NO.4, DECEMBER 2021

Acid News

Energy sufficiency

A necessary complement to energy efficiency. Making the case for energy sufficiency in European policies.

► Page 6

Closing the nitrogen cycle with agroecology

A recent study shows that it is possible to halve nitrogen losses in Europe by abolishing synthetic fertilisers, reconnecting livestock and cropping systems and changing diets.

► Page 10

WHO guidelines are based on science

Detailed models and data from more parts of the world are behind the lower acceptable levels for particles, ozone and nitrogen dioxide in the new WHO air quality guidelines.

► Page 14

Time to ban climate-threating advertising

European NGOs push to prohibit advertising for fossil fuels, fossil-fuelled cars and air travel. Several European cities have taken the lead by introducing local bans.

► Page 16

Air pollution in Africa

Air pollution in Africa differs from that in developed countries. The main contributors to particle emissions are old diesel-powered vehicles, burning of waste and use of biomass for cooking.

► Page 22

Ocean acidification in the Black Sea

The acidification problem is a "black elephant" – an obvious, predictable event with enormous consequences, but highly overlooked by many stakeholders, which is also relevant for the Black Sea region.

► Page 26

Dependence on fossil gas cause soaring energy bills

As the world recovers from the pandemic, energy prices in the European Union have surged to record-high levels and the only way forward is renewables.

The energy crisis is driven by increased global demand as the world recovers from Covid-19 and lower-than-expected natural gas deliveries. According to the European Commission, wholesale electricity prices have increased by 200% compared to the 2019 average but are expected to fall in the spring. The majority of EU countries depend on gas-fired power stations to meet electricity demand, and about 40% of that gas comes from Russia, according to Eurostat. This is a clear wake-up call that the EU needs to wean itself off its fossil fuel dependency and accelerate the transition to clean energy.

A new report produced by the NGO Global Witness shows that European gas transmission operators and their parent companies made €4 billion in profits in the first six months of 2021, even as the energy crisis was beginning to bite. "At a time when many Europeans are being forced to choose between heating and

Page 3 ►

Acid News

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

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

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

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The Air Pollution and Climate Secretariat

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

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

In furtherance of these aims, the Secretariat:

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

Editorial

AirClim

Europe's top court has ruled that the Energy Charter Treaty (ECT) cannot be used in lawsuits between EU countries.

Prior to this ruling, the ECT has allowed companies to sue countries over decisions that affect their energy investment, which can be used to protect fossil fuel projects. The treaty is outdated and has not been updated since it was signed in 1994 by 54 signatories. Under the ECT, companies can attempt to claim millions of euros in compensation through a mechanism called an investor-state dispute settlement (ISDS). This was used by German energy companies Uniper and RWE to sue the Dutch government over the country's planned coal phase-out.

"The ECT's protection of fossil fuel investments needs to end"

But in September Europe's top court ruled that the treaty cannot be used in lawsuits between European Union countries because the process undermines the role of the union's courts. According to the ruling, "the preservation of the autonomy and specific character of EU law precludes the Energy Charter Treaty from being able to impose the same obligations on the Member States among themselves." Thus, the court puts into question the legality of ongoing claims, like those against the Dutch Government.

The ECT has been under criticism for some time and in 2019, the European Commission received a mandate to revise the treaty. This stated that it must reinstate Europe's "right to regulate" in areas like climate change as well as workers' rights. The EU executive only clarified its stated ambition to phase out the protection of fossil fuels at the fourth negotiation round in March 2021. The Commission proposal included a ten-year sunset protection for existing fossil fuel investments along with an immediate exclusion of new investments made after the entry into force of the amended treaty. Any modification of the treaty needs unanimity and progress has been lacking. Negotiators conducted the eighth round of talks in early November.

There has been a growing impatience among climate groups and EU member states to conclude negotiations or walk away. More than 400 NGOs also published a joint statement[1] earlier this year calling on the EU to withdraw. However, leaving the treaty does not end the commitments as a sunset clause keep countries to their commitments for another twenty years. Italy for example, left in 2016 and faced a number of post-withdrawal arbitrations.

At the start of the year, EU foreign ministers highlighted the "urgent need for progress" in the ECT reform negotiations and some member states, including France, Greece, Poland and Spain, have stated that they are willing to follow Italy by withdrawing from the treaty.

The ruling in September highlights the misuse of the treaty and environmental organisations have applauded the ruling. ClientEarth lawyer Amandine Van Den Berghe stated "Given the scale of the climate crisis, it's not only abhorrent that EU companies have used the Energy Charter Treaty to claim compensation, but it's now confirmed that it's also illegal". Implementing the decision will be more complex though, she added. It will be up to EU countries to defend themselves using this decision, with countries like the Netherlands now having more firepower in contesting the claims.

It is still unclear whether claims made by companies in non-EU countries against member states are acceptable under EU law, according to Climate Action Network Europe. However, 81% of investments protected by the ECT are intra-EU investments, so preventing intra-EU lawsuits could dramatically slash the number of cases.[2]

The ECT's protection of fossil fuel investments needs to end together with the fossil fuel dependency to accelerate the transition to a society with clean and affordable energy for all.

By Emilia Samuelsson

[1] *https://caneurope.org/content/uploads/2021/07/CSO-Statement-.pdf*

[2] *https://www.euractiv.com/section/energy/news/energy-charter-treaty-cannot-be-used-in-intra-eu-disputes-rules-top-court/*

Dependence on fossil gas ...

Continued from front page

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eating, Europe's powerful gas companies are enjoying huge profits," said Jonathan Noronha-Gant, Senior Gas Campaigner at Global Witness. He adds "As these companies pass massive rises in the price of gas onto some of the most vulnerable people, it leaves a sour taste that those same companies continue to enjoy healthy profits".[1]

At the end of October the Commission published an annex to its State of the Energy Union Report which showed that fossil fuel subsidies amounted to 56 billion euro in 2019. Fossil fuel subsidies have increased, it found, by 2 billion euro since 2015. The annex states that "EU and its member states have to do more to reduce fossil fuel subsidies". Rebecca Humphries, at the WWF, calls for action in light of the energy price increase "More gas in the EU would mean more pollution, more costs, more risks".[2]

Poland and Hungary have blamed Europe's climate policies for the rise in energy prices and called on the Commission to suspend the Emissions Trading Scheme (ETS). Viktor Orban, the Hungarian Prime Minister stated: "The price will go up every day if this stupid plan is not withdrawn".[3] Even though there has been an increase in European carbon prices, these were not the main culprit for soaring energy costs. Ember, an independent climate and energy think-tank, shows that the surge in European power prices is predominantly being driven by soaring fossil gas costs.

A related report was published alongside the Energy Union report focusing on the EU carbon market. The carbon market (EU ETS) covers sectors responsible for 36% of the bloc's greenhouse gas emissions. It was stated that this "contributed significantly" to emission reductions, with emissions from power generation and energy-intensive industrial sectors falling by 43% since the launch of the cap and trade system in 2005. Data set out in a working document relating to the carbon market report show that EU member states (including the UK) received 19.2 billion euro in auction revenues from the ETS in 2020, with cumulative revenues from the system surpassing 68 billion euro. Some 72% of the 2020 revenues were spent on "climate and energy purposes", the Commission explained. In addition, investments in renewables increased 48% in 2020, according to the report.

The Commission has introduces a "toolbox" of short-term measures available to EU countries. It relies mainly on temporarily cutting national energy taxes that typically account for around a third of power bills. However, the solution to these price spikes in the longer run is a faster rollout of renewable energies, such as wind and solar, as well as improved energy efficiency. The Commission Executive Vice-President Frans Timmermans stated "The irony is, had we had the green deal five years earlier, we would not be in this position, because then we would have less dependency on fossil fuels and on natural gas. We have seen along this energy price crisis, along the way, that the prices for renewables have stayed low and stable".[4]

Emilia Samuelsson

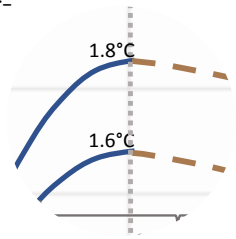
[1] Gas companies in Europe made €4 billion from energy crunch: report , Euractive, 29 October 2021, *https://www.euractiv.com/section/energy/news/gas-companies-in-europe-made-e4-billion-from-energy-crunch-report/*

[2] Fossil fuel subsidies 'must continue to fall' amid energy crisis, say OECD and IEA, ENDS Europe, 3 November, *https://www.endseurope.com/article/1732268/fossil-fuel-subsidies-must-continue-fall-amid-energy-crisis-say-oecd-iea*

[3] EU summit to pass on energy 'hot potato' to ministers, Euractive, 21 October 2021, *https://www.euractiv.com/section/climate-environment/news/eu-summit-to-pass-on-energy-hot-potato-to-ministers/*

[4] Timmermans: Fossil fuel dependency, not ETS to blame for rising energy costs, ENDS Europe, 14 September 2021, *https://www.endseurope.com/article/1727335/timmermans-fossil-fuel-dependency-not-ets-blame-rising-energy-costs*

The science of temperature overshoots



On behalf of CAN and AirClim, Climate Analytics has analysed the Impacts, Uncertainties and Implications for Near-Term Emissions Reductions if the planet overshoots a 1.5°C global temperature increase.

Climate science uses emission pathways to assess different trajectories towards limiting warming to specific warming levels, most commonly to below 1.5°C or 2°C. In recent years, so-called overshoot pathways have also increased in prominence. In overshoot pathways global mean temperatures temporarily exceed a specific target, such as 1.5°C, before bringing temperatures back down below the target.

https://climatenetwork.org/resource/the-science-of-temperature-overshoots-impacts-uncertainties-and-implications-for-near-term-emissions-reductions/

30 billion euro to repair after German flooding

The severe flooding which hit Germany in summer 2021, in which more than 170 people died, also resulted in high costs. Germany's federal and regional governments allocated about 30 billion euro ($35 billion) to help pay to rebuild infrastructure damaged in the disaster, Bloomberg reports. Loss and damage was a key issue at the UN climate conference in November, the term refers to unavoidable impacts of climate change that cannot be adapted to, from flooded villages to drought-struck farms. Vulnerable nations want money and support for people threatened by such impacts. However, wealthy countries have consistently resisted this idea, fearing that they will be forced to pay compensation due to their historical responsibility for climate change, reports Carbon Brief.

Bloomberg, 9 August 2021, *https://www.bloomberg.com/news/articles/2021-08-09/germany-to-allocate-30-billion-euros-to-repair-flooding-damage*

Carbon brief *https://www.carbonbrief.org/cop26-key-outcomes-agreed-at-the-un-climate-talks-in-glasgow*

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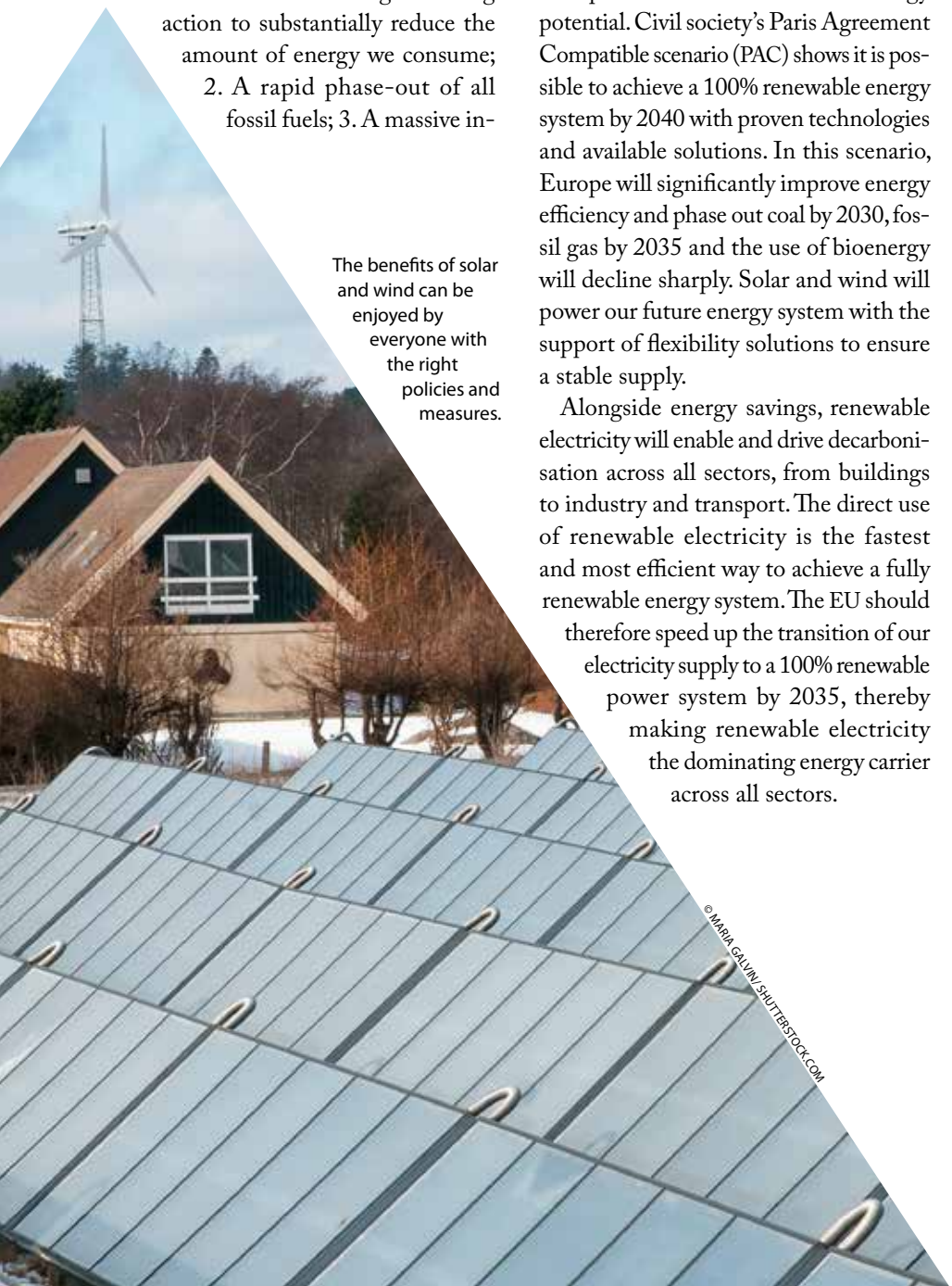
NGOs demand a fully renewable energy system by 2040 in Europe

An initiative of Climate Action Network (CAN) Europe calls for a 100% renewable energy system by 2040 (heat, transport and industry) and 100% renewable electricity by 2035.

