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1. COP28's potential impact on climate change

From an article by Matt McGrath, BBC Environment correspondent at COP28, 13 Dec 2023

The agreement reached for the first time nails the role of fossil fuel emissions in driving up temperatures and outlines a future decline for coal, oil and gas. But by itself, will this deal be enough to keep temperatures under 1.5C this century? Most likely not.

The major element of the deal, the transition away from fossil fuels in energy systems, is indeed a landmark moment. But the language is far weaker than many countries desired.

This wasn't all the fault of countries like Saudi Arabia. A key factor in softening the text was the attitude of middle-income developing countries who were very uncertain about the much hyped phased out of fossil fuels. For Nigeria, Uganda, Colombia and others there were complaints that they needed to use revenues from the sale of coal, oil and gas to ensure they could pay for the transition to greener energy.

Colombia complained that by moving away from fossil fuels, credit agencies had downgraded their rating, meaning that international loans to go green would cost them far more.

The final pact now calls on countries to "transition away" from fossil fuels specifically for energy systems, but not for plastics, transport or agriculture. The agreement also has many other elements that will help limit emissions including a new commitment to triple renewables and energy efficiency by 2030. This will see wind and solar displace some coal, oil and gas.

Another important factor is the requirement for countries to submit stronger carbon cutting plans by 2025. If China and India put a rapid transition to green energy at the heart of these new commitments, that could make a massive difference to the global effort.

But there is also a recognition of the role of "transitional fuels" in the agreement - which is UN code for continuing use of natural gas. There is also support for the use of carbon capture and storage, a technology that oil producers want to use to continue drilling.

Observers here believe that this meeting and the next two COPs, in Azerbaijan and Brazil, are part of a package deal that will help the world correct course on climate. The view is that with the cost of renewables continuing to fall, the pressure on fossil fuels will continue to grow.

2. Human 'behavioural crisis' at root of climate breakdown, say scientists

Extracts from an article by Rachel Donald, Guardian website, 13 Jan 2024

"We've socially engineered ourselves the way we geoengineered the planet," says Joseph Merz, lead author of a new paper which proposes that climate breakdown is a symptom of ecological overshoot, which in turn is caused by the deliberate exploitation of human behaviour. "We need to become mindful of the way we're being manipulated," says Merz, who is co-founder of the Merz Institute, an organisation that researches the systemic causes of the climate crisis and how to tackle them.

Merz and colleagues believe that most climate "solutions" proposed so far only tackle symptoms rather than the root cause of the crisis. This, they say, leads to increasing levels of the three "levers" of overshoot: consumption, waste and population.

They claim that unless demand for resources is reduced, many other innovations are just a sticking plaster. "We can deal with climate change and worsen overshoot," says Merz. "The material footprint of renewable energy is dangerously underdiscussed. These energy farms have to be rebuilt every few decades – they're not going to solve the bigger problem unless we tackle demand."

"Overshoot" refers to how many Earths human society is using up to sustain – or grow – itself. Humanity would currently need 1.7 Earths to maintain consumption of resources at a level the planet's biocapacity can regenerate.

Where discussion of climate often centres on carbon emissions, a focus on overshoot highlights the materials usage, waste output and growth of human society, all of which affect the Earth's biosphere.

"Essentially, overshoot is a crisis of human behaviour," says Merz. "For decades we've been telling people to change their behaviour without saying: 'Change your

behaviour.’ We’ve been saying ‘be more green’ or ‘fly less’, but meanwhile all of the things that drive behaviour have been pushing the other way. All of these subtle cues and not so subtle cues have literally been pushing the opposite direction – and we’ve been wondering why nothing’s changing.”

The paper explores how neuropsychology, social signalling and norms have been exploited to drive human behaviours which grow the economy, from consuming goods to having large families. The authors suggest that ancient drives to belong in a tribe or signal one’s status or attract a mate have been co-opted by marketing strategies to create behaviours incompatible with a sustainable world.

“People are the victims – we have been exploited to the point we are in crisis. These tools are being used to drive us to extinction,” says the evolutionary behavioural ecologist and study co-author Phoebe Barnard. “Why not use them to build a genuinely sustainable world?”

Just one-quarter of the world population is responsible for nearly three-quarters of emissions. The authors suggest the best strategy to counter overshoot would be to use the tools of the marketing, media and entertainment industries in a campaign to redefine our material-intensive socially accepted norms.

