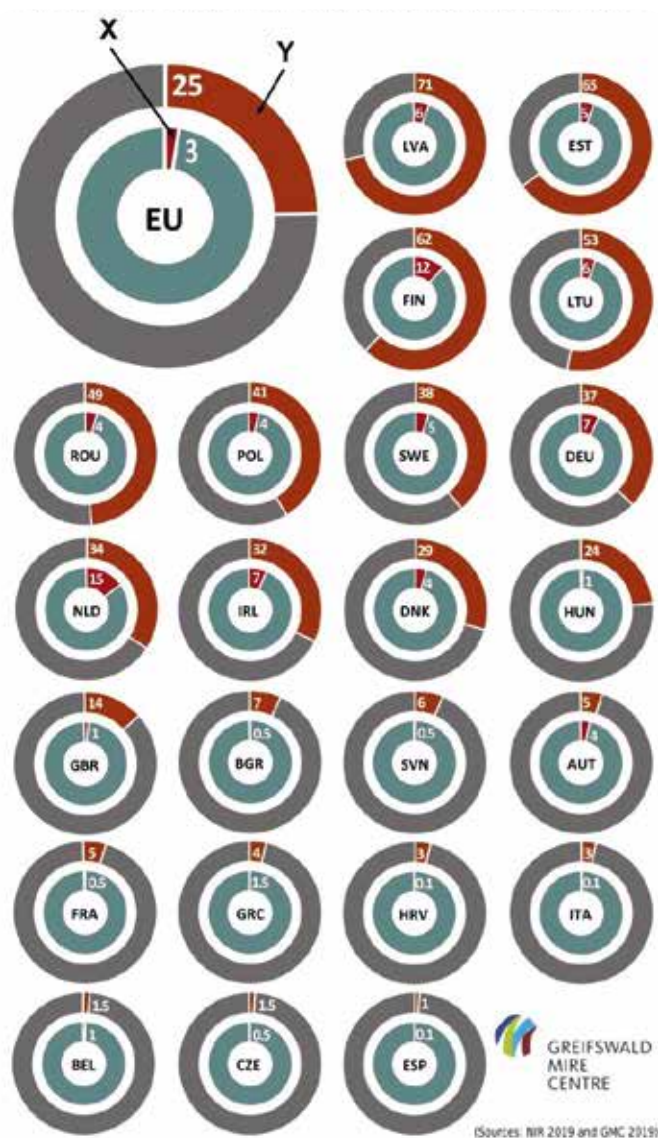


Figure. Relation between share of peatlands used for agriculture in the EU and selected member states and the attributed share of greenhouse gas emissions from these areas. Rewetting just X% of agricultural land will reduce agricultural greenhouse gas emissions by up to Y%.



Case study: 6 ha rewetted grassland saves 100 tonnes CO₂ a year

To learn more about how paludiculture works in practice, I met with Nerijus Zableckis, director at the Foundation for Peatland Restoration and Conservation, a Lithuanian NGO. He describes paludiculture “as an opportunity for landowners to continue to get a return on their land even after it has been restored”. His organisation offers trainings to landowners and land managers. Improving the state of knowledge is a first step, “you see, most people haven’t made the connection between peatlands and climate change”.

In Lithuania, emissions from degraded peatlands are a big deal, as they account for around 10 per cent of Lithuania’s total greenhouse gas emissions and 40 per cent of the emissions from the agricultural sector.

The organisation’s first paludiculture project was carried out in 2021 on six hectares of grassland in central Lithuania, managed by the Lithuanian Veterinary Academy. At the start of the project, the land was classified as highly degraded peatland. Like much farmland, it was originally wetland that was drained in the first half of the 20th century. Drainage pipes had been buried and led the water out into a ditch. So when the decision was taken to rewet the area it could be done easily by damming the ditch.

In the area closest to the ditch there is a strip that will be constantly under water. Plants that can withstand constant wetness, such as cattail, sedges and reeds, were planted here. However, most of the area is only flooded for parts of the year and dries up during the summer.

This area could remain grassland and here it is possible to let livestock graze or harvest hay for fodder and bedding.

The project included calculating the prevented greenhouse gas emissions. Nerijus Zableckis is happy with the results. This relatively small project was estimated to mitigate 100 tonnes of CO₂ emissions each year until 2050. What might this mean if the project were upscaled, bearing in mind that Lithuania alone has 250,000 ha of drained peatlands used for farming? Unfortunately, it is not just a matter of multiplication, as the level of carbon dioxide emissions from peatlands varies greatly. But even conservative calculations show great potential.

Europe² few member states have done so in practice. The report assessed Strategic Plans in seven northern member states. It found that some member states have eco-schemes and Pillar 2 measures that support the management of remaining wetlands. But there are no schemes that aim to incentivise broad-scale rewetting.

More promising is the proposed Nature Restoration Law (NRL) that sets national targets for peatland restoration. It also recognises paludiculture as a possible alternative land use. Unfortunately, the

proposal does not include drained peatlands covered by forest, which constitutes much of the area in need of rewetting in the northernmost member states.