The initiative launched in October, right before COP26, calls for a fair and sustainable transition to a 100% renewable energy system, specifically contributing to accelerating solar and wind deployment at the pace and scale required by the climate crisis. It asks policy makers both at EU and national levels to take bold and forward-looking actions to build a prosperous and sustainable energy future for everyone.

The transition of our energy system will need to stand on three legs 1. Strong action to substantially reduce the amount of energy we consume; 2. A rapid phase-out of all fossil fuels; 3. A massive increase in sustainable renewable energy to fully cover the remaining energy demand. It can and must address environmental and social goals at the same time. A fully renewable and fair energy future will unlock a healthier environment while creating local jobs. It would also ensure greater self-sufficiency and alleviate energy poverty, thus avoiding a future energy crisis.



The benefits of solar and wind can be enjoyed by everyone with the right policies and measures.

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Europe's potential for renewable energy is massive and mostly untapped. A large number of energy scenarios show that Europe has abundant renewable energy potential. Civil society's Paris Agreement Compatible scenario (PAC) shows it is possible to achieve a 100% renewable energy system by 2040 with proven technologies and available solutions. In this scenario, Europe will significantly improve energy efficiency and phase out coal by 2030, fossil gas by 2035 and the use of bioenergy will decline sharply. Solar and wind will power our future energy system with the support of flexibility solutions to ensure a stable supply.

Alongside energy savings, renewable electricity will enable and drive decarbonisation across all sectors, from buildings to industry and transport. The direct use of renewable electricity is the fastest and most efficient way to achieve a fully renewable energy system. The EU should therefore speed up the transition of our electricity supply to a 100% renewable power system by 2035, thereby making renewable electricity the dominating energy carrier across all sectors.

The transition from dirty fossil fuels to renewable electricity is still too slow. On 26 October, the European Commission published its 2021 state of the energy union report which showed that renewables became the primary energy source in 2020, generating 38% of the bloc's electricity needs, and only half of this by wind and solar, while fossil fuelled generation stood for 37%. The report also highlighted that some member states, notably France and Poland, appear at risk of failing to achieve their national binding targets without making use of statistical transfers. In other words transfers that allow EU countries to fulfil their commitments towards the EU's 2030 renewable target by paying countries who have exceeded their national targets.

Nevertheless, renewable electricity generation needs to increase five-fold from 2020 to 2040 for a fully renewable energy system. In concrete terms, for solar and wind energy, this means at least quadrupling the capacities that are installed every year in the EU compared to the past decade. Europe has the potential, the knowledge, the capital and the popular support for this far-reaching transition.

When it comes to people's support, a new survey of 10,000 citizens by pollster YouGov, commissioned by the European Climate Foundation (ECF), showed that 62% of respondents would support an onshore wind farm being built near to where they live. The number for offshore wind was almost as high, differing by one percentage point, while public acceptance of solar installations appears to be noticeably higher: rooftop panels resulted in 81% and panels in fields got 73%. The ECF noted that 86% of respondents supported the development of at least one of the four categories of onshore and offshore wind, rooftop solar or solar arrays.

The transition towards a 100% renew-

able energy system needs to be done with respect for social and environmental complexities. Ensuring that people are active participants and benefit from it, in particular vulnerable and low-income households, is vital to fight inequalities. The benefits of solar and wind can be enjoyed by everyone with the right policies and measures, adequate funding and sound procedures alongside inclusive planning and governance. Additionally, boosted renewable energy deployment must be accomplished with respect for biodiversity. To minimise the negative environmental effects and enable synergies with nature conservation, good governance is vital. Measures in the form of dialogue and public involvement, proper spatial planning, and applying circular design principles will promote this outcome.

As part of its campaign, CAN Europe has gathered stories of local initiatives driving the transition;

- **The Parc des Grands Causses – a 100% renewable energy territory by 2023.** Parc Naturel Régional des Grands Causses, in southern France, combines energy ambition and local development. After 15 years of voluntarist policy on the control of consumption and the development of renewable energies, the Parc des Grands Causses is building the energy and financial autonomy of the territory, by federating public and private actors. The objective is to become a "positive energy / 100% renewable energy" territory by 2023.
- **Offshore wind and biodiversity.** The Belgian Offshore Platform, an association of investors and owners of wind farms and 4Sea, a coalition of environmental organisations, will work together for the development of wind energy in the Belgian part of the North Sea to benefit both nature and climate. Based in part on the findings of more than 10 years of scientific research on existing wind farms (WinMon.BE 2020), they are convinced that further development of offshore wind energy can go hand in hand in the protection of the marine environment and marine biodiversity, provided that one starts from the biodiversity or other natural habitats to be protected.
- **Former polluter site, now a home of the first solar park in N. Macedonia:** N. Macedonia is showing the transition to renewable and clean energy in the Western Balkans is indeed possible. In 2022, former coal deposits and the related coal-fired thermal power plant in Oslomej will be covered with a 10 megawatt photovoltaic power plant, the first of its kind in North Macedonia. It will provide annual production of 15–17 gigawatt-hours, sufficient for the needs of 2800 households, create at least 100 new jobs and enable the recultivation of the former coal mining land. CAN Europe's member Ekosvest has been active in influencing the just energy transition in the Kicevo region, which even though pioneering, could motivate further action, especially in similar coal regions.
- **The coal to clean switch in two years in Greece's lignite regions.** For years Greece was the third-largest lignite producer in Europe. In late 2019 the Greek government and the Public Power Corporation (PPC), announced that all existing lignite power plants will retire by 2023, while the last plant (Ptolemaida V) will cease to burn lignite by 2028. In April 2021, PPC effectively moved the phase out date three years earlier by declaring that it will convert Ptolemaida V to a different technology by 2025. PPC is also planning on installing a total PV capacity of over 2.5 GW by 2024 in the vast lignite mine fields, and offering a 5% share to local citizens. Thus, in the space of two years, PPC has gone from business as usual, to ending lignite burning by 2025 and shifting to renewables.

Emilia Samuelsson

Based on CAN Europe's Campaign

US EPA new air quality policy assessment

Tighter standards for $PM_{2.5}$ could reduce mortality in the US.

The US EPA has published a draft policy assessment of the National Ambient Air Quality Standards (NAAQS) for particulate matter based on new information and analyses. It concludes that the available scientific evidence, air quality analyses, and the risk assessment allow for a revision of the current annual and 24-hour primary $PM_{2.5}$ standards for the adequacy of public health protection. The risk assessment estimates that, compared to the current standards, potential alternative annual standards with levels from 11.0 down to 8.0 $\mu g/m^3$ could significantly reduce $PM_{2.5}$-associated mortality broadly across the United States.

US EPA Policy Assessment for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter, External Review Draft can be read in full at *https://www.epa.gov/system/files/documents/2021-10/draft-policy-assessment-for-the-reconsideration-of-the-pm-naaqs_october-2021_0.pdf*

Express your view on EU Air Quality

Have your say on the revision of the EU Ambient Air Quality Directives (2008/50/EC and 2004/107/EC). The European Green Deal announced this initiative under the umbrella of the Zero Pollution ambition for a toxic-free environment. Citizens and stakeholders are welcome to express their views. Public consultation is open until 16 December 2021.

Source: Air quality – revision of EU rules by European Commission, accessed October 2021 *https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12677-Revision-of-EU-Ambient-Air-Quality-legislation/public-consultation_en*


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Energy sufficiency: a necessary complement to energy efficiency

Making the case for energy sufficiency in European policies: the construction of a European sufficiency-based energy transition scenario.

The need to substitute fossil fuels with low-carbon energy resources as soon as possible requires the development of new energy sources such as electric renewables, as well as keeping the level of energy demand under control, so that these new sources can be used instead of fossil sources, rather than in addition. Action to limit energy demand could encompass changes in the amount of energy that is used to provide a given level of services, by improving energy efficiency, and changes in the level of services that use energy, through energy sufficiency.

In the past 20 years, successful energy efficiency policies have enabled progress in the design of more energy-efficient equipment. Cars are a good example of this, with constant progress made in improving the efficiency of vehicles. However, the fact that cars have got bigger and heavier and travel longer distances has kept annual fuel consumption at a high and steadily rising level. This also has consequences for the consumption of resources, with steel demand for cars increasing, as well as the space they require (parking spaces and roads), at the expense of natural areas and, with the shift to electric vehicles, projected high pressure on lithium and cobalt reserves needed for batteries. However, in traditional environmental and climate policy action there has been little room to question whether those increasing trends were tailored to actual needs, or whether they may have been the result of unsustainable consumption patterns, with no reflection on the dimensioning or level of use of the energy service.

Energy sufficiency aims at keeping consumption at a sustainable level through action at the level of the service, such as the size of the car, its sharing or the shift to other modes, or the distances covered. This mostly entails satisfying decent minimum energy service levels for everyone, while keeping the average level within limits that do not endanger the carrying capacity of the Earth. In Northern economies it aims to curb the demand for energy services without negatively affecting the well-being of consumers.

The perception of energy as a simple commodity has nurtured the myth of infinite growth in energy production. Since the first decarbonisation efforts, this view has focused policy-maker's attention on tapping the potential of low-carbon energy production and efficiency of processes, with little consideration given to changing consumption patterns. The urgency of climate action, the need to get to net-zero greenhouse gas emissions, and rising concerns for biodiversity, resource availability, water and land use issues call for a vision shift towards dimensioning energy services at a just and sustainable level. To achieve this, the overarching purpose of fulfilling services (mobility, housing, lighting, etc.), rather than producing energy, must become central in the analysis of the energy system and its evolution.

Starting energy system modelling with the analysis of energy services lets us question the need for those services and define just levels. As such, it contrasts with the more traditional approach of energy modelling, which aims to achieve decarbonisation by optimising the low-carbon energy supply mix and energy efficiency processes. As our understanding of the climate and delays in the energy transition require more and more ambitious decarbonisation pathways, this traditional approach has reached its limits: classical modellers now try to add lifestyle changes as additional options (e.g. keeping international air travel at the pre-Covid crisis level in the latest IEA Net Zero Roadmap). While this is of course to be welcomed, it does not enable us to fully tap the broader and deeper potential of sufficiency to save resources and reduce impacts – which requires us to question societal needs first and then define sustainable consumption levels on a more systematic, comprehensive and meaningful scale, allowing for societal coherence and consistency.

European governments and the EU have committed to becoming carbon neutral by 2050, and more recently to increase the pathway towards this target through a 55% cut compared to 1990 levels in 2030. Previous decarbonisation strategies that were set for only 80–95% reductions in GHG emissions relied mostly on exploiting energy efficiency and renewable energy. Now, meeting the unprecedented challenge of reaching carbon neutrality by mid-century requires broad and deep changes in production and consumption patterns. By reducing costs as well as the required scale of renewable installations, energy storage and their related impacts on materials and land use, sufficiency can facilitate the achievement of the EU's renewed ambitious targets.

At the European level, the sufficiency potential remains a hidden resource. Revealing its full potential in order to meet the adequate level of ambition on all sustainability issues requires a high level of detail in the energy demand analysis, which is best done at the national level.

The full integration of energy sufficiency into scenarios requires a concrete description of energy services and their possible evolution in the modelling work. This calls for a more physical approach to modelling, compared to most classical models. Experience shows that most of the models developed and used to build energy and climate scenarios over the past decades tend to focus on representations of economic systems, often with the aim of minimising costs of energy supply and

Energy sufficiency aims at keeping consumption at a sustainable level.

processes, in a way that is not fit to embed specific sufficiency-related assumptions and consistently assess their impact.

In the case of mobility, to implement sufficiency in practice, one could envisage actions that aim to tailor the size of transport vehicles to energy service needs, (e.g. fewer cars in the urban environment), or reducing the distance travelled, particularly for the most energy-consuming transport modes (e.g. cars or planes). This can be achieved through modal shifts towards cleaner modes of transport such as rail or smaller vehicles, or non-energy-consuming uses such as soft mobility, as well as through mutualisation and occupancy with car sharing and pooling, or through an absolute reduction such as remote working.

For buildings, the most common implementation of sufficiency will aim to reduce the floor area that is supplied with energy (e.g. heated m^2, or m^2/capita), or reducing the temperature for heating. Other sufficiency levers are the reduction of specific electricity consumption needs (particularly through the reduction of the number of appliances through mutualisation, or their size), but also of the needs for other uses of heat (for water and cooking).

Partners in around twenty European countries[1] are working together on the integration of harmonised, sufficiency-based, national scenarios into a pathway to meet 100% renewables energy supply and net-zero greenhouse gas (GHG) emissions on a European level by 2050 at the latest.

A first, key building block of the construction of a common sufficiency modelling language was achieved through the definition and prioritisation of a list of sufficiency indicators that were integrated within a dedicated indicators dashboard used to "translate" national scenarios based on different methodologies, models, scopes, logic and level of aggregation or disaggregation of data, into a common, sufficiency-focused, language.

A contraction and convergence approach can be applied to energy consumption through dedicated comparison indicators relating to the level of energy services. On the basis of sufficiency assumptions made on key indicators, sufficiency corridors that include minimum and maximum levels corresponding to decent energy consumption levels are discussed in the technical dialogue for indicators based on population (e.g. residential floor area (m^2/cap) and passenger traffic (pkm/cap). This enables a search for convergence in living standards . In this complex search for convergence, international literature and the concepts of decency and social justice are referred to: the general vision is rather one of a reduction in excessive energy services, particularly for the most affluent consumers (a good example could be a reduction in the use of SUVs for short-distance travel in urban areas, which can be modelled through a reduction in the distance travelled by heavier cars in urban areas). At a European level, the aim is to define how energy services in different countries and within those countries can converge towards energy service levels that are lower than those of the most affluent countries, such as Luxembourg, but higher than those of catching-up economies, such as Bulgaria. Consumption reduction in the North makes space for fair access and development towards decent energy service levels in the South.