“We’re talking about replacing what people are trying to signal, what they’re trying to say about themselves. Right now, our signals have a really high material footprint – our clothes are linked to status and wealth, their materials sourced from all over the world, shipped to south-east Asia most often and then shipped here, only to be replaced by next season’s trends. The things that humans can attach status to are so fluid, we could be replacing all of it with things that essentially have no material footprint – or even better, have an ecologically positive one.”

Population growth is a difficult topic to broach given the not-too-distant history of eugenics and ethnic cleansing practised in many nations around the world. However, Merz and colleagues insist it is important to confront the issue as population growth has cancelled out most climate gains from renewables and efficiency over the past three decades. “It’s a question of women’s liberation, frankly,” says Barnard. “Higher levels of education lead to lower fertility rates. Who could possibly claim to be against educating girls – and if they are, why?”

The team is adamant that solutions that do not tackle the underlying drivers of our growth-based economies will only exacerbate the overshoot crisis. “Everything we know and love is at stake,” says Barnard. “A habitable planet and a peaceful civilisation both have value, and we need to be conscious about using tools in ethical and justice-based ways. This is not just about humanity. This is about every other species on this planet. This is about the future generations.”

Note: As ESR members may remember, a presentation on the paper was made in November 2023. The webinar link to the recording of the presentation is

<https://www.dropbox.com/scl/fi/e5ukippu6ewye4ne2dy7n/The-Behavioural-Crisis-Driving-Ecological-Overshoot.mp4?rlkey=z94s63m1fwltjj4ig3t0d2q&dl=0>

As there are some sound issues, it is understood that the event will be run again on 6 March.

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3. Carbon released by bottom trawling

Karen McVeigh, guardian website, 18 Jan 2024

Scientists have long known that bottom trawling – the practice of dragging massive nets along the seabed to catch fish – churns up carbon from the sea floor. Now, for the first time, researchers have calculated just how much trawling releases into the atmosphere: 370m tonnes of planet-heating carbon dioxide a year – an amount, they say, that is “too big to ignore”.

Over the study period, 1996-2020, they estimated the total carbon dioxide released from trawling to the atmosphere to be 8.5 to 9.2bn tonnes. The scientists described trawling as “marine deforestation” that causes “irreparable harm” to the climate, society and wildlife.

The study – Atmospheric CO₂ emissions and ocean acidification from bottom trawling, written by a global team of climate and ocean experts – found that 55-60% of the carbon dioxide in the water released from the seabed by trawlers will make it to the atmosphere within nine years.

Trawling hotspots in the East China Sea, the Baltic, the North Sea and the Greenland Sea have the largest climate emissions, the study said. Carbon released from the sea floor also causes local acidification, reducing the oceans' capacity to absorb carbon, the study found.

“We have long known that dragging heavy fishing nets – some as large as 10 747 jets – across the ocean floor destroys sea life and habitats,” said Dr Trisha Atwood, an aquatic ecologist at Utah State University and National Geographic's Pristine Seas. “Only recently, we have discovered that bottom trawling also unleashes plumes of carbon, which otherwise would be safely stored for millennia in the ocean floor.”

The study relied on a vessel-tracking database processed by Global Fishing Watch, which shows where trawling took place in 1996-2020. They added data on sea-floor carbon, then used three different internationally accepted models of carbon cycles in the ocean, used by the Intergovernmental Panel on Climate Change, to calculate how much carbon released into the water entered the atmosphere.

The estimates of carbon dioxide released to the atmosphere from trawling are conservative, the researchers said, given they have included only trawlers that are publicly tracked, when a Global Fishing Watch study found that 75% of fishing vessels are not.

4. India rebuilds coal stocks to ensure electric reliability

Extracts from an article by [John Kemp](#), Reuters website, February 1, 2024

India's electricity consumption peaks between June and August, when temperatures are hottest and the demand for air-conditioning and refrigeration is greatest. But the summer monsoon is also when generation from hydroelectric sources and wind farms is greatest, relieving some of the pressure on the electricity transmission network.

As a result, power supplies tend to be most stretched in March and April, before the monsoon arrives, when temperatures and air-conditioning have started to rise but renewable generation is still low. The same problem occurs in reverse after the monsoon in September and October, when renewable generation starts to fade while air-conditioning demand is still elevated.