The newly launched Carbon Removal Certification Framework is another Commission proposal that might be of significant use for the uptake of paludiculture. There is, of course, much to be said about voluntary carbon credits, whose intended buyers are large food companies that want to be able to claim climate neutrality in their marketing. There are

many of us who would prefer an ambitious programme under the CAP. But credits that would incentivise rewetting and the spread of paludiculture are among the more reasonable aspects of the proposal.

Kajsa Pira

¹ Opportunities for Paludiculture in the CAP <https://europe.wetlands.org/news/opportunities-for-paludiculture-in-the-cap/>

² Peatlands and wetlands in the new CAP: too little action to protect and restore <https://www.birdlife.org/wp-content/uploads/2022/04/Analysis-Peatlands-Wetlands-CAP-strategic-plans-April2022.pdf>



Carbon removal proposal – a gift to emitting industries

A new Commission proposal presents carbon dioxide removal as an alternative to stop emitting CO₂. This may open up large loopholes in EU climate policy.

A proposal for an EU Regulation¹ “establishing a Union certification framework for carbon removals” may sound innocuous but could also have far-reaching consequences.

One form of Carbon Dioxide Removal (CDR) is enhancing natural carbon sinks, such as restoring wetlands or leaving forests to grow. This is obviously better for the climate than letting the wetland dry up and emit its store of carbon or to clear-cut the forest. The problem comes with quantification of these advantages and monetising. “Carbon farming”, paid for through a carbon pricing system, is not necessarily the only or best way to save the climate and biodiversity.

The other form of removal is when carbon enters the technosphere and is stored either as CO₂ in CCS storage, in principle forever, or for many years as wood in buildings. This is much problematic.

CDR is one of two ways to achieve EU carbon neutrality by 2050, as stipulated in the 2021 Climate Law. The first way is obviously renewables and efficiency.

“Second, we need to recycle carbon from waste streams, from sustainable sources of biomass or directly from the atmosphere, to use it in place of fossil carbon in the sectors of the economy that will inevitably remain carbon dependent, for

instance through carbon capture and use (CCU) and sustainable synthetic fuels,” states the proposed Regulation.

Here controversies abound.

The stated need to “recycle carbon” echoes the Saudi 2020 presidency of G-20. Is there indeed a shortage of carbon on Earth?

“Directly from the atmosphere” means giant vacuum-cleaners that take CO₂ directly from the air.

Is it a good idea to first emit CO₂ from fossil power stations and cars and then vacuum the atmosphere for the molecules, compress the gas and send it down a hole and hope it stays there forever? The technology is unproven on a meaningful scale, but we know it will need a lot of electricity from, say, wind power. This power could be used to replace coal power directly, which would obviously be faster, cheaper and involve less risk.

As for “sustainable sources of biomass”, their existence is increasingly questioned. The need for synthetic fuels is not a foregone conclusion, as there are non-carbon alternatives: renewable electricity and hydrogen.

The proposed legislation states that increasing amounts of CO₂ “will have to be captured and removed each year from the atmosphere by carbon farming and industrial removal activities or projects to compensate hard-to-abate emissions from sectors like agriculture, cement, steel, aviation or maritime transport, with the view to reach climate neutrality”.

There are alternative ways to deal with most, or all, of these emissions. Acid News has described many of them. Steel can be made with hydrogen as a reductant instead

of coal and coke. Cement for concrete can be reduced or replaced. Agricultural practices can be changed.

Technically, the proposed regulation only aims to clarify how a carbon removal certification system is to be organised. But if it is adopted, the ideological notions it contains will also become an official EU position.

It takes a lot more than a paper to make some of these outlandish schemes really happen. But the “Get out of jail free” card for the fossil industry in the EU and beyond it is there from day one.

The really important thing is not the classification and criteria, but how the product – “certified carbon removal units” – will be used.

“The EU carbon removal certification framework will contribute to improving the GHG quantification of supported practices and GHG inventories of national land sector. Through voluntary markets development it can ensure longer-term protection of carbon stocks,” according to the text.

Most of the NGO community has been dead against offsetting and voluntary schemes for decades, and they have ample evidence for its uselessness, most recently in an investigation by the Guardian.

The consultation process with the NGOs has been tightly controlled, and did not leave room for other views than those supported by the eurocrats and the lobbyists behind them.

Which lobbyists? This is, as usual, is not easy to prove. But one can guess that the forest industry, the agri business, the oil, gas, coal and cement lobbies will not be sorry if the draft is adopted.

Fredrik Lundberg

¹ https://climate.ec.europa.eu/document/fad4a049-ff98-476f-b626-b46c6afdded3_en

² https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13172-Certification-of-carbon-removals-EU-rules/public-consultation_en





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Germany wants to scrap VAT on vegetables

German agriculture minister Cem Özdemir has proposed lowering value-added tax (VAT) on fruit and vegetables to zero, Euractiv reports. The aim is to compensate for inflation and provide incentives for healthier diets. German men eat the fewest vegetables in all of Europe.

To create a shift to more plant-based diets, additional efforts may be needed, experts tell Euractiv. This could include higher VAT on meat, improving communal catering or better education on healthy diets.

Spain has already abolished VAT on fruit and vegetables, along with several other staple foods such as bread, flour, milk, cheese, eggs and cereals.