This should ultimately allow assessment and discussion of the kind of ambitious energy consumption reduction target that is needed to meet the other sustainability goals (carbon neutrality and 100% renewables).

Yves Marignac
Stephane Bourgeois
Mathilde Djelali
Nicolas Taillard

[1]The project is developed on a coherent geographical area that encompasses the EU plus UK, which was still part of the former when the project started, Switzerland and Norway.

[2]The work on sufficiency-related indicators is being deepened within the framework of the CACTUS project ("Consolidating Ambitious Climate targets Through end-Use Sufficiency", *www.cactus-energy-sufficiency.eu*).

[3]This approach has been documented, for instance, through the calculation of convergence and compression factors in the EUCalc project (Climact, 2019).

[4]"Minimum consumption standards allowing every individual to live a good life, and maximum standards guaranteeing the chance to live a good life for others" (Fuchs, 2021)

Taxing livestock to reduce nitrogen and GHG emissions

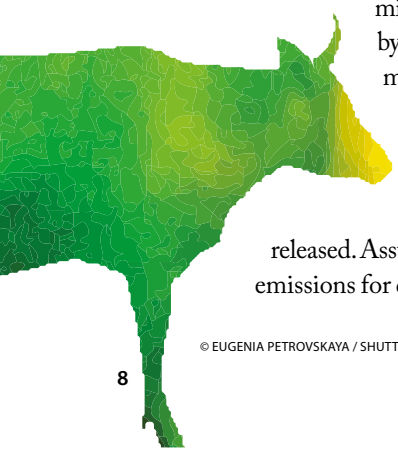
A recent report provides three concrete proposals on how livestock could be taxed to reduce ammonia and greenhouse gas emissions, while generating funds for reforms.

In Germany, as in large parts of Europe, emissions of ammonia and greenhouse gases from agriculture have remained, with small fluctuations, constant in recent decades. The German environment organisation Deutsche Umwelthilfe (DUH) has in a recent report examined different possibilities to introduce taxes to reduce emissions from livestock production.

The report is based on an existing proposal from the Bochert Commission to introduce an excise duty on animal products to finance efforts to improve animal welfare in agriculture. In principle, the duty would be 40 cents per kg of meat and processed meat products, 2 cents per kg of milk, fresh milk products and eggs, and 15 cents per kg of cheese, butter and milk powder.

In contrast to the original proposal, DUH proposes that the tax could be related to the magnitude of ammonia emissions that different animal species give rise to, and instead of a consumer tax it should be a tax on production. To generate as much tax revenue as the original proposal, 28 euro per cow, 4 euro per pig and 0.30 euro per chicken would have to be charged in the first year.

In another proposal, which focuses on reducing German agricultural emissions of ammonia by 30 percent (in order meet German commitments under the NEC directive by 2030), DUH introduces a limit value for livestock density. With an agricultural area of 16.7 million hectares by 2030, a maximum of 0.025 tonnes of ammonia per hectare should be released. Assuming typical emissions for different species, this corresponds to approximately 1.05 cows, 5.5 pigs or 89 chickens per hectare. The proposal is to impose a progressive tax on the number that exceeds the acceptable limit. With a farm of 100 hectares, it is possible to have 105 cows without paying the tax. But after that, you must pay more tax for each additional animal.



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Keeping significantly more cows than indicated by the limit value quickly becomes uneconomical. Especially as many forms of animal husbandry already have low profit margins. A reduction in the number of animals is then inevitable. Farms with little space and lots of animals would need to undergo a major transformation. The report therefore proposes that the funds generated be used for investments in agriculture that drive this conversion process forward. It may also be a good idea for this type of tax to be introduced gradually, so that farmers have time to adjust.

The authors of the report believe that the tax would only contribute to a marginal cost increase for animal products, as most farms would choose an animal density that is close to the set limit value for the tax. It may not be that simple. A transition to more extensive animal husbandry can have a number of effects on farmers' finances and the price of the end product. Certainly, the production of animal products will decrease, which opens up for increased imports and that ammonia emissions will increase elsewhere in the world.

Reduced ammonia emissions in Germany would, however, be of great social benefit. A reduction from current emissions by 184,000 tonnes would mean savings of almost 4 billion euro in lost costs for ill health.

A third proposal is based on the polluter pays principle and the climate impact that animal husbandry gives rise to. Instead of using tax as a means of adjusting animal density to a specific level, taxation should be set according to the climate costs that production gives rise to, a so-called Pigouvian tax. The most accurate would of course be to measure the emissions for each individual animal, but this would take up too much resources. Instead, you have to make generalisations for different animal groups, life expectancy before slaughter, etc.

According to the report's calculations, for example, the price of a litre of milk would increase by 6 cents. This in turn would reduce the demand for milk by 1–10% and one can assume a similar reduction in emissions.

The report also advocates that the tax incomes should go back to agriculture. Farmers who, for example, reduce their herds and instead restore wetlands, reforest areas, maintain permanent grassland or otherwise contribute to CO_2 reductions could receive financial resources that compensate for their loss of income and reward the environmental system service provided.

As with the production tax on ammonia there is an obvious risk of leakage, i.e. imports would increase and emissions move abroad. Unlike ammonia, there are not even any local environmental benefits. The problem of leakage could to some extent be avoided if the whole of the EU adopted a similar tax system. Otherwise, a system would be needed where a tax is levied on imported products as well.

It is certain, however, that more tools are needed to reduce emissions from agriculture. In this search environmental taxes on livestock or animal products should not be overlooked. These examples show that there is a variety of options, depending on what you want to achieve.

Kajsa Pira

Source: Ökonomische Instrumente für eine umwelt- und klimafreundliche sowie artgerechte Tierhaltung by Forum Ökologisch-Soziale Marktwirtschaft on behalf of Deutche Umwelt Hilfe, August 2021 Link: *https://www.clean-air-farming.eu/downloads-und-links*

Coastal areas will see continued sea level rise throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas

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IPCC: Climate change is widespread, rapid, and intensifying

The IPCC has summarised the main conclusions of its WG 1 physical science report from August 2021 in a press release.

Scientists are observing changes in the Earth's climate in every region and across the whole climate system.

Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years, and some of the changes already set in motion – such as continued sea level rise – are irreversible over hundreds to thousands of years.

It is projected that in the coming decades climate changes will increase in all regions. For 1.5°C of global warming, there will be increasing heatwaves, longer warm seasons and shorter cold seasons. At 2°C of global warming, heat extremes would more often reach critical tolerance thresholds for agriculture and health.

Climate change is bringing multiple different changes in different regions – which will all increase with further warming. These include changes to wetness and dryness, to winds, snow and ice, coastal areas and oceans. For example:

- Climate change is intensifying the water cycle. This brings more intense rainfall and associated flooding, as well as more intense drought in many regions.
- Climate change is affecting rainfall patterns. In high latitudes, precipitation is likely to increase, while it is projected to decrease over large parts of the subtropics. Changes to monsoon precipitation are expected, which will vary by region.
- Coastal areas will see continued sea level rise throughout the 21st century, contributing to more frequent and severe coastal flooding in low-lying areas and coastal erosion. Extreme sea level events that previously occurred once in 100 years could happen every year by the end of this century.
- Further warming will amplify permafrost thawing, and the loss of seasonal snow cover, melting of glaciers and ice sheets, and loss of summer Arctic sea ice.
- Changes to the ocean, including warming, more frequent marine heatwaves, ocean acidification, and reduced oxygen levels have been clearly linked to human influence. These changes affect both ocean ecosystems and the people that rely on them, and they will continue throughout at least the rest of this century.
- For cities, some aspects of climate change may be amplified, including heat (since urban areas are usually warmer than their surroundings), flooding from heavy precipitation events and sea level rise in coastal cities.
- Human actions still have the potential to determine the future course of climate. The evidence is clear that carbon dioxide (CO_2) is the main driver of climate change, even as other greenhouse gases and air pollutants also affect the climate.

The IPCC had concluded earlier in a Special Report on 1.5°C degrees warming that there is an urgent need to halve global CO_2 emissions by 2030 from fossil energy use and from land use change (e.g. deforestation). There should be fast action to reduce emissions from all other greenhouse gases as well.

Compiled by Reinhold Pape

Source: *https://www.ipcc.ch/working-group/wg1/*

Vulnerable countries: high emitters must act

Some of the countries most vulnerable to climate breakdown have called on the UN and climate progressive countries to help them ensure high emitters upgrade their carbon targets, as called for at the COP26 in Glasgow. Countries such as Australia, which has refused to embrace strong carbon-cutting targets, would lose out economically. It would be "an uphill battle" to ensure adequate revisions to national carbon targets, and all those who want to see climate action must use the coming year to put pressure on the governments that had inadequate plans. At COP26, countries came forward with emissions-cutting targets, known as nationally determined contributions (NDCs), that would lead to an estimated 2.4°C of heating, far in excess of the 1.5°C set out in the Paris agreement. All countries agreed to return next year to COP27 in Egypt with reviewed targets. However, some countries are reluctant to strengthen their targets – Australia has already signalled its refusal, while the US and the EU have said their targets are good enough.

Source; Climate-vulnerable countries call for help forcing high emitters to act, The Guardian 18 November 2021

Places to preserve to avoid climate chaos

The Guardian reports that detailed mapping has pinpointed the carbon-rich forests and peatlands that humanity cannot afford to destroy if climate catastrophe is to be avoided. The vast forests and peatlands of Russia, Canada and the US are vital, as are tropical forests in the Amazon, Congo and south-east Asia. Peat bogs in the UK and mangrove swamps and eucalyptus forests in Australia are also on the list. The scientists identified 139 billion tonnes (GT) of carbon in trees, plants and soils as "irrecoverable", meaning that natural regeneration could not replace its loss by 2050, the date by which the net global carbon emissions must end to avoid the worst impacts of global heating.

Source: Revealed: the places humanity must not destroy to avoid climate chaos, The Guardian, 18 November 2021

Natural ecosystemes all over the world are needed to store carbon.

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Closing the nitrogen cycle with agroecology

Study shows that it is possible to halve nitrogen losses in Europe by abolishing synthetic fertilisers, reconnecting livestock and cropping systems and changing diets.

What if the Haber-Bosch process[1] was never invented? The researchers behind the study "Reshaping the European agro-food system and closing its nitrogen cycle" do not express themselves so dramatically. But one of their main findings is that it is possible to manage food supply in Europe[2] without synthetic fertilisers by 2050.

It is not given as much attention as it ought to be, but the backbone of the current European food-system consists largely of artificial fertilisers. Their introduction little more than a century ago enabled a decoupling of livestock and crop production. This in turn led to specialization in farming, which admittedly was also favoured by economics and agricultural policy. Today we see areas with only crop production and almost no livestock, and other areas with very high livestock density. Areas not optimal for either have been abandoned or planted with production forest. This has been a success in terms of productivity. But, unfortunately, not for the environment.

Synthetic nitrogen fertilisers are spread over the land in crop regions to maximise harvests. In livestock regions there is a need to import feed, since locally grown crops and grass are not enough. The production of manure is greater than the local need, resulting in over-fertilisation of crops. The average nitrogen surplus on European farmland increased by 34 per cent between the early 1960s and the mid 2010s. The increase since the 1930s when the use of fertilisers began to gain momentum is of course even greater. Losses to water and air have followed similar trends, causing air pollution, greenhouse gas emissions and eutrophication.

Today, eight per cent of EU agricultural land is cultivated with organic methods, i.e., without synthetic fertilizer. The authors of the study extrapolate the data available from existing organic farming to the whole of Europe. Among other things, they base their scenario on the crop rotations that are most common in different regions today.

A limit for nitrogen surplus is set at 35 kgN/ha/year, to ensure that nitrate leaching into groundwater is kept in line with the Nitrate Directive. This in turn acts as a cap for livestock concentrations since manure production must be kept within the limits. Applying this restriction more than halves the number of livestock in Europe. At the same time, their geographical distribution becomes more even.

Besides nitrogen-fixing crops and manure, they also include recycled human urine as a fertiliser. This assumes a wide uptake of urine separation and lifting the ban on human excreta in the EU organic farming regulation. Seventy percent of the nitrogen in human excreta

Nitrogen-fixing crops, manure and recycled human urine are used as fertilisers in the scenario.

is considered to reach the fields. Crop yields are calculated based on the total nitrogen input, and organic crop rotations.

In the scenario the authors assume a European diet that is a middle ground of several previous suggested sustainable diets. The proportion of animal protein in the diet is slightly less than half that in today's average European diet. This is largely replaced by cereals, legumes, fruits, and vegetables. But the intake of nitrogen in the diet is also reduced by about 20 per cent.

The harvests are then matched to the demand of humans and livestock. The countries in the scenarios are assumed to strive for self-sufficiency. In some countries this was not possible and import from neighbouring countries is then allowed. Trade between the scenario countries is approximately halved. In Europe as a whole, there is enough food to feed the estimated population of 600 million by 2050.

There is even a small surplus available for export outside Europe, although only a fraction compared to current exports: 7% of cereals and 36% animal products. One might wonder if this would be a threat to food security on other continents. The authors believe that this would not be the case, since the current export level is far outweighed by imports of oilseeds and forage (e.g. soybeans), fruit and vegetables. When Europe becomes more self-sufficient in food and feed, land resources in the rest of the world will be released that can be used for their domestic food production.

So, the scenario shows that there is enough to eat. What are the environmental results? This nitrogen-sparing agro-food system is calculated to reduce nitrogen losses linked to manure management by 53%. Overall nitrogen surplus is reduced by 57%. This is not addressed in the paper, but it can be assumed that because

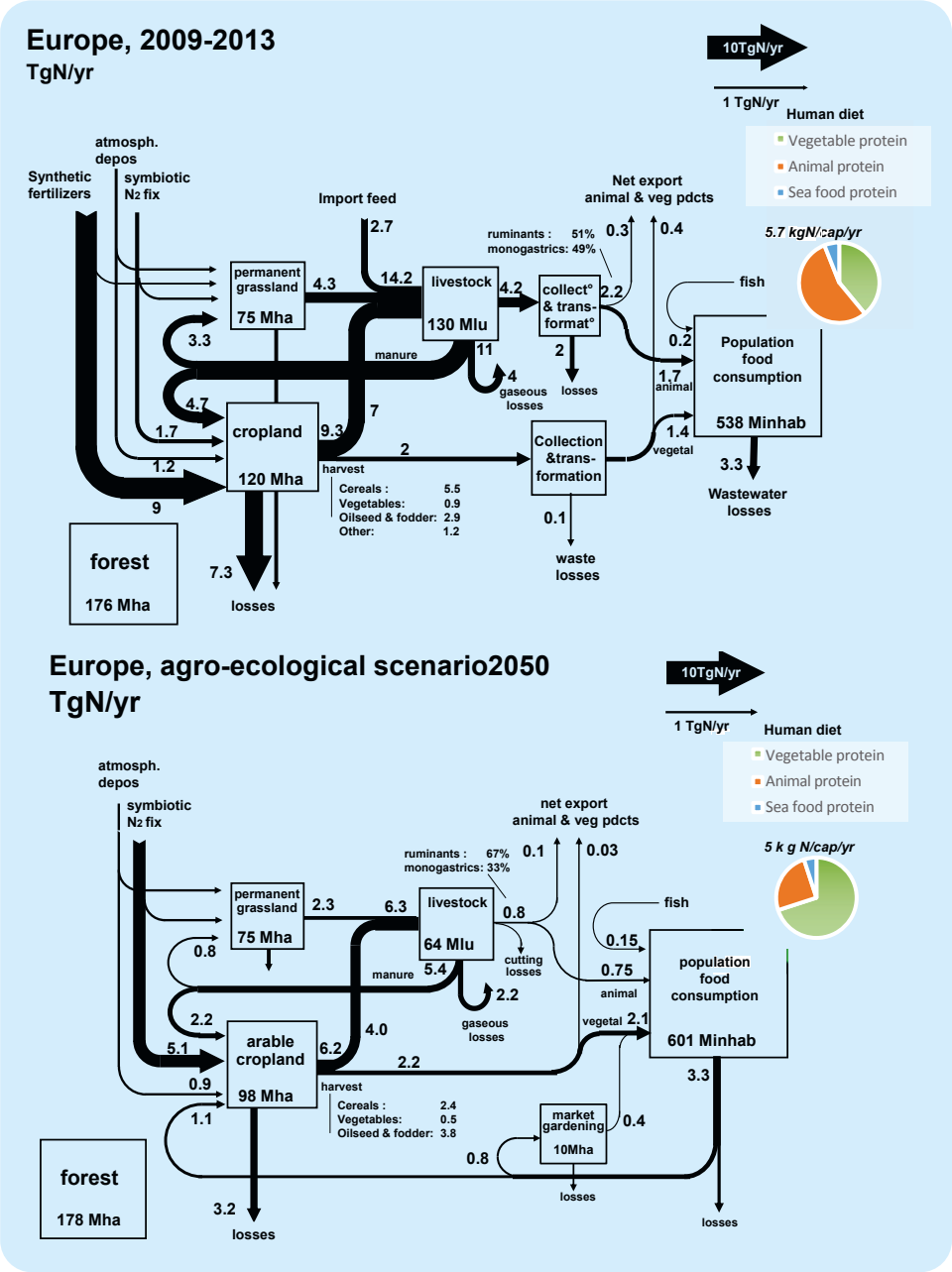


Figure: Nitorgen fluxes involved in the agro-food system of Europe. The chart above is based on data for the 2009–2013 period. The chart below on data from the agroecological scenario for 2050.

the number of livestock is more evenly distributed in the scenario, the effects will be even greater in the parts of Europe that have the highest animal densities today. Figure shows all the nitrogen fluxes under the scenario in comparison with the current situation.

In a press release[3] the outcome of the scenario is summarised as follows: "it would in this way be possible to reinforce Europe's autonomy, feed the predicted population in 2050, continue to export cereals to countries which need them for human consumption, and above all substantially reduce water pollution and greenhouse gas emissions from agriculture."

Kajsa Pira

Source: Reshaping the European agro-food system and closing its nitrogen cycle: The potential of combining dietary change, agroecology, and circularity, One Earth, 18 June 2021 *https://doi.org/10.1016/j.oneear.2021.05.008*

[1] The most widespread method of producing nitrogen fertilisers. It was invented by Fritz Haber in 1909 and adapted for industrial use by Carl Bosch one year later.

[2] Europe is in this case defined as the EU member states, United Kingdom, Norway, Switzerland, Albania and the countries previously belonging to the Yugoslavian Republic.

[3] Press release, CNRS, 18 June 2021, *https://www.cnrs.fr/en/organic-farming-could-feed-europe-2050*

Revising LULUCF regulation could be a chance for both climate and biodiversity

The European Union carbon sink must more than double by 2030. The cheapest way to do this is by protecting and restoring forests, peatlands, and other natural ecosystems.

While drastic emission reductions are key to averting catastrophic climate change, diverse and resilient lands and forests have long been recognised as equally important. The ways we use our land and forests require urgent changes which should be in line with the speed and scale of the climate emergency we are facing.

Following an agreement on a revised EU 2030 target of at least 55% net greenhouse gas emission reductions, in July the European Commission presented proposals to revise the EU climate and energy legislation for the period 2021–2030, including the EU Regulation on Land Use, Land Use Change and Forestry, known as LULUCF, which aims to tackle the carbon flows in forests and on land in the EU.

In recent years the EU carbon sink provided by the LULUCF sectors has decreased significantly to a value of 265 Mt of CO_2 in 2019. This last figure consists of around 135 Mt of emissions (mainly from croplands, wetlands and land conversion to settlements) and 400 Mt of removals (mainly from managed forests). Under the current policy the sink is allowed to further decrease to 225 Mt by 2030 without member states accumulating any debits. This is what is expected if member states move on with their plans to increase forest harvesting and continue to drain peatland soils for agriculture, forestry and peat extraction.

To meet the long-term goals of the Paris Agreement, the LULUCF sectors need to urgently increase the amount of CO_2 that is removed from the atmosphere and stored in landscapes. This must be done while restoring ecosystems in order to support and enhance the long-term viability of natural resources, ecosystem services, biodiversity and ecological food production. If the EU wants to contribute towards limiting warming to 1.5°C without significant overshoot, there is a pressing need for the land sector to be part of the solution over this current decade.

European NGOs call on the EU to aim to increase the LULUCF sector's net carbon sink to 600 Mt of CO_2 annually by 2030. This is based on a number of academic studies assessing the potential size of an ecologically viable LULUCF sink in the EU, aligned with adaptation needs and the EU's Biodiversity Strategy. Öko Institute's exploratory analysis, which reviews a wide range of studies, assesses a potential for an EU net sink of up to 600 Mt annually by 2030. The EU Transition Pathways Explorer EUCalc, put together by a large academic consortium, shows potential for a LULUCF sink of 570 Mt per year in 2030, and 787 Mt in 2050.

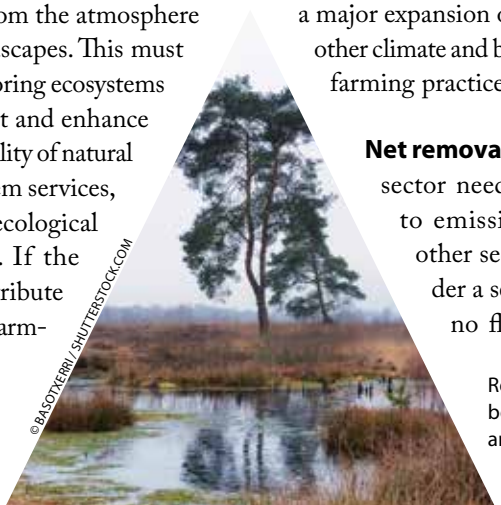
To achieve a net LULUCF carbon sink of 600 Mt by 2030 there need to be radical changes in the way we use land across the EU. Most importantly, forest harvesting rates must be reduced significantly and forests must be managed with a close-to-nature approach, as the forests' ability to absorb carbon is closely related to harvesting rates. There needs to be a significant reduction in the consumption and production of animal products, such as meat and dairy, a reform of the EU's bioenergy rules, and a shift to a more circular economy. Emissions from organic soils need to be drastically reduced, through careful application of re-wetting approaches, and carbon stocks on cropland need to be dramatically increased, through a major expansion of agroforestry and other climate and biodiversity-friendly farming practices.

Net removals by the LULUCF sector need to be additional to emission reductions in other sectors and kept under a separate target with no flexibility with the Emissions Trading System (ETS) and Effort Sharing Regulation (ESR) sectors. This is critical because emission reductions and removals in the LULUCF sector are not equal to emissions in other sectors and the two cannot simply be considered interconvertible. Measuring emissions and removals in the land sector is less accurate and land-based carbon stocks cannot be considered permanent in the same way as reducing fossil fuel emissions and keeping fossil fuels in the ground can. The climate and ecological crisis requires all sectors to exert their maximum effort, without progress in one undermining progress in the other.

The LULUCF sector is fundamental, not just to climate change mitigation, but also to the EU's natural environment, its wildlife and people. Changes in the incentives for forestry and land use can have either negative or positive consequences for biodiversity. The revised legislation must remain mindful of the impacts to biodiversity and ensure that concrete links are drawn between the LULUCF Regulation and the EU's biodiversity objectives, including those set out in the Biodiversity Strategy, in the Restoration Law and the Birds and Habitats Directive.

The revision of the LULUCF Regulation is an important opportunity in the EU's aim to mitigate both climate and biodiversity crises. For this to happen, more adequate targets as well as better-defined and transparent rules are needed in order for the LULUCF sector to stay in line with the path towards climate neutrality. Protecting and restoring forests, peatlands, and other natural ecosystems remains the cheapest, most effective and only readily available way to accomplish that.

Ulriikka Aarnio



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Restoring wetlands benefits both biodiversity and carbon storage.

A global roadmap to "climate-smart" offshore renewable energy

The Global Wind Energy Council and UN Global Compact launched a roadmap to advance offshore renewable energy on 5 November – "Ocean Day" – at COP 26.

The roadmap highlights the importance of a climate-smart approach to ocean management. Offshore wind is one of the most promising clean energy sources to support the vast increase in renewable energy that is needed to decarbonise the world. However, the deployment faces challenges fitting into an increasingly busy and vulnerable marine space. The Global Wind Energy Council leaders and IOC-UNESCO joined the UN Global Compact to voice their support for the roadmap.

The development of Marine Spatial Plans (MSP) was discussed, as these are central for the transition away from sectoral management to a more integrated process. According to IOC-UNESCO, as of 2021, over 45 countries worldwide are either implementing or approving marine spatial plans. This number needs to increase to enable participation and the environmental sustainability of the deployment.

The roadmap calls on MSPs to become more "climate-smart" as the climate crisis has and will continue to have great impact on the oceans. But only a few MSPs integrate adaptation and mitigation to climate change into their objectives and frameworks. By adding a climate-smart approach the MSPs prioritise space for climate-mitigation solutions like offshore renewable energy along with nature-based mitigation and adaptation solutions, such as marine protected areas.

When it comes to the socio-economic perspective the report highlights the benefits of new job opportunities. One offshore wind farm has the potential to create 10,000 full-time jobs over the 25-year project lifetime of a 500 MW offshore wind farm. If done right, with respect to both biodiversity and inclusion, the deployment could have positive effects on less-developed coastal areas by offering opportunities for new green jobs.

There are eight main recommendations that the roadmap calls for:

1. Recognise the importance of, and ensure implementation of, a climate-smart MSP process
2. Unlock public and multilateral financing to support countries advancing climate-smart MSPs
3. Improve knowledge and data-sharing on national and international levels
4. Strengthen socio-economic considerations in planning decisions
5. Strengthen the cross-border and transnational collaboration mechanisms for MSPs and offshore renewable energy
6. Ensure a stakeholder process that uses a climate-smart approach to minimise conflicts and maximise synergies between ocean users (read more about a case study on page 19)
7. Strengthen the link between offshore renewable energy and biodiversity protection and restoration to maximise climate mitigation effects
8. Explore synergistic multi-use combinations that can speed up the transition to low-carbon and climate-resilient economies.

The continued advancement of offshore renewable energy, and especially the environmentally and socially responsible installation of offshore wind, should be a strategic priority for countries and companies striving to meet the Paris Agreement goals. The World Bank estimates that the global technical potential for offshore wind exceeds 71,000 GW using current technology, and using just one per cent of this would meet more than 10 per cent of the world's current electricity consumption .

IRENA's 1.5°C scenario also foresees enormous growth of offshore wind, increasing from the current 34 gigawatts (GW) to 380 GW by 2030 and more than 2,000 GW by 2050 . In addition, other sources of offshore energy such as offshore solar, wave tidal and thermal energy installations can provide reliable and flexible energy for many coastal countries and Small Island Developing States (SIDS), balanced with offshore wind and different forms of land-based renewable energy production.

Emilia Samuelsson

Source Roadmap to Integrate Clean Offshore Renewable Energy into Climate-smart Marine Spatial Planning. Available at *https://www.un-globalcompact.org/library/5977*

WHO guidelines are based on science – policy should follow

Detailed models and data from more parts of the world are behind the lower acceptable levels for particles, ozone and nitrogen dioxide in the new WHO air quality guidelines.

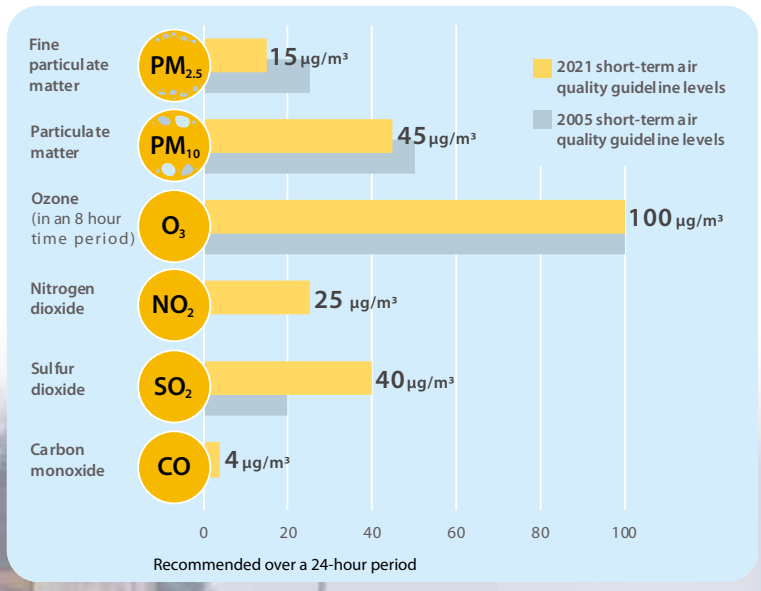
The new air quality guidelines from the World Health Organization (WHO)were published in September and the acceptable levels have been lowered for almost all pollutants (figure). This means that we now have the evidence that air pollution is harmful for health at much lower levels than previously believed.