Source: Euractive 11 January 2023

Court stops dairy producer from making net-zero claim

The Danish-Swedish dairy giant Arla Foods can no longer market its products with the expression “Net-zero climate footprint” according to a ruling by the Swedish Patent and Market Court on 2 February. This is in line with the approach used by the Swedish Consumer Agency, which filed the suit.

“The court does not believe that consumers understand that the company’s promise of net zero is based on climate-compensating activities that would only be able to offset the climate footprint that milk production gives rise to after 100 years,” writes the Swedish Consumer Agency in a press release.

It was in 2019 that the message “net-zero climate footprint” began to appear on the packaging in Arla’s organic range. Arla



Packaging with the misleading claim.

had for some time been experiencing strong competition from plant-based alternatives to milk and companies such as Oatly, who claimed that their products had a significantly lower climate footprint than milk.

Arla Foods chose to drop the claim completely back in spring 2022, saying that it “took the focus away from the farmers”.

They later announced that they had stopped their climate offsetting work completely, since they were not allowed to use the expression.

Source: The Swedish Consumer Agency Press release, 2 February 2023

Swedish Radio, 21 November 2022 <https://sverigesradio.se/artikel/arla-slutar-klimatkompensera-vi-kan-inte-motivera-den>

Flemish nitrogen breakdown

Nitrogen policy in the Flanders, in Belgium, has now become as explosive as it has been in the Netherlands in recent years. Acid News has previously reported on the Flemish government’s proposal to reduce the region’s high nitrogen emissions (AN2/22). Although almost a year has passed, the plan has not been adopted. Parts of the coalition government have opposed the original proposal, which, among other things, would mean that farms that have the greatest impact on sensitive natural areas would need to close.

Unsurprisingly, this has not gone down well with the broad furrow of Flemish farmers.

In typical Dutch fashion they filled the streets of Brussels with processions of tractors. But their problems are greater than just having to adapt to a new nitrogen regulation. If the regional government fails to reach an agreement, the EU Commission may freeze the subsidies provided by the EU’s Common Agricultural Policy – funds that most farmers are dependent on.

That brings us back to the original purpose of the bill, which is to deal with the excessively high deposition of nitrogen in the region’s sensitive natural areas. In 2019, the critical limit values for nitrogen were exceeded for 63 per cent of the area of the nitrogen-sensitive habitat groups, and 56 per cent of the total Natura 2000 area. The latter are areas that the government is obliged to protect under the EU Habitats Directive.

Another twist is that the high nitrogen emissions are putting the environmental licence of Brussels airport at risk. Brussels airport must apply for a new environmental permit this summer. But without a new nitrogen regulation in place, they don’t know how much nitrogen they will be allowed to emit.



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Farmers’ protest in Brussels.

Sources: The Brussels Times 1 February 2023 <https://www.brusselstimes.com/362787/brussels-airport-environmental-licence-clash-risks-grounding-flights>

The Brussels Times 2 March 2023 <https://www.brusselstimes.com/belgium-in-brief/387062/belgium-in-brief-tractors-bear-down-on-brussels>

Flanders Environment Ministry <https://omgeving.vlaanderen.be/nl/stikstof>



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Energy savings in buildings – an untapped potential

Heating and cooling of buildings is behind a third of CO₂ emissions in the EU. Less than 1% of the stock is renovated each year; member states must step up and increase the pace.

Buildings account for 40 per cent of Europe's energy consumption and are responsible for more than 33 per cent of the bloc's CO₂ emissions. Inaction in the building sector in recent years has already cost the EU four years of potential progress towards the climate neutrality goal¹. The current recast of the Energy Performance of Buildings Directive (EPBD) is not only vital for achieving the EU's climate goals but is also an opportunity to create better residential and commercial buildings while reducing energy bills.

For the recast of EPBD it is important to establish a Whole Life Carbon regulatory roadmap. Buildings can be constructed on zero-emission construction sites, creating positive energy buildings. However, the standing time is the longest phase to address, as 80 per cent of existing buildings will still be there in the year 2050.

Two-thirds of the buildings in the EU

have poor energy performance. Under current policies, less than one per cent of buildings are renovated each year, while data suggests the number of Europeans unable to provide enough heat in their homes has risen from 36 million to 50 million since 2020.²

The main priority for renovating buildings is to achieve the proposed target of three per cent renovation per year, by introducing a European framework for the Minimum Energy Performance Standard of buildings (MEPS). This will make renovation mandatory for the worst-performing buildings in Europe. Recent data shows that retrofitting buildings in Europe could create 1.2 million additional jobs and increase GDP by one per cent by 2050.³

Francesca Andreolli, researcher at the think tank ECCO states "Energy efficiency is a strategic key option for lowering

energy prices, increasing energy security and tackling energy poverty. Although Italian fiscal supporting schemes for buildings' renovations represent an advanced example at European level, they are affected by temporal instability, regulatory fragmentation and weak effectiveness. in order to make energy efficiency and heating decarbonization good options for economic growth and energy security, a long-term planning for building decarbonization coupled with an adequate financial support mechanism is needed."⁴

Measures at the EU level should target energy use and emission hotspots, especially heating and cooling but progress is slow at local level and is hampered by a number of obstacles. CAN Europe has released a new report on how to address the economic and non-economic barriers.

Mónica Vidal, Renewable Heating campaigner at CAN Europe states that

Recommendations

Wean off fossil fuels:

- ✗ Establish 2035 as a planned phase-out date for fossil fuels consumption in buildings via EPBD. This will also provide an important signal for the Ecodesign regulation to set an end-date for the sale of stand-alone fossil fuel boilers.
- ✗ Stop subsidies for the installation of fossil-fuel based heating systems in buildings as of 2024. This public financing should instead be redirected towards improving energy efficiency, renovating buildings and transitioning district heating systems to renewables.
- ✗ End the flexibilities and exemptions that would enable boilers using a blended mix of hydrogen, biogas and fossil gas to be installed in existing and new buildings, since this will endanger the achievement of our climate and energy goals, and would also lock-in occupants with polluting heating technologies for many winters to come.

Clear policy objectives:

- ✗ Provide clear objectives for heating decarbonisation, inspired by other countries that have already done so (UK, NL, DE). Such objectives could take many forms: a date by which all heating needs be decarbonised; an ambitious annual target rate for deep renovations encompassing work on the building envelope and the installation of renewable heating and cooling technologies; and an obligation to install renewable technologies or connect to (renewable) district heating networks when replacing a boiler, etc.
- ✗ National Energy and Climate Plans (NECPs) should be updated in the revision plans to assure an ambitious level for the renewables share in the heating & cooling

sector, leading to a 100 per cent renewable energy system by 2040 in combination with the reduction of energy needs and with a clear phase-out of fossil fuels.

Financial support:

- ✗ The upfront costs of renewable heating technologies can make it inaccessible for people, especially those who need it most. Financial support can help to overcome this problem. Subsidies, rebates and zero-interest and/or state-guaranteed loans can help homes overcome this initial cost. Financial support needs to be targeted at renewable heating solutions and their enablers, and take into account recipients' age, ownership structure, etc.
- ✗ Make the most of the Next Generation EU funds at national level, a once-in-a-decade opportunity to finance the transformation of our buildings.

Technical support:

- ✗ Homeowners need to be guided and supported throughout the process of switching heating technology and/or renovating their homes. A network of national, regional and local one-stop shops and other sources of free-of-charge, independent information, would help homeowners and tenants, especially the most vulnerable, to identify and access financial support, refine their projects, and even check installers' offers and the quality of the installations carried out.
- ✗ Public authorities and other organisations providing such services should work with social services, local associations and identify and proactively reach out to people in need of support. Such schemes not only support citizens in their projects, but they also help make those providing

advice more aware of citizens' situations and needs.

Public awareness:

- ✗ Public information campaigns can promote the opportunity for renewable heating technologies and highlight how they can benefit households and businesses. There is evidence from countries like Sweden and Germany that a successful renewable heating transition requires significant investment in strategic communications.

A skilled workforce:

- ✗ Governments and manufacturers need to step up their efforts to promote this sector and entice a new workforce to install renewable heating systems. They first need to make current installers aware of renewable heating technologies, their importance, benefits, applications, etc. Installers will then be more likely to recommend such technologies. In addition, governments and the private sector need to team up to establish a concerted recruitment and training programme.

Stronger supply chain:

- ✗ As a result of a strong post-Covid recovery and geopolitical tensions, resources and materials for renewable heating systems are limited. In the short-term, this issue can be addressed by installers of renewable heating equipment by diversifying their supply chain and pre-ordering key equipment to make sure there is a stock to offer clients. Long-term supply chain disruptions could lead to partial or total relocation of the renewable heating industry, which could be funded by the Just Transition Fund, among others.

"When it comes to the ongoing fossil fuel crisis, the elephant in the room is the heating installations running on fossil fuels, leading to rising levels of greenhouse gas emissions and energy poverty. If we are to protect the people and the climate in winters to come, clear policy objectives, more financial support, a skilled workforce and easy access to independent information for all, are essential to transform European countries' outdated heating systems to renewable and efficient models."⁵

Stronger policy and financial frameworks across Europe can overcome the barriers to renewable heating, and the report include a list of key recommendations (see box).

These measures would transform Eu-

ropean buildings where more than 450 million people live, study and work, into sustainable and climate-friendly buildings. Buildings urgently needs to become renewable, accessible, efficient and affordable for all. This will entail positive impacts on peoples' everyday lives, to make them more comfortable, safe, and healthy.

Emilia Samuelsson

¹ Buildings Performance Institute Europe 2022, https://www.bpie.eu/wp-content/uploads/2022/06/BPIE_EU-Buildings-Climate-Tracker_Final.pdf

² Euractiv, Mike Peirce et al, Insulating the economy: why the EU must aim high on its buildings directive <https://www.euractiv.com/section/energy-environment/opinion/insulating-the-economy-why-the-eu-must-aim-high-on-its-buildings-directive/>

³Ibid.

⁴Press release for report "Embracing a renewable heating revolution in our buildings! Overcoming barriers and going beyond fossil fuels heating", found here <https://caneurope.org/content/uploads/2023/02/Clearing-the-hurdles-to-Renewable-Heating-before-next-Winter-1.pdf>

⁵Ibid.