The previous WHO air quality guidelines (AQGs) were published more than 15 years ago. Since they were issued, air pollution research has rapidly developed. Air pollution is now recognised as the single biggest environmental threat to human health. Although air quality in past decades has improved gradually in high-income countries, there are still many areas that do not reach the levels recommended in the previous WHO AQGs. Air quality has generally deteriorated in most low- and middle-income countries, in step with large-scale urbanisation and economic development that rely on the burning of fossil fuels. Disparities in air pollution exposure are, therefore, increasing worldwide.

Since the 2005 air quality guidelines were established, thousands of new studies have continued to document the adverse health effects of air pollution. During this time, enormous advances have also occurred in exposure assessment. In particular, the use of satellite remote-sensing instruments in combination with advanced chemical transport models and ground-based measurements has substantially improved the understanding of pollution levels at a much higher spatial scale. For example, the WHO AQG from 2005 for annual mean $PM_{2.5}$ was largely based on results from two American studies where exposure to $PM_{2.5}$ was assessed from just a few monitoring sites per city. Today's more advanced models can capture the spatial variation of air pollution levels within cities, which gives us a better understanding of the impact of living in the more polluted parts of the city, compared with cleaner areas. This has been useful not only for population studies of health effects but also to estimate the worldwide health impact of air pollution

These new methods of exposure assessment have facilitated studies of nationwide populations, not just in cities but also in rural areas where air pollution monitoring is sparse or even absent. Studies conducted in low- and middle-income countries where concentrations are high are of great importance; however, equally important are studies in very clean areas, as they can answer important questions on the effects of low-level exposures and the evaluation of thresholds. These studies provide critical information on the benefits that might be expected if air pollution levels were reduced worldwide. In view of these many advances, revision of the old WHO AQGs was both timely and necessary and followed a rigorous predefined process outlined in the WHO handbook for guideline development. A long-term AQG level is defined as the lowest exposure level to an air pollutant above which there is confidence that there is an increase in adverse health effects. The gap between the WHO air quality guidelines and the levels adopted in national regulations reflects the policy-making process. Whereas the WHO guidelines are evidence-informed, health-oriented recommendations, the process of developing legally binding regulations is driven by national policymakers and the willingness to set environmental standards. This process involves different actors and may be influenced by a range of economic drivers and powerful lobby organisations, but the new WHO AQGs are what we should strive for if we value health.

Ebba Malmqvist



More advanced models can capture the spatial variation of air pollution levels within cities.

Norwegian NGOs demand: "No new oil licences"

Norway is the fourteenth-largest global producer of oil and the second-largest of gas. Almost all of it is sold to other countries, mostly to the EU and China. As shown by Oil Change International [1] Norway is the seventh-largest exporter of greenhouse gases – and the third largest per per capita (only beaten by Qatar and Kuwait). Despite the small population, Norway is a key contributor in keeping the world addicted to fossil fuels.

The industry is well established in the North Sea and Norwegian Sea, and therefore does not anticipate any big new discoveries in these areas, so it is looking for new areas to exploit. After roughly 20 years of battle, the environmental movement has been successful in keeping the Lofoten islands oil-free. But partly as a compensation for not opening up Lofoten, the government has increasingly opened up the Barents Sea for oil drilling – even in the particularly vulnerable marginal ice zone [2]. Future development of the Norwegian petroleum industry will have to extend even further into the Arctic, where nature is as invaluable as it is vulnerable; where the risk of accidents are higher, and the costs too.

Anti-fossil fuels campaigns in Norway have traditionally centred around protecting especially vulnerable areas, such as the Lofoten islands and the marginal ice zone. The "nature argument" is still important in the debate regarding arctic oil, but more than ever Norwegian NGOs argue it is time to stop all further exploration for new petroleum out of concern for the climate. In addition to "no new oil licences" we are demanding that the government starts a managed winding down of existing production, and a just transition for the hundreds of thousands who work in or are connected to the industry today. These are the main demands of WWF Norway, Friends of the Earth Norway, Young Friends of the Earth Norway and Greenpeace Norway, who collaborate closely.

Andreas Randøy

The Norweigan government has increasingly opened up the Barents Sea for oil drilling

[1] *http://priceofoil.org/content/uploads/2017/08/The-Skys-Limit-Norway-1.pdf*

[2] *https://naturvernforbundet.no/naturvern-i-arktis/norway-allows-oil-drilling-in-the-arctic-marginal-ice-zone-the-government-are-puppets-for-the-norwegian-oil-lobby-article40338-2645.html*

State of the climate in 2021

The World Meteorological Organization's new analysis reports that in 2020, greenhouse gas concentrations reached new highs. Levels of carbon dioxide (CO_2) were 413.2 parts per million (ppm), methane (CH_4) at 1889 parts per billion (ppb) and nitrous oxide (N_2O) at 333.2 ppb, respectively amounting to 149%, 262% and 123% of pre-industrial (1750) levels. The increase has continued in 2021. The global mean temperature for 2021 (based on data from January to September) was about 1.09°C above the 1850–1900 average and 2015 to 2021 will be the seven warmest years on record. Around 90% of the accumulated heat in the Earth's system is stored in the ocean, which is measured through Ocean Heat Content. The upper 2000 m depth of the ocean continued to warm in 2019 reaching a new record high. A preliminary analysis based on seven global data sets suggests that 2020 exceeded that record. All data sets agree that ocean warming rates show a particularly strong increase in the past two decades and it is expected that the ocean will continue to warm in the future.

2015 to 2021 will be the seven warmest years on record.

The ocean absorbs around 23% of the annual emissions of anthropogenic CO_2 to the atmosphere and so is becoming more acidic. Open ocean surface pH has declined globally over the last 40 years and is now the lowest it has been for at least 26,000 years. Current rates of pH change are unprecedented since at least that time. As the pH of the ocean decreases, its capacity to absorb CO_2 from the atmosphere also declines.

The report gives detailed analysis about other key developments during 2020/2021 concerning sea level, sea ice, glaciers and ice sheets, extreme weather, precipitation, socio-economic and environmental impacts.

State of Climate in 2021: Extreme Events and Major Impacts, 31 October 2021, *https://unfccc.int/news/state-of-climate-in-2021-extreme-events-and-major-impacts*

Fossil advertising persuades us to buy more and bigger cars, fly more often over longer distances and use more fossil fuels

Time to ban climate-threating advertising

European NGOs push to prohibit advertising for fossil fuels, fossil-fuelled cars and air travel. Several European cities have taken the lead by introducing local bans.

Around 20 organisations in Europe have joined forces to push through a ban at EU level on adverts for fossil fuels, cars and air travel. Last summer, a proposal for a ban was submitted to the European Commission as a citizens' initiative[1] with the goal of uniting the support of at least one million citizens within a year: fossil Fuel Advertising and Sponsorships ban.[2] If this goal is achieved, the European Commission will have to take a position on the proposal.

The climate and the planet are now changing faster than mankind is. We know that emissions must be halved by 2030, but it appears that the emission reductions that were achieved in 2020–2021 will be offset by growing emissions in the coming years. There are no signs that we will meet the Paris Agreement's target to limit heating to 1.5°C.

Many people, from activists and scientists to Pope Francis, Boris Johnson and UN Secretary-General António Guterres, are saying that we are in a state of planetary emergency – a global crisis. At the same time, the results of the recent COP meeting in Glasgow clearly show that politicians simply do not dare to implement what they have promised.

It is becoming increasingly apparent that what is needed is bottom-up change. Citizens, companies, municipalities and organisations must do what is within their own power. It was over 30 years ago that the phrase "think globally, act locally" was coined. This message is at least as relevant today as it was then. All consumption is local. All emissions, eradication of species, resource extraction and waste mountains originate locally, so we must take measures everywhere, but in different ways.

One of the biggest obstacles to these changes is the lifestyle advertising of fossil fuels, fossil-fuelled cars and air travel that we are all bombarded with. Advertising cannot be seen as an isolated communication between businesses and consumers; it is part of everyday life, in a context and in a society that allows itself to be influenced by it.

Almost 20 years ago tobacco advertising was banned in the EU and many other countries because this advertising led to more smoking, which in turn damaged public health and led to more deaths. As long as tobacco companies were allowed to advertise their products it was impossible for authorities to curb smoking. Since the ban we have seen a sharp reduction in smoking in those same countries.

In the same way, fossil advertising persuades us to buy more and bigger cars, fly more often over longer distances and use more fossil fuels. More people are dying today from fossil fuel emissions than from smoking.

But fossil advertising also stands in

Local and national initiatives

Several cities in Europe have already taken initiatives to limit fossil advertising.

Amsterdam
In December 2020, a decision was taken in Amsterdam to ban the advertising of fossil companies and airlines. Since then, advertising for low-cost flights and diesel cars has been banned from the Metro transit system and central areas of the city, based on voluntary undertakings.

The Hague
The Hague has also taken a decision to restrict advertising of fossil cars and air traffic at the city's bus and tram stations.

Geneva
The city's politicians have agreed to remove advertising from public spaces by 2025, an initiative called "Zéro pub". Implementation and regulatory frameworks will be developed in the coming months.

France
France is considering a legislative proposal to ban the advertising of fossil fuels, which can be found in Loi climat et résilience and was presented to parliament in February.

Liverpool
In January 2021, the city adopted a motion for a "Low carbon Advertising Policy". The motion specifically mentions advertising for petrol and diesel cars, particularly SUVs, and for air flights. The city plans to revise its advertising guidelines based on this motion.

Norwich
In June 2021, politicians in the city voted to limit harmful advertising and sponsorship in areas such as gambling, junk food, and environmentally harmful products. The policy is subject to amendments and has not yet been implemented.

North Somerset
In July 2021, a motion was voted through proposing the introduction of a "Low carbon Advertising Policy". It is not yet clear which advertisements will be covered, but the motion specifically identifies advertisements for airlines, oil companies, petrol and diesel cars.

the way of the change in values and behaviours that are needed to reduce greenhouse gas emissions as quickly as necessary. Research shows that advertising promotes and strengthens values that lead to increased consumption and to the social normalisation of these values. Advertising has become the cultural sea in which we swim; it shapes our society and us.

Fossil advertising normalises a society with high greenhouse gas emissions and slows down change. Many of us naturally want to go on a weekend trip to New York or take a beach holiday in Asia when it is presented as not only reasonable, but also desirable and status-enhancing. And of course we want a big new SUV if the adverts tells us that this is the norm.

A ban on fossil advertising will clearly not be sufficient on its own to reduce emissions to a sustainable level, but it should be seen as an important part of the solution. In a scientific study, a large number of researchers, including Johan Rockström, point to a ban as part of a package that is needed to achieve the Paris Agreement's target to limit global heating.

When advertising aims to preserve behaviour that threatens human civilisation and the planet's ecosystems, it is clearly unacceptable. It is high time we banned the advertising of fossil fuels, just as the advertising of tobacco has already been banned.

Gunnar Lind
& Anna Jonsson

[1]European Citizens' Initiative *https://europa.eu/citizens-initiative/_en*

[2]Ban Fossil Fuel Advertising and Sponsorships *https://europa.eu/citizens-initiative/initiatives/details/2021/000004_en*

Consumption in G20 kills 2 million people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Just a few clicks and all the pollution is exported elsewhere.

We know that outdoor air pollution kills over 4 million people per year, but few have studied what causes these premature deaths. A new article in Nature Communications found that consumption in the 19 nations with presidency rights to the G20, induces the premature mortality of 1.983 million people a year through global supply chains. The study indicates that G20 nations should take responsibility for their footprint rather than focusing solely on transboundary air pollution.

Source: Consumption in the G20 nations causes particulate air pollution resulting in two million premature deaths annually by Nansai and co-authors published November 2021 in Nature Communication. *https://www.nature.com/articles/s41467-021-26348-y*

SUVs hinder emission reductions from traffic

The European Parliament's Committee on the Environment (ENVI) recently published an Opinion on the Commission's Sustainable and Smart Mobility Strategy. It supports the strategy's intention to end fossil fuel subsidies and ask for better incentives in the Energy Tax Directive for sustainable transport fuels. It is also alarmed by the fact that average emissions from new passenger cars have increased every year since 2017, which to a large extent can be attributed to sales of sport utility vehicles (SUVs). This has been enabled due to the heavy vehicle adjustment factor. Furthermore, the Opinion calls on the Commission to develop life cycle assessment (LCA) methodologies to measure the full climate impact of cars.

Source: Opinion of the European Parliament's Committee on the Environment, Public Health and Food Safety for the Committee on Transport and Tourism on the sustainable and smart mobility strategy (2021/2046(INI))

Average emissions from new passenger cars have increased every year since 2017. The reason is spelled SUV.

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Solutions to reach 1.5°C still available

Study on 1.5 pathways concludes that EU can reduce greenhouse gases by at least 65% by 2030. This means a transition to 100% renewable electricity while reducing energy use.

In July 2021, the European Commission presented the "Fit for 55" package which aims to revise the EU's climate and energy legislation to implement its new 2030 climate target of net 55% emission reductions.

Member states are currently developing their position on the package, which needs a coherent and comprehensive approach. In an effort to help member states to develop their positions, Climate Action Network (CAN) Europe brings together science, policy makers and civil society organisations to show how the "Fit for 55" package can further increase the EU's climate ambition and accelerate the energy transition.