Article is based on: CAN Europe's report "Embracing a renewable heating revolution in our buildings! Overcoming barriers and going beyond fossil fuels heating", published 22 February 2023, found here <https://caneurope.org/renewable-heating-barriers-solutions/>



Wind, water and solar – enough to solve the climate crisis

The payback time for a transition to a completely renewable energy system is less than six years. Additionally, it would require only about 0.53% of the world's land for new energy which is less than the land required for the current energy system.

The results from new technology such as Carbon Capture and Storage are disappointing but the technologies needed to address the climate crisis already exists and is affordable.

To avoid 1.5°C of global warming we need to eliminate 80 per cent of the world's greenhouse gas emissions within the next seven years. The average global temperature is currently 1.1°C above the pre-industrial average and the climate crisis is already causing catastrophic damage. In addition, the world is facing serious energy-security risks. The best solution to these challenges is one that can be implemented quickly and at low cost. New studies have shown that carbon capture and storage (CCS) and nuclear do not meet these requirements but that wind, water and solar do (WWS). Their costs are mostly low and dropping, and implementing WWS has multiple co-benefits.

A new report has cast doubt on the ability of CCS to help the world transition to net zero. The report, by the Institute for Energy Economics and Financial Analysis (IEEFA), studied 13 projects involving CCS or Carbon Capture, Utilisation and Storage (CCUS). These 13 CCS/CCUS projects account for around 55 per cent of capacity worldwide. It found that 7 of the 13 projects underperformed, 2

failed and 1 was mothballed. Many of the projects covered involve enhanced oil recovery (EOR), where carbon dioxide, mainly sourced from naturally occurring underground deposits, is reinjected and sequestered in oil fields to extract more oil. Globally, 21 out of the 28 existing operational projects involve EOR. About three-quarters (28 million tonnes) of the carbon dioxide captured annually by CCUS facilities worldwide is reinjected through EOR.

“Many international bodies and national governments are relying on carbon capture in the fossil fuel sector to get to net zero, and it simply won't work,” says Bruce Robertson analyst at IEEFA and one of the report's author. “Although it might have a role to play in hard-to-abate sectors such as cement, fertilisers and steel, overall results indicate a financial, technical and emissions-reduction framework that continues to overstate and underperform.”

Another technology that has recently risen up the political agenda is nuclear power. New nuclear suffers from a 10 to 21-year time lag between planning and operation. Thus, it won't be useful for immediately addressing the climate crisis. The costs are also 5–8 times higher than new wind and solar per unit energy. Additionally, the risks includes weapons

proliferation, meltdown, waste disposal and underground uranium mining health hazards. Bioenergy produces air pollution and greenhouse gases while using vast amounts of land and water.

The enormous problems associated with climate change can be solved with WWS combined with storage solutions at low cost worldwide. The storage options include battery storage, thermal storage, cold storage and hydrogen storage. Other important aspects are techniques to encourage people to shift the times when they use electricity, a well-interconnected electrical transmission system as well as efficient electrical appliances, such as heat pumps, induction cooktops, electric vehicles and electric furnaces for industry.

The main reason for the low cost of the WWS system is that it wastes much less energy than combustion-based energy system. If WWS systems were implemented globally, they would reduce total energy use by over 56 per cent. The reductions are due to multiple advantages: the efficiency of electric vehicles over combustion vehicles, the efficiency of electric heat pumps for air and water heating over combustion heaters, the efficiency of electrified industry and the elimination of energy needed to obtain fossil fuels and uranium.

A WWS system also reduces the cost per



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Cutting carbon emissions from offshore wind

A group of European offshore wind players will work with the Carbon Trust, a government industry body, to “measure and address” carbon emissions linked to construction and installation of turbines at sea.

The group includes BP, EnBW, Fred Olsen Seawind, Orsted, Parkwind, RWE, ScottishPower, Shell, SSE, TotalEnergies and Vattenfall. The aim is to spur the international industry to scale up “as sustainably as possible and continue its contribution” toward meeting global 2050 net-zero targets.

“Global climate targets cannot be met without stepping up renewable energy generation, and offshore wind is particularly crucial to the world’s transition away from fossil fuels,” said Carbon Trust offshore wind director Jan Matthiesen.

“While offshore wind energy generation has a significantly lower carbon impact than fossil fuels, the sector must also work collaboratively to de-couple its own value chain from carbon and resource-intensive models of production, deployment and operation, addressing key hotspots such as steel, cement and fuels.”

The group’s first project is targeting a standardised methodology to allow devel-

opers to calculate the lifecycle emissions of offshore wind assets, from upstream supply chain emissions through construction and into operations, with the spotlight on “key carbon emission drivers and hotspots in the offshore wind value chain and wind farm life cycle”.

The Carbon Trust highlighted that while over 55 GW of offshore wind had already been installed by the start of last year, the International Energy Agency has calculated a further 70–80 GW a year will need to be built annually from 2030 in order to achieve net zero by mid-century.

Commenting on the project, which is being delivered as part of the Carbon Trust’s Offshore Wind Sustainability Joint Industry Programme, Matthiesen said “Our experience working with the industry through various joint industry projects is proof that collaboration is key,” noting that a first plan is expected to be released for use across the industry “by 2025”.

Source: Recharge, 2 February 2023, <https://www.rechargenews.com/wind/steel-cement-and-fuels-european-energy-players-in-industry-first-to-green-offshore-wind/2-1-1398028>

unit of energy by another 12 per cent on average, resulting in a 63 per cent lower annual energy cost worldwide. When savings in health and climate costs are factored in it means an overall 92 per cent reduction in annual social costs (energy, health and climate costs combined) relative to a conventional system.

And now to the issue of costs, which is always brought up in WWS discussions. The worldwide cost of implementing a WWS system by 2050 is around 62 thousand US dollars but due to the 11 thousand US dollars annual energy cost savings, the payback time is less than six years. Additionally, the new system could create over 28 million more long-term, full-time jobs than are lost worldwide, and require only about 0.53 per cent of the world’s land for new energy, which is less than required for the current energy system.

Furthermore, 95 per cent of the technology needed for the WWS transition is already available. The missing elements are long-distance aircraft and ships, and some industrial technologies, but the knowledge of how to transition to those technologies already exists. What is needed at this stage is social acceptance and the political willpower to bring about change.

Based on the article of a interview with Prof Mark Jacobson <https://www.theguardian.com/environment/2023/jan/23/no-miracles-needed-prof-mark-jacobson-on-how-wind-sun-and-water-can-power-the-world>



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Greening electricity

Wind and solar produced more than 10% of global electricity in 2021, for the first time. They also surpassed nuclear, which fell below 10% for the first time in several decades. Hydro is still the top non-fossil electricity producer, but solar and wind are growing much faster.

In 2021, for the first time, solar and wind power provided more electricity to the world than all nuclear power (see table). This is one of many key points that can be found in BP's Statistical Review of World Energy June 2022¹, and it is a landmark. It was the first time that solar and wind surpassed 10 per cent of global electricity generation. It was also the first time in many years that nuclear did not exceed 10 per cent.

The remaining 62 per cent is fossil power. What the climate needs is for fossil power to be eliminated by the three non-fossil sources. Of these, renewable power alone is a credible candidate for the job. So far, renewables have only reduced the growth of fossil power. The next doubling of solar and wind will cut fossil power,

and emissions, in absolute terms.

Nuclear has moved sideways for almost two decades, globally. It has decreased in the EU. Renewables are now predominantly wind and solar, the least controversial sources. Some of the remaining renewables are also generally seen as benign: particularly geothermal, tidal and some bioenergy.

Hydro is also controversial but not accounted for as renewable in BP statistics. It is the biggest of the three non-fossil sources of electricity, but renewables are growing much faster

Politics and history play a big role in which energy sources different countries choose – much bigger than geographical conditions. Nuclear power is mostly found in countries that have or had nu-

clear weapons ambitions and is found in countries with high risks of earthquakes and tsunamis, weak infrastructure and extensive corruption, as well those with stable bedrock and management. It is found in rich and poor countries.

Wind power is mostly found in countries that developed it as an alternative to nuclear power and fossil fuels.

Sunnier countries have more solar power. But there are many examples of countries with very good conditions that have almost no solar power at all: Russia and most of the former Soviet republics in the south, most of the Middle East and, with some exceptions, Africa.

Fredrik Lundberg

Link to AirClim briefing: <https://www.airclim.org/publications/fossil-free-electricity-2021>

¹ See <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/downloads.html>

Table. Electricity generation by source.

	TWh electricity, World			Average annual growth 2010–2021, %	Share 2021
	2010	2020	2021		
Nuclear	2,769	2,694	2,800	0.6	9.8
Hydro	3,429	4,346	4,274	1.9	15.0
Renewables ¹	761	3,147	3,657	74.3	12.8
Solar & wind	370	2,362	2,915	120.4	10.2

¹Note that solar & wind is a subset of renewables.

Floating solar PV and wind turbines at Houlong Flood Detention Pond in Miaoli, Taiwan.

Gotland – an energy self-sustaining case study

The Swedish island of Gotland is aiming to become a fully self-sufficient sustainable energy region with its Got Heat project.

In 1990, the per capita emissions of Gotland county were almost 5 times as high as the rest of Sweden, and by 2045 that figure could rise to almost 13 times as high. Gotland is also the only county in Sweden where greenhouse gas emissions have increased during the period 1990–2015.

Gotland has been chosen to test and demonstrate that it is possible to make the sustainable transition. The Swedish Energy Agency recently published a “Roadmap to enable Gotland to become a pilot for a sustainable energy system”. During the development of the roadmap, dialogue was established with many actors and stakeholders that operate or are interested in working on Gotland, such as private individuals, entrepreneurs and non-profit and public organisations.

The Swedish Environmental Institute IVL is now setting up the Got Heat project together with industrial companies and electricity and heat producers on the Swedish island of Gotland. The

aim is to create a sustainable energy system where all interactions and all forms of energy waste are avoided. The project must extend to both existing and future industries and energy producers.

One example that increases the efficiency of the energy system is when wind power is used to produce hydrogen gas, while the heat generated during the production process is also used. However, in order to utilise this heat at reasonable cost, users must be located quite close to the source. Planning for this requirement is also part of the project, as new industries that need process heat must be established in the right location. The project will also bring together stakeholders that are planning to build solar parks, industrial villages and computer halls with the district heating company, Gotlands Energy.