In October 2021, CAN Europe hosted the launch of Climate Analytics' recent research on 1.5°C compatible emission reduction pathways for the EU and nine member states. Climate Analytics is a renowned global climate science and policy institute. Their report illustrates how the 1.5°C target is still within our reach. Panellists from member states and representatives of civil society discussed how national plans, such as National Energy and Climate Plans and National Long Term Strategies, should be updated to pave the way for 1.5°C compatible policies for European countries.

Under the 1.5°C pathways project, modellers from Climate Analytics derived a comprehensive set of emission reduction pathways for the EU in view of the update of its 2030 targets. For the first time, consistent trajectories towards 2030 are presented, going beyond the 55% emission reduction target in order to be on the safe side with regards to reaching the 1.5°C objective.

1.5°C Pathways for Europe: Achieving the highest plausible climate ambition

The Climate Analytics report presents domestic emissions and energy mix pathways required to meet the Paris Agreement's 1.5°C goal for the EU27 and nine member states: Denmark, France, Germany, Italy, Poland, Portugal, Romania, Spain, and Sweden, and assesses if their current 2030 climate targets are in line with these pathways.

To date, governments have submitted inadequate and unambitious national climate targets that are not sufficient to meet the Paris Agreement's long-term temperature goal according to the latest available science.

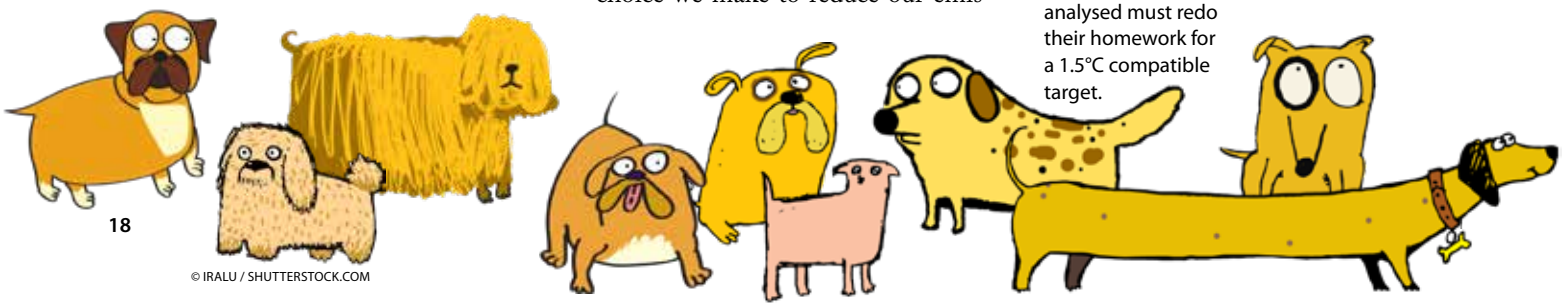
This report presents domestic emissions and energy mix pathways required to meet the Paris Agreement's 1.5°C goal for the EU27 and nine member states: Denmark, France, Germany, Italy, Poland, Portugal, Romania, Spain, and Sweden, and assesses if their current 2030 climate targets are in line with these pathways.

Download the report and country factsheets here: *https://climateanalytics.org/publications/2021/15c-pathways-for-europe-achieving-the-highest-plausible-climate-ambition/*

Existing scenarios show that the EU and its member states can still choose from a broad range of available solutions and technologies to reach the 1.5°C objective. Sharp emission reductions are not only possible but urgently required. The EU can still definitely get to net zero emissions by 2040 to respect the Paris Agreement. The pathways presented for the EU's energy and industry sectors substantiate and detail CAN Europe's call for a higher level of ambition, namely that a 65% emission reduction by 2030 is needed to stay in line with the Paris Agreement. The electricity sector is the forerunner, quickly decarbonising with 100% renewable power. Renewable electricity then helps to cut emissions in industry.

Independently from the technological choice we make to reduce our emissions, the time dimension is crucial. There is one important condition: If the EU does not reduce its energy consumption while multiplying its renewable energy capacities during this decade, all attempts to reach 1.5°C will very likely fail. In concrete terms, the "Fit for 55" package needs to become a "Fit for 1.5" package. In parallel, member states urgently need to ramp up their national targets and policies. It is grotesque that some national policies would even allow for a further increase in their greenhouse emissions. Only one out of the nine member states analysed has already endorsed a 1.5°C compatible target. When national governments update their National Energy and Climate Plans (NECPs), they should design policies that truly enable emission reduction pathways in line with the 1.5°C objective.

Jörg Mühlenhoff
Reinhold Pape



Eight out of nine member states analysed must redo their homework for a 1.5°C compatible target.

A different COP – Communities of Practice – encourages offshore cooperation

The development of offshore wind farms has gained momentum in the EU but to accelerate deployment the challenge of conflicting interests within marine areas needs to be addressed. A new study examines the potential of so-called Communities of Practice (COPs).

The conflict of interest challenge can be addressed by creating synergies through combining different activities such as wind farms, nature conservation and aquaculture. Marine Spatial Planning (MSP) is seen as the mechanism for allocating access to marine space by different and often conflicting users within ecologically sustainable boundaries. But on its own, MSP seems to fall short of organising multi-use in practice, as the participation process often leaves much to be desired. Flaws in the process can take the form of limited consultation meetings dominated by active or influential stakeholders, which lack inclusiveness or are set up post-political decision-making.

A new study has looked at the potential of so-called Communities of Practice (COPs). COPs are defined as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly". COPs are informal, self-organising and based on trust, and hence differ from other organisational structures such as Marine Spatial Planning. A case study of the Dutch Community of Practice North Sea (COPNS) examines the potential contribution of COPs as an instrument for stimulating multi-use by balancing multiple interests and initiating pilots and learning.

Multi-use of marine space is often seen as a "technological fix" to a resource allocation problem. From this perspective, the issue can be addressed through a planning process such as organising efficient and combined use of space. In practice, regulatory and socio-economic hurdles, as well as technical challenges, can pose challenges to the implementation of multi-use. Overcoming such obstacles requires cooperation between the parties involved, not only to negotiate resource use but also to collectively work towards shared definitions of issues and resolve these together. This implies that multi-use development is not a technocratic but a social process.

In MSP processes, stakeholder participation is associated with the objective of legitimising management measures and policy decisions rather than jointly working towards salient solutions for (multi-use) resource use allocation. The latter requires active and inclusive cooperation. In this process, collaborative or social learning plays a key role. Social learning is defined as "a process that can be encouraged by lifting barriers to communication and by encouraging interaction between the parties involved in policy issues. The core idea is that parties can learn from each other by more open and responsive communication".

The Netherlands has taken steps to involve stakeholders in the planning of multi-use offshore wind farms.

The Dutch part of the North Sea is one of the busiest marine areas in the EU. The government is planning large-scale offshore wind farms development as part of its climate change strategy, with a potential space requirement of 17–26% of its waters by 2050. The country must also comply with objectives from EU nature conservation regulations and seeks to develop the potential of seafood production. The government's North Sea 2030 strategy aims to find a balance between these objectives. While the government, seafood producers, energy companies and environmental Non-Governmental Organisations are willing to cooperate in realising multi-use offshore wind farms, most offshore wind farms are still monofunctional. The COPNS has been set up to share knowledge and experiences in relation to innovations and multi-use pilots. The government is actively providing support to the COPNS to develop more adaptive policies within the framework of its North Sea 2030 strategy.

At the first of eight COPNS meetings the government made clear that "the COP evolves around pilots that experiment with multi-use and investigate the conditions that are necessary to make these pilots work. The objective is to share experiences, discuss potential solutions to barriers, and work together on resolving issues". When the COPNS had run for a year, the work was evaluated through a questionnaire. Most of the respondents valued the meetings as good (51%) or excellent (12%), while 20% scored the meetings as satisfactory. More importantly, 92% of the respondents felt that the meetings met their needs very well (32%) or well (59%).

The case study suggests that Communities of Practice can play a positive role as a tool for encouraging a culture of cooperation around marine multi-use between stakeholders in an informal setting. Through decoupling of policy and practice, Communities of Practice create a positive learning environment where participants can focus on practical challenges, gaining experience, and developing working relationships. Indirectly, in due time, COPs may play a positive role in conflict resolution around resource use as they encourage relationship building and cooperation.

Emlia Samuelsson

Source Combining offshore wind farms, nature conservation and seafood: Lessons from a Dutch community of practice by Nathalie A. Steins, et al. Marine Policy, Volume 126, 2021, https://doi.org/10.1016/j.marpol.2020.104371.

Methane pledge must be followed by a fossil fuel phase-out target

The EU needs to improve its methane pledge. Emissions must be reduced by at least 70% by 2030 compared to 1990, in order to provide a fair contribution to the 1.5°C target.

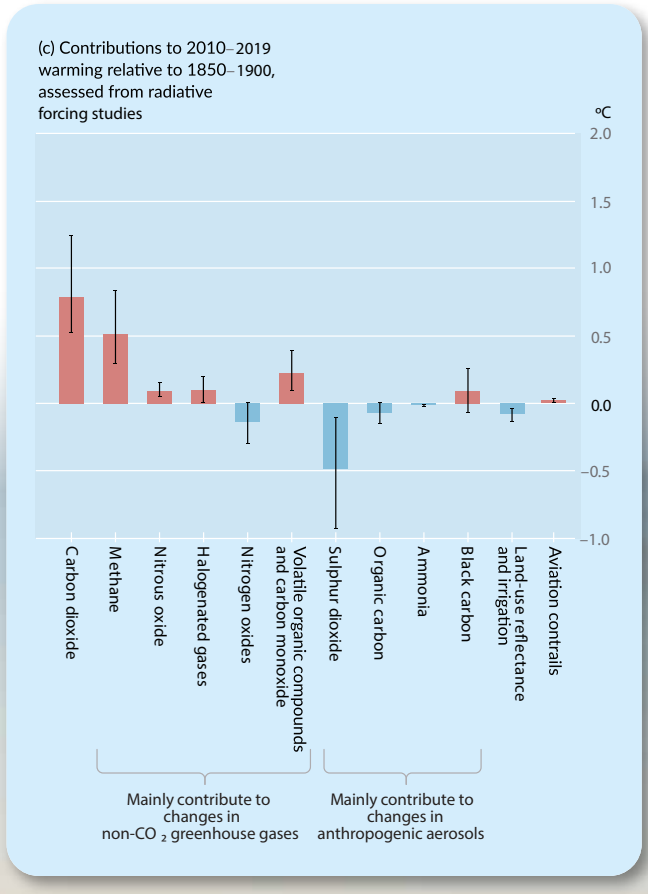
At COP26 in Glasgow, over 90 countries, led by the US and the EU, launched the Global Methane Pledge in which they basically committed to collectively reduce global anthropogenic methane emissions, across all sectors, by at least 30 percent below 2020 levels by 2030. By doing so, these countries have recognised the importance of reducing methane emissions as an important contribution to limiting temperature rise in the short-term, while acknowledging that such action needs to be complementary to much-needed substantial reductions of CO_2 emissions. While reducing emissions by one third in the next ten years might sound ambitious, the pledge is still far away from the IEA proposed pathway to reduce methane emissions from fossil fuel operations by 75% between 2020 and 2030, as part of their Net Zero by 2050 Roadmap.

The importance of methane has also been highlighted in the latest IPCC Assessment Report that indicates methane to be responsible for approximately 0.5°C of warming (figure).

For the EU, the pledge builds further on the Commission's Methane Strategy of October 2020, in which the Commission set out a number of actions to reduce methane emissions, in particular in the energy, agriculture and waste sectors. In this strategy the Commission puts particular emphasis on monitoring and reporting of methane emissions, while proposals to strengthen legislation are limited and emission targets absent.

This is also highlighted in the European Parliament Resolution on the Commission's strategy that was adopted last October, in which the Parliament not only calls for a binding EU methane emissions target but also for a plan to phase out all fossil fuels in the EU. Indeed, the biggest contribution to global methane emissions from the EU happens outside of its borders, as massive amounts of methane are released by the exploration and transport of fossil fuels, of which the EU is a major importer.

Such a methane emission reduction target would need to be substantially high and go well beyond the 55% overall greenhouse gas emission reduction target for 2030. In fact, the EU reduced its methane emissions by almost 35% between 1990 and 2019 and a substantial additional reduction is to be expected in 2020 (at least 10%) bringing methane emission reductions beyond 40%. Applying the Global Methane Pledge to the EU would need the EU to reduce its methane emissions by at least 60%. However, as we know, in order to provide a fair contribution to the 1.5°C target of the Paris Agreement, the EU's



<-- Figure. Contributions to warming.
Source: IPCC WG 6th AR

Table 1. Emission reductions between 1990 and 2019 using GWP100.

	all (tCO2-e)	CO2 (tCO2-e)	CH4 (tCO2-e)	other GHGs
1990	4,713,874	3,711,219	591,120	411,535
2019 (%/1990)	3,493,574 (-26%)	2,783,082 (-25%)	385,154 (-35%)	325,338 (-21%)
% of total emissions in 2019	100%	80%	11%	9%

Table 2. Assumed emission reductions between 1990 and 2030 using GWP100.

	all (tCO2-e)	CO2 (tCO2-e)	CH4 (tCO2-e)	other GHGs
1990	4,713,874	3,711,219	591,120	411,535
2030 (%/1990)	2,224,423 (-52.8%)	1,772,040 (-52.3%)	245,235 (-58.5%)	207,148 (-49.7%)
% of total emissions in 2030	100%	80%	11%	9%

Table 3. The same emission reductions as in table 1 and table 2 using GWP20.

	all (tCO2-e)	CO2 (tCO2-e)	CH4 (tCO2-e)	other GHGs
1990	7,078,354	3,711,219	2,955,600	411,535
2019	5,034,190 (-29%)	2,783,082 (-25%)	1,925,770 (-35%)	325,338 (-21%)
% of total emissions in 2019	100%	55%	38%	7%
2030 (%/1990)	3,337,534 (-52.8%)	1,845,109 (-50.3%)	1,276,734 (-56.8%)	215,691 (-47.6%)
% of total emissions in 2030	100%	55%	38%	7%

overall greenhouse gas emissions will need to be reduced by more than 65% by 2030. Because methane emissions have been reduced more than other gases, for this approach to continue, EU methane emissions from all sectors will need to be reduced by at least 70% by 2030, compared to 1990 emissions.

All the above is based on the current approach of comparing methane (and other short-lived greenhouse gases) with CO_2 emissions. In order to have a uniform reporting system the Intergovernmental Panel on Climate Change has developed reporting guidelines that calculate the impact of methane emissions over a 100-year timeline (also called GWP100 approach, where GWP stands for Global Warming Potential), thereby reducing the short-term impact methane has on temperature rise. Some, including the European Parliament, are also asking to assess methane over a 20-year timeframe (GWP20), which would make the importance of methane in the short term much more visible. However, there are clear risks linked to such an approach. In the EU in particular, using a GWP20 approach would reduce incentives to cut both CO_2 emissions and methane emissions. A simple calculation shows how this would happen.

Table 1 is based on a GWP100 approach and shows that emissions from methane have been reduced well beyond average.

Assuming the EU sticks to its ambition to reduce greenhouse gas emissions by 52.8% by 2030 (which together with removals of 2.2% would result in a 55% net reduction), and assuming reductions are evenly spread across the different gases (which is theoretical), we would get the results to be seen in table 2.

Applying a GWP20 approach to these numbers would give the results seen in table 3.

As the tables indicate, using a GWP20 approach would NOT lead to more ambitious reduction targets, neither for methane emissions nor for CO_2 emissions. It is therefore questionable whether there is any necessity to use this argument.

Wendel Trio

Only a few countries plan eco-shemes to support agroforestry.

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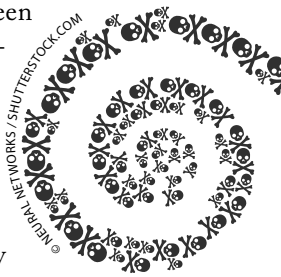
Even lower levels of air pollutants are mortal



A new report that examines the associations between low levels of air pollution and natural-cause, cardiovascular, respiratory, and lung cancer mortality. The findings of the study are that air pollution is a mortality risk at even lower levels than previously considered (10 µg/m^3 for $PM_{2.5}$ and 20 µg/m^3 for NO_2). This study contributes important evidence of associations between long-term exposures to relatively low concentrations of ambient $PM_{2.5}$, BC, and NO_2 and important health endpoints such as mortality. The results are in line with the new revised WHO Air Quality Guidelines on $PM_{2.5}$ and NO_2. Using data from 22 cohorts, including 28 million people across 11 European countries, makes the study one of the largest of its kind.

Source: HEI study in Europe finds evidence of health effects at lower levels of air pollution by Health Effect Institute, accessed October 2021

Eco-schemes must be sharpened to deliver

Eco-schemes is a new support mechanism in the CAP that was sealed in November. In a recent report, three environmental NGOs have assessed proposed eco-shemes from 21 member states.

They found that out of the 166 draft eco-schemes evaluated, only 19% are likely to deliver on their stated environmental objectives.

Célia Nyssens, from EEB said: "To keep 1.5° alive, the new CAP would need to incentivise a large-scale transition to agroecology, the restoration of degraded peatlands used in agriculture, and strong reductions in the number of farmed animals. The eco-schemes represent the largest pot of money the EU has to drive these changes, but as they stand, they will not deliver on any of these priorities."

EEB press release 1 December 2021, *https://eeb.org/draft-cap-eco-schemes-unlikely-to-deliver-on-green-deal-objectives/*

The vehicle fleet is the greatest contributor to outdoor urban air pollution.

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Air pollution in Africa

Air pollution in Africa differs from that in developed countries. The main contributors to particle emissions are old vehicles, burning of waste and use of biomass for cooking.

Air pollution research has expanded from Europe and North America to Asia and South America. Africa, however, has been blatantly left behind in this quest for cleaner air and better health. A recent review highlights the importance of focusing on air quality in the process of sustainable urban development in Africa, a continent undergoing rapid urbanisation with an extreme shortage of air pollution data.

The lack of attention this issue receives likely results from other pressing social, economic, and health-related problems, creating a negative feedback loop. The lack of data reduces public awareness and concern, which in turn leads to a lack of policy action; without policies to follow, few incentives exist to collect data. Addressing air pollution could also drive other positive changes in relation to health, climate, and well-being. Although 60% of the African population lives in rural areas, urbanisation is ongoing across the continent at a speed unprecedented in history. The continent's population is anticipated to be primarily urban by 2035. The population is growing faster than the supporting infrastructure, leading to changes in urban environments that are hard to control. This burgeoning urban population could lead to an increase in deaths attributable to air pollution. The World Health Organization (WHO) estimates that the annual median concentration of $PM_{2.5}$ surpassed 26 μg/m^3 in more than half of the African continent, greatly exceeding the WHO limit of 5 μg/m^3. In a review of eight studies of outdoor air pollution in African cities (covering seven countries), $PM_{2.5}$ levels varied between 40 and 260 μg/m^3, compared with an annual average of 13 μg/m^3 in urban Europe and 9 μg/m^3 in the urban United States in 2019. Air pollution monitoring is vastly lacking; among the 47 countries comprising sub-Saharan Africa, only 6 can provide long-term data on airborne particulate matter (PM), spanning a total of 16 cities. The few available emission inventories are seldom precise and are typically based on surveys of, for example, fuel consumption. As highlighted above, the lack of data from the African continent is a serious hindrance for mitigation actions but promises include technological innovations to monitor air pollution where the availability of stable electricity and Wi-Fi is scarce. Such devices, including cell phones, satellite remote sensing, and

low-cost sensors, could also create awareness and design policies. This shortcut, however promising, needs careful data calibration to ensure reliability.

African PM emissions originate from sources different from those in developed countries. The predominant contributors to outdoor air pollution are the extensive number of old diesel-powered vehicles, poor household waste management, and households burning biomass. The vehicle fleet is the greatest contributor to outdoor urban air pollution. There is a significant increase in the number of two-wheel vehicles used for public transportation (e.g. motorcycle taxis). These two-stroke motorcycles use a mixture of gasoline and oil, a cheap and highly polluting fuel. Although the number of vehicles per 1,000 inhabitants is much lower in Africa than anywhere else, it is rising considerably. The increasing number of vehicles and the lack of urban planning cause severe traffic congestion, which contributes not only to increased air pollution but also to significant economic losses in terms of time and fuel. Road traffic was the main source of black carbon and $PM_{2.5}$ (88%) in four West African cities, with diesel exhaust being the largest contributor. Diesel exhaust from road transport is of great concern, especially if the vehicle fleet is old and poorly maintained. Most vehicles in Africa meet this description. In fact, vehicles no longer upholding the environmental standards of their origin countries, such as Japan and European nations, are regularly shipped to Africa after the catalytic converters and air filters are removed. Africa is arguably becoming a dumping ground for the world's old cars, so-called super emitters. Moreover, exhaust emissions are not regulated in most African countries.

Despite a much lower level of waste generation compared to high-income countries, solid waste still affects air quality. Due to a lack of waste transport services in many areas household burning is a common method for waste elimination. Another important source of air pollution is biomass burning, with some surveys indicating that 95% of the populations use biomass for cooking. Biomass burning for cooking generates high indoor levels but also contributes to dangerous ambient air pollution levels. In countries where many households rely on biomass for cooking, indoor air pollution is the largest environmental health risk factor. According to health impact assessments, biomass burning for cooking causes nearly 600,000 premature deaths in Africa annually. Natural sources of particles are generated by Saharan dust, in fact half of the global atmospheric mineral dust originates from the Sahara. It is still debated whether the health effects of these particles are as toxic as those originating from combustion processes.

The health impact in African cities has only been sparsely studied, a recent review found only three studies outside South Africa. Despite this lack of research, recent health impact assessments indicate that sub-Saharan Africa suffers the highest burden of disease and premature deaths attributable to environmental pollution in the world. These studies, however, rely on effect estimates from other parts of the world when it comes to ambient air pollution. This could lead to an underestimation of effects as the continent has lower access to healthcare, a higher prevalence of infectious diseases, and differing sources of air pollutants. Air pollution is also a threat to child health and a study attributed one in five infant deaths in Africa to air pollution. The number of deaths attributable to air pollution globally is projected to double by 2050, with many of these deaths predicted to occur on the African continent. Regarding overall development strategies, there is ample evidence that urban air quality will become an increasingly important political, economic, and social issue for African countries.

Ebba Malmqvist

Source: Review article Air pollution in Africa published in Annual Review in Public Health by Abera and colleagues and accessed October 2021

https://www.annualreviews.org/doi/10.1146/annurev-publhealth-100119-113802

Breathe London

Citizens in London are provided with low-cost, easy-to-install sensors, so they can monitor air pollution in their local area. This is part of the citizen-science program, Breathe London, which besides collecting data aims to raise awareness about air pollution. The sensors will monitor particles ($PM_{2.5}$) and nitrogen dioxide (NO_2) using both solar and the electric grid. Small sensors are not as accurate as reference-grade analysers, but the sensor data will be combined with data from the reference network to ensure valid data. The project is run by the Environmental Research Group at Imperial College London, which has long and extensive experience in air pollution monitoring.

Source: Press release by Breathe London, October 2021, *https://www.breathelondon.org/*

Western Balkans deserve cleaner air

A report from CEE Bankwatch Network and the Centre for Research on Energy and Clean Air estimates that around 19,000 premature deaths in the past three years are attributed to air pollution from Western Balkan coal-fired power plants. The Large Combustion Plants Directive – an EU directive to reduce emissions of dangerous substances, adapted for countries parties to the Energy Community Treaty – legally requires these countries to rein in air pollution from their power plants since 2018. Yet, as the report finds, in 2020, the Western Balkans' 18 coal plants emitted two and half times as much sulphur dioxide (SO_2) as all 221 coal power stations in the EU combined.

Source: Bankwatch Press release 7 September *https://bankwatch.org/press_release/eu-complicity-in-colossal-lawless-air-pollution-from-balkan-coal-plants-must-prompt-swift-action-new-report*

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Coal-fired power plants in the Western Balkans cause around 19,000 premature deaths

EU institutions ignore latest evidence when evaluating health effects

More recent data of $PM_{2.5}$ show greater effects on mortality. Although some of this research is more than seven years old, it has not been incoporated in currently used models.

Two recently published reports on the health costs of air pollution[1, 2], both produced as a basis for European decision-makers, do not make use of the latest research. The neglect mainly concerns calculations of the health effects of small particles ($PM_{2.5}$).

The two reports include cost-benefit analyses and these are based on estimated air pollution, health, and population data. The attributed health effect relies on effects estimates from epidemiological studies which form a concentration-response function (CRF) to derive how much ill health will occur for each increase or decrease in air pollution levels. To have a robust CRF they are often based on all available and applicable studies pooled in a meta-analysis. The CRFs chosen will impact the extent of the health effects significantly.

The last time WHO Europe was asked to recommend suitable CRFs for key pollutants to be included in cost-benefit analysis supporting the revision of the coming European Union's air quality policy was nearly ten years ago. The project was called HRAPIE, and the health experts were asked to focus on the mortality impact of exposure to $PM_{2.5}$ and to ozone. For the long-term effects of $PM_{2.5}$ on mortality, a CRF of 6% increased mortality risk per 10 μg/m^3 $PM_{2.5}$ was chosen[3a, 3b]. By this time, mortality studies on long-term exposure to $PM_{2.5}$ conducted in the EU were scarce and only two studies, Dutch and Italian, had been published. Instead, the evidence consisted of mainly US studies. Most of the US's studies used a very crude exposure assessment suggesting that everyone within several tens of kilometres had the same exposure, by relying on one or a few monitors and not considering variations in air pollutants across the city.

EU acknowledged the need for European studies on mortality effects from long-term $PM_{2.5}$ exposure and provided millions of euros in funding for the ESCAPE project[4]. The ESCAPE project was ambitious and developed novel air pollution maps for many European cities. Their mortality studies based on 22 European cohorts was only published in 2014 and could not be included in HRAPIE. The CRF value in ESCAPE had a more than a doubled mortality risk then previous studies reviewed in HRAPIE. However, this evidence has not found its way into the EU cost-benefit analysis seven years later.

In a more recent review,[5] they found that more precise ways of estimating exposure such as detailed air pollution maps tended to produce higher CRFs, suggesting that prior meta-analyses that ignored exposure error likely underestimated effects. They also identified traffic particles as likely more toxic than average, on a unit mass basis, which could explain larger effects when looking within cities. US studies using more precise air pollution maps in cities had also been published with similar higher effect estimates: 26% and 30% increase per 10 μg/m^3 respectively[6,7]. More recent European studies with detailed air pollution maps support the statement that more detailed air pollution maps provide higher CRFs; a study from Sweden, with a 28% risk [8]; Denmark, with a 26% risk [9]; Spain, with 19% risk [10]; and the European-wide ELAPSE study, with a 26% risk per 10 μg/m^3 $PM_{2.5}$, respectively [11].

Another review with meta-analysis was done as part of the WHO revision of guidelines [12] and another by Pope and his colleagues [13]. The new recommended effect estimates from WHO suggest an 8% risk. Pope et al. suggest a 9% risk for all studies, 12% for European studies and 8% for studies with more available data (which can be a legal requirement for US EPA). In developing standards, WHO recommends regulators to consider the local context of CRFs. Focusing on European studies, WHO included five studies and Pope et al. added five more, including the above-mentioned Danish and Spanish studies which were published after the scope of the WHO review. Due to timing, none of the mentioned reviews includes the European wide ELAPSE study nor the Swedish study but including them would lead to a higher CRF. Recent cost-benefit analyses of local abatement strategies show that the choice of CRFs depend on the local context and using the wrong CRF would severely underestimate the benefits of reducing local city emissions[14]. Using CRFs based on studies with crude regional differences is not suitable for a city context, says the authors, and suggest different effect estimates in cities or between regions[14]. To conclude, health researchers ask for new scientific evidence, where air pollution was found more harmful per unit mass, to be included in future cost-benefit analysis.

It is reasonable to believe that as long as EU institutions, such as the EEA, use the old HRAPIE model, the cost of air pollution will be underestimated. This in turn can lead to insufficient measures being taken.