“The project will enable us to build up an overall picture of Gotland’s heating sector, today and in the future, to determine what is required to exploit the existing opportunities and synergies. We hope this knowledge will contribute to a



In the late 1970s, this oil pump was established in Rute on Gotland. The oil was of good quality, but the extraction was too small and 14 years later the operation ceased. The pump now stands as a piece of industrial heritage. However, in this new project to make Gotland energy self-sufficient, there are no plans to extract fossil fuels.

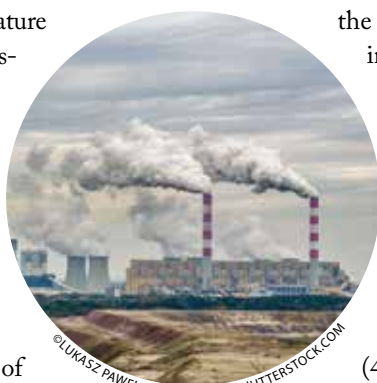
resource-optimised energy transition on Gotland that can also be used on other islands and in other countries and regions,” commented Theo Nyberg, IVL’s project manager, in a press release.

IVL press release, 16 December 2023, <https://www.ivl.se/press/nyheter/2022-12-16-nytt-energilandskap-pa-gotland---varme-el-och-industri-i-samverkan-for-en-livskraftig-o.html>

Bełchatów most harmful to health and climate

A scientific report in Nature

has ranked European industrial facilities by toxicity and global warming potential. The European facility with the largest contribution to both human toxicity and climate impact is Bełchatów, a coal-fired power station that is part of Poland’s largest energy sector company. Germany’s largest remaining lignite-fired power plant, Neurath, came second in both rankings. And just a few kilometres away from Neurath is another lignite-fired power plant, Niederaussem, that ranks third on climate impact. Third on the human toxicity ranking is however



the Estonian oil power plant in Narva, where the oil is extracted from oil shale. The rankings are based on data from 2017.

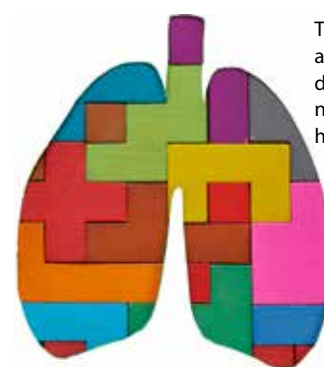
Overall, the companies in the electricity production sector have the largest human toxicity impact potential (46% of total) and the largest global warming impact potential (50%), while companies in the sewerage sector have the largest ecotoxicity impact potential (50%).

Erhart, S., Erhart, K. Environmental ranking of European industrial facilities by toxicity and global warming potentials. *Sci Rep* 13, 1772 (2023). <https://doi.org/10.1038/s41598-022-25750-w>

Unequal risk of dying from air pollution

A recent study in Brussels, which followed more than 400,000 residents, looked at air pollution exposure and the risk of dying in a cardiovascular or respiratory diseases. To assess exposure they used both modelled and perceived air pollution levels, and found that both measures were associated with mortality. They also looked at unemployment rates and found that associations were stronger in areas of higher unemployment.

<https://www.sciencedirect.com/science/article/abs/pii/S0013935122025075?via%3Dihub>



The effects of air pollution differ between neighbourhoods.

European Commission taken to court over fossil greenwashing

A year ago the ten leading environmental NGO networks in the EU and in Brussels urged the EU to review the Commission's Taxonomy Complementary Delegated Act, released on 2 February 2022. The Act includes fossil gas and nuclear energy, in stark contrast with science, independent expert advice, existing EU legislation, investor demands and global practice on green bonds. Not only does this mislead consumers and investors, and call into question the extent to which the Commission values scientific evidence, but labelling gas and nuclear energy as green incentivises their further development in the EU and entrenches Europe's dependence on gas and uranium imports – which can in turn fuel geopolitical turmoil. Greenpeace will

now take the European Commission to the European Court of Justice over the inclusion of fossil gas and nuclear energy in the EU's list of sustainable investments, known as the taxonomy. The move comes after the Commission rejected a formal request made by Greenpeace in September to abandon the greenwashing of fossil gas and nuclear power. On 9 February 2023, the Commission replied, declining Greenpeace's request to withdraw gas and nuclear from the taxonomy. In April 2023, Greenpeace will file a lawsuit at the European Court of Justice. The Austrian government is also suing the Commission for its greenwashing of fossil gas and nuclear power.



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Greenpeace Press release 9 February 2023

Green 10 letter to the EU Commission: <https://green10.org/wp-content/uploads/2022/03/G10-letter-on-withdraw-the-Taxonomy-Complementary-Delegated-Act.pdf>

EU is too slow on phasing-out fossil fuels in transport sector

The EU reached agreement in February 2023 on ending sales of new combustion engine cars and vans by 2035. But phasing out sales of new cars with internal combustion engines in the EU by 2035 is a deadline which Greenpeace says falls well short of the EU's climate commitments and will cost drivers hundreds of

billions in fuel in the midst of a spiralling energy crisis. "The EU is taking the scenic route, and that route ends in disaster. A European 2035 phase-out of fossil fuel-burning cars is not quick enough: new cars with internal combustion engines should be banned by 2028 at the latest. The announcement is a perfect example of where politicians can bask in a feel-good headline that masks the reality of their repeated failures to act on climate. The UN has just confirmed that the climate crisis will spiral out of control unless governments take rapid and decisive action, including a shift to cleaner modes of transport."