Ebba Malmqvist

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Including results from newer studies in the models would show greater health costs.

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Was it the Scottish water temperature that contributed to the lack of targets for ocean acidification? A new opportunity is given in Egypt next year.

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COP26 neglects ocean acidification

"COP26's ocean acidification failure: States must protect the world's oceans" is the title of a noteworthy text by Professor Karen Scott (University of Canterbury), published in "The Conversation Australia and New Zealand". Ocean acidification is caused by excess carbon dioxide in the oceans. So far, the concentration of carbon dioxide has increased from about 280 ppm in 1750 to 414 ppm. The resulting acidification – or decreased pH – is a threat to many marine species, especially shell-forming organisms and corals. As pointed out by the author, ocean acidification is among the targets of sustainable development goal 14 (Life in the Oceans), set by the UN. However, the Paris Agreement does not set a limit for ocean acidification, as it is focused on limiting global temperature rise. The United Nations Convention on the Law of the Sea (UNCLOS) requires nations to protect the oceans. The author argues that "These obligations must be expressly considered and incorporated into commitments made by states […] in international climate agreements and their actions to implement these at the domestic level", and she concludes that "COP27, to be held in Egypt next year, provides the next opportunity to address ocean acidification and to support a more integrated approach under both the climate change regime and the law of the seas".

Source: RNZ 20 November 2021, *https://www.rnz.co.nz/news/on-the-inside/456190/cop26-s-ocean-acidification-failure-states-must-protect-the-world-s-oceans*

Foreign minister of Tuvalu gets his feet wet for COP26

A few years ago, The Guardian published an article on climate change effects on Tuvalu, which is a small Polynesian country. "Tuvalu is sinking" was reported to be the local catch phrase regarding these effects, and it was said that two of Tuvalu's nine islands were already at the edge of their existence. Now, the Guardian and several other media around the world have shared a wake-up call in the form of a video with Tuvalu's foreign minister, Simon Kofe, standing knee-deep in the ocean. The video was recorded and presented as a speech to COP26. In his opening remark, the minister states that "In Tuvalu, we are already living the realities of climate change – sea level rise". He stresses that there is no time to "wait for speeches when the sea is rising around us all the time". The minister calls for bold action today so that tomorrow can be secured. In a later part of his speech, he points out that everyone else is sinking as well, and that whether now or in a hundred years, everyone will sooner or later experience the severe effects of the global crisis.

'We are sinking': Tuvalu minister gives Cop26 speech standing knee deep in seawater

Sources: The Guardian 16 May 2019, Ainge Roy, E. 'One day we'll disappear: Tuvalu's sinking islands`

The Guardian 9 November 2021 ´Tuvalu minister to address Cop26 knee deep in water to highlight climate crisis and sea level rise`

Ocean acidification: the "Black elephant" in the Black Sea?

The acidification problem is, indeed, a "black elephant" – an obvious, predictable event with enormous consequences, but highly overlooked by many stakeholders, which is also relevant for the Black Sea region.

In 2014 the new term "black elephant" was used for the first time in a New York Times article. The term is a curious cross-breed of two already familiar expressions: "black swan", which describes an event that is extremely rare and unexpected but has very significant consequences, and "elephant in the room", something whose presence everyone is aware of, but nobody seriously addresses.

Although some scientists recognised more than 50 years ago that rising CO_2 (carbon dioxide) concentrations would affect seawater chemistry and cause ocean acidification, this phenomenon has only recently emerged as one of the big knowledge gaps in marine science and has now become a global research priority. And in this regard, the acidification problem is, indeed, a "black elephant" – an obvious, predictable event with enormous consequences, but highly overlooked by many stakeholders and policymakers.

Ocean acidification – or decreased pH – is a result of shifts in acid-base equilibria caused by increased concentrations of CO_2 in surface waters. Such changes in living conditions have an impact on the performance of organisms. Calcifying plants and animals are especially under threat because a decrease in pH impairs their ability to build and maintain calcareous structures (e.g. shells) by reducing the availability of their building materials, i.e. aragonite and calcite. These compounds are mineral forms of calcium carbonate, and in marine chemistry this change in availability is called a decrease in their saturation state. The general impact of ocean acidification on water chemistry is well understood, but regional data and models are needed, which is particularly true for the Black Sea.

As a semi-enclosed sea, the Black Sea has a very limited connection with the Mediterranean Sea, which, in turn, is connected to the Atlantic Ocean. Its depth is considerable, in some places reaching 2,212 metres. The mean salinity is 18 ‰, which is about half that of other seas and oceans. The Black Sea is a very unique sea, most notably having the largest anoxic water volume of all the world's seas, along with associated ecosystem features. Below a depth of about 100 metres there is no oxygen, and the seawater, populated only by adapted bacteria, contains highly toxic hydrogen sulphide.

The Black Sea is affected by natural and anthropogenic pressures, resulting from the growth of coastal populations, the exploitation of marine resources, industrialisation, as well as climate change. This is what makes it difficult to quantify the impact of ocean acidification itself. The situation is even more complicated by the complex water chemistry of the Black Sea, resulting from its isolation and natural features.

The capacity of the Black Sea to buffer, or resist, ocean acidification is, like other bodies of water, determined by the total alkalinity . Due to the high total alkalinity of the rivers feeding the Black Sea, the total alkalinity of seawater in the oxic surface waters is higher than typical oceanic values, resulting in the high buffering capacity of the Black Sea with respect to ocean acidification.

Nevertheless, and even if the data on the Black Sea carbon cycle is very limited, there are long term observations (1932-1993) of pH and pCO_2 (partial pressure of CO_2) in the Northern part of the Black Sea that reveal signs of ocean acidification.

An evident result of long-term variations of the carbonate system is an almost halving of the ability of the Black Sea to absorb CO_2 from the atmosphere. Newer research shows that the surface waters still absorb CO_2 from the atmosphere, but this ability has decreased by 20% between 2001 and 2015. Another extremely negative trend is the decrease in pH values. The most significant decrease in pH values was recorded in the upper part of the suboxic layer, with an average reduction of 0.15. This caused at least a twofold decrease in the concentration of carbonate ions and a significant decrease in the level of saturation of waters with calcium carbonate – i.e. the compound needed for the minerals that are essential as building blocks for calcareous structures.

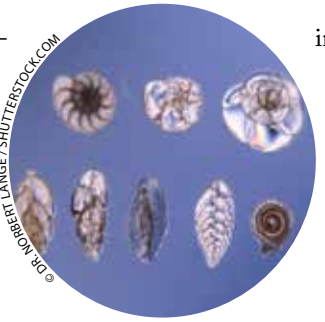
These changes are superimposed on comparatively low levels of these building blocks in deeper waters. In contrast with the Mediterranean Sea, which is supersaturated with calcite and aragonite throughout the whole water column, in the Black Sea the saturation coefficients of both calcite and aragonite show undersaturation at depth. In addition to the

complex carbonate chemistry, intensive eutrophication of the ecosystem caused by human interference in both the Black Sea waters and the drainage basins of its major supplying rivers can greatly influence surface water coastal acidification.

Although the data on acidification and particularly its impacts on biodiversity are fragmentary in the Black Sea, many biota components of the Black Sea could be susceptible to decreased pH, which in turn could cause ecological, economic and social problems in this region. Among the calcareous organisms, the single-celled phytoplankton known as coccolithophores are one of the most abundant groups of organisms both globally and in the Black Sea ecosystems, among which Emiliania huxleyi is the dominating species of coccolithophores. The effects of changes in coccolith calcification on carbon cycling within the Black Sea ecosystems are completely unknown, but most studies on these organisms have demonstrated a decline in their calcification rates at low pH.

There are also more than 100 species of foraminifera, single-celled organisms with a calcite shell, in the Black Sea. They are an important component of the zooplankton and meiofauna. Changes in foraminifera shell weight due to changes in surface water carbonate chemistry have also been suggested by several studies in other regions. Data suggest the possibility of an ecological extinction of benthic foraminifera due to ocean acidification by 2100.

Several studies have shown significant negative impacts of decreasing pH on mollusc species, which are also ecologically and economically very important for the healthy functioning of the Black Sea ecosystem. Being a key element of ecosystems in the Black Sea, bivalve molluscs provide a habitat for species (forming biogenic reefs) and filter seawater, affecting the cycle of nutrients.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'Foraminifera are single-celled organisms with a calcite shell that are vulnerable to acidification.

Given the potential of ocean acidification to appreciably affect marine biodiversity, it is important to make initial evaluations of the possible negative socio-economic impacts, related for example to the fishing and tourism industries. Ocean acidification has the potential to affect food security, since up to 150,000 people depend directly on the Black Sea fisheries. The fishery sector plays an important role both in supplying the increasing protein demand of the growing population and by contributing to the economy through local employment. Although the physiological response of commercially important fish to increased temperature has been well documented in the Black Sea, little is known about the effects of ocean acidification. However, research has demonstrated that under certain conditions elevated temperature and carbon dioxide may create synergistic adverse effects. In this regard, commercially important species that are adversely affected by global warming may be even more vulnerable to acidification. It is therefore very important to study the influence of these factors on biodiversity in the Black Sea in general, and on commercially important species on which local communities depend.

In addition to the common measures under global agreements (such as cutting emissions and adapting to climate change), it is important to implement basin-scale actions with the participation of all coastal countries. Promoting research in this field will help to improve the understanding of the impacts of ocean acidification, and a key element of this is setting up a network of monitoring stations that use a harmonised methodology. It is also necessary to build links between economists, policymakers and scientists in order to evaluate the socioeconomic extent of impacts and costs for action versus inaction.

The isolation of the Black Sea, combined with highly dynamic oceanography within basins, implies that effective responses to ongoing changes require intensified regional cooperation not only on better coordinated monitoring, but also on forecasting of changes, adaptation, mitigation and increasing awareness of the Black Sea with respect to acidification.

Sofia Sadogurska

Source (including all references to articles and reports): *https://airclim.org/sites/default/files/document/ocean_acidification_report_for_the_black_sea.pdf*

Climate Change threatens the capacity of oceans to store CO_2

Rising temperatures could lead to substantial releases of carbon dioxide currently bound to the deep ocean floor, reports the BBC. This is extremely bad news, as the oceans have so far buffered some of the temperature rise that would otherwise have occurred because of the greenhouse effect of carbon dioxide. In fact, oceans take up about one third of the carbon dioxide released into the atmosphere. Part of the carbon is taken up by marine life and is eventually buried in the sea floor. According to the BBC, the amount of carbon stored in this way is counted in billions of tonnes. If carbon dioxide starts to be released from the sea floor, this would lead to additionally increased warming.


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CO_2 bound to the ocean floor is likely to be released when sea temperatures rises.

Evidence for the release of carbon dioxide comes from experimental work within the iAtlantic research programme. The work specifically focused on the deep ocean, which covers more than 60 per cent of our globe. For the experiments, sediment (in essence, material that constitutes the sea floor) was brought from the abyss to the laboratory, and studied under temperatures that are predicted for the end of this century. Reportedly, temperature rise increases the release of carbon dioxide from these deep-sea sediments.

Source: Gills, V. "Ocean's climate change 'buffer' role under threat", *https://www.bbc.com/news/science-environment-59214866*

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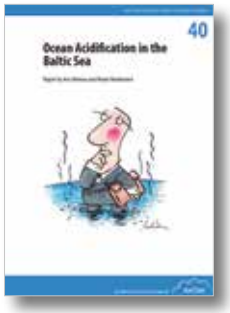

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The Baltic sea is especially vulnerable because of its low total alkalinity.

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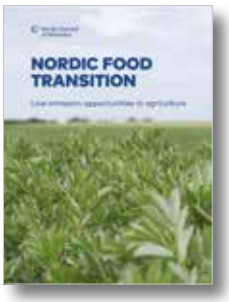

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Eight case studies and forty policy recommendations.

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Phasing out fossil gas power stations in Europe by 2030 (February 2021. By Fredrik Lundberg
A list of 142 gas-fired power stations that should be closed or not commissioned.

The science of temperature overshoots (October 2021). By Susanne Baur, Alexander Nauels, Uta Klönne & Carl-Friedrich Schleussner

Analysing marine geoengineering technologies (February 2021). By Fredrik Lundberg

1.5°C Pathways for Europe: Achieving the highest plausible climate ambition (October 2021). By Ryan Wilson, Lara Welder, Alexandre Delfosse et al.

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Coming events

EU Environment Council. Brussels, Belgium, 20 December 2021. Information: *https://www.consilium.europa.eu/en/meetings/calendar/*

EU Environment Council, Brussels, Belgium, 17 March 2022. Information: *https://www.consilium.europa.eu/en/meetings/calendar/*

IMO PPR 8 (Sub-Committee on Pollution Prevention and Response). London, UK, 4 - 8 April, 2022. Information: *www.imo.org*

CLRTAP Working Group on Strategies and Review. Geneva, Switzerland, 11 - 14 April 2022. Information: *www.unece.org/env/lrtap/welcome.html*

Health Effect Institute Annual Conference. Washington DC, US 24-26 April 2022 Information: *https://www.healtheffects.org/annual-conference*

Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity. Stockholm, Sweden, 2 - 3 June 2022. Information: *https://www.stockholm50.global*

IMO Marine Environment Protection Committee (MEPC 78). London, UK, 6 - 10 June 2022. Information: *www.imo.org*

Ocean Acidification Action Week. 6-10 June 2022. Information: *www.airclim.org*

EU Environment Council. Brussels, Belgium, 28 June 2022. Information: *https://www.consilium.europa.eu/en/meetings/calendar/*

International aerosol conference. Athens Greece, 4-9 September 2022. Information: *https://iac2022.gr/*

CLRTAP EMEP Steering Body + Working Group on Effects. Geneva, Switzerland, 12 – 16 September 2022. Information: *www.unece.org/env/lrtap/welcome.html*

ISEE 2022 34th Annual conference of the International Society for Environmental Epidemiology. 18-22 September 2022, Athens, Greece. Information: *https://www.viethconsulting.com/Calendar/moreinfo.php?eventid=66101*

UNFCCC COP 27. Sharm El-Sheikh, Egypt. 7-18 November 2022. Information: *https://unfccc.int/*

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