A roadmap produced by Greenpeace to decarbonise the European transport sector by 2040 found that new sales of fossil fuel-burning cars must end by 2028 at the latest, in addition to measures to cut unnecessary journeys and shift to cleaner modes of transport to meet the Paris climate agreement's commitment to limit global heating to below 1.5°C. Phasing out internal combustion en-

gines by 2028 would save drivers more than 635 billion euro on fuel, compared to the 2035 deadline.

At the same time the EU was also discussing whether polluting trucks could continue to be sold in Europe after 2040, which Transport and Environment (T&E) says would make the bloc's net-zero climate goal impossible. The proposed 90 per cent CO₂ reduction target for truck makers virtually ensures that diesel freight trucks would still be on the road 10 years later, in 2050. Trucks account for just 2 per cent of the vehicles on the road but are responsible for almost 30 per cent of EU road transport CO₂ emissions. Road transport and heavy-duty vehicles are also one of the largest sources of particulate matter (PM) and nitrogen oxides (NO_x) pollution, which cause an estimated 300,000 premature deaths per year in the EU.

Compiled by Reinhold Pape

Greenpeace press release, 27 October 2022

T&E press releases, 27 October 2022 and 14 February 2023



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The EU has a hard time letting go of fossil fuels.

EU agrees deforestation law

Last December the EU agreed that companies will have to show that their products have not contributed to deforestation if they want to sell them in the EU. The new law will require companies to trace their commodities back along the supply chain to the plot of land, and prove that forest was not recently cleared, or face fines. It will apply to companies selling soy, beef, palm oil, wood, rubber, cocoa and coffee, and some derived products such as leather, chocolate and furniture. Under pressure from the European forestry sector and the Canadian government, EU governments secured a loose definition of “forest degradation” – essentially a loophole that allows con-

tinued unsustainable logging of natural forests. National governments also resisted a push by the European Parliament to include respect for international human rights legislation in the deforestation law, and the deal agreed only requires the right to free, prior and informed consent for Indigenous People to be respected if the producing country guarantees that right.

Greenpeace described the new law as “a major breakthrough”, but they were also critical: “EU governments should be ashamed of themselves for adding loopholes for their logging industries.” And added: “in the coming years, the EU must broaden its focus to protect nature as a whole, not just forests, and to stop the companies destroying nature not only from accessing the EU market but also getting loans from European banks.”

Greenpeace press release, 6 December 2022

Coffee is one of the products covered by the new law.

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Report on particles

Particles are present in all the air we breathe, in different sizes, shapes and compositions, and can contribute to disease or ultimately death. We have known for a long time that they are dangerous, but research

has evolved to cover more diseases and the biological mechanism behind their effects, as well as new information about sources and particle components. The Swedish Environment Protection Agency has compiled the evidence in a new report that municipalities and authorities can use within the framework of their tasks. It covers a wide range of topics, such as biofuels, studded tires, electric cars, wood burning and urban planning, as well as the effects of particles: health problems, premature death, pollution and corrosion.

The Swedish EPA report, *Air & Environment*, <https://www.naturvardsverket.se/om-oss/publikationer/1300/978-91-620-1309-7/>



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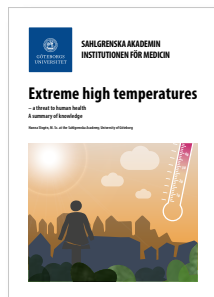
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Fossil-free electricity 2021 (March, 2023). By Fredrik Lundberg. Global EU status and trends.



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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The Revision of the EU ETS Directive: Assessing Cap and Market Stability Reserve Reform Options (May 2022). By Dr. Felix Chr. Matthes.



Failing to achieve 1.5°C puts a huge economic burden on our (grand)children (September, 2022). By Wendel Trio. Costs of action and inaction for several EU scenarios.

Coming events

EU Energy Council. Brussels, Belgium, 28 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>

CLRTAP Task Force on Integrated Assessment Modelling 52nd meeting. Utrecht, Netherlands, 24–26 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-session-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

International Action Week Against Ocean Acidification. Everywhere, 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. Everywhere, 8 June 2023. Information: <https://www.un.org/en/observances/oceans-day>

EU Energy Council. Luxembourg, 19 June 2023. Information: <https://www.consilium.europa.eu/en/meetings/calendar>

EU Environment Council. Luxembourg, 20 June 2023. Information: <https://www.consilium.europa.eu/en/meetings/calendar>

CLRTAP Working Group on Strategies and Review, sixty-first session. Geneva Switzerland, 4–6 September 2023. Information: <https://unece.org/info/events/unece-meetings-and-events/air-pollution>

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 Transport and Air Pollution Conference. Gothenburg, Sweden 25–26 September 2023. Information: ivl.se/tapase

UN Climate Change Conference. United Arab Emirates, 30 November–12 December 2023. Information: <https://unfccc.int/calendar/events-list>

CLRTAP Executive Body, Forty-third session. Geneva Switzerland, 11–14 December 2023. Information: <https://unece.org/info/events/unece-meetings-and-events/air-pollution>

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