The country needs to accumulate coal inventories during the summer wet season and especially in winter to ensure coal units can maximise generation during the shoulder seasons. In September-October 2021 and again in March-April 2022 the grid was hit by widespread outages when coal generators ran out of fuel and could not start up during periods of hot weather. Accumulating coal inventories has therefore been a priority for the government and generators to avoid any repeat. Stock building so far this winter has put the system in a much more resilient position to cope with the pre-monsoon increase in demand.

In addition to boosting coal mining, India has been able to relieve some of the pressure on coal supplies through a massive expansion of renewable generation, saving significant quantities of fuel.

The country has installed 79 gigawatts (GW) of additional generating capacity since the end of 2018, with capacity increasing at a compound rate of 4% per year. But just 10 GW of extra capacity has been coal-fired (an average increase of just 1% per year) with 60 GW coming from renewables (a compound increase of 13% per year).

Solar capacity has surged by 48 GW (24% per year) with smaller increase in wind capacity of 10 GW (5% per year), according to Central Electricity Authority data.

5. World groundwater levels showing 'accelerated' decline

Jan 25, 2024 (Reuters) - Groundwater levels across the world have shown widespread and "accelerated" decline over the past 40 years, driven by unsustainable irrigation practices as well as climate change. Groundwater is a major source of fresh water for farms, households and industries, and depletion could pose severe economic and environmental threats, including falling crop yields and destructive land subsidence, particularly in coastal areas, said the study published in the Nature scientific journal dated 24 January 2024.

"One of the most likely major driving forces behind rapid and accelerating groundwater decline is the excessive withdrawal of groundwater for irrigated agriculture in dry climates," said Scott Jasechko from the University of California, Santa Barbara, one of the paper's co-authors. But drought, driven by climate change, was also having an impact, with farmers likely to pump out more groundwater to ensure their crops are irrigated, he said.

Depletion has been particularly pronounced in arid climates with extensive croplands, said the study, which analysed 170,000 wells in more than 40 countries. Northern China, Iran and the western United States were among the worst-hit regions.

More than a third of the 1,693 aquifer systems - bodies of porous rock or sediment holding groundwater- monitored by the study fell by at least 0.1 m per year from 2000 to 2022, with 12% seeing annual declines of more than 0.5 m. Some of the worst hit aquifers in Spain, Iran, China and the United States fell by more than 2 m per year over the period.

6. Short extracts from Reuters website

Reuters Sustainable Switch: Climate

Extracts from articles by Sharon Kimathi, Energy and ESG Editor, Reuters Digital, 20 January 2024

Phasing out fossil fuels has been on the top of the climate agenda at the World Economic Forum in Davos, Switzerland this week, with policymakers calling for faster action. The United Nations Secretary-General Antonio Guterres said the phase-out of fossil fuels was essential and inevitable to avoid a global climate catastrophe.

Additionally, International Monetary Fund Managing Director Kristalina Georgieva said that countries need to shift some \$7 trillion in direct and indirect annual subsidies for fossil fuels to help finance the fight against climate change. She was speaking during a climate panel that also featured World Bank President Ajay Banga. Banga told the forum that the world "cannot afford another set of decades of emissions-heavy growth," and leaders must increase the urgency to find ways to finance clean energy sources and clear the way for private capital to invest.

But the environmental think tank Ember found that worldwide electricity generation from coal hit record highs in 2023, while thermal coal exports surpassed 1 billion metric tons for the first time as coal's use in power systems continues to grow despite widespread efforts to cut back on fossil fuels.

The discussions around phasing out fossils come as the European Union is drafting its first 2040 climate target, to bridge the gap between its existing goals to cut net emissions 55% by 2030 and reach net zero emissions by 2050. The European Commission is set to recommend the EU reduce its net greenhouse

gas emissions 90% by 2040, from 1990 levels, to ensure the bloc can reach net zero emissions a decade later, sources familiar with the matter told Reuters.

London is underprepared for the heatwaves, flooding and rising sea levels it is forecast to experience in coming years, a report commissioned by Mayor Sadiq Khan said. The report, which was ordered after soaring temperatures, wildfires and floods all hit the capital in recent years, said a "step change" in planning and investment was needed.

Reuters Power Up (12 Jan 2024)

Globally, more than \$720 billion is going to be spent on building new gas pipelines with another \$190 billion going into liquid natural gas (LNG) facilities, ensuring fossil fuels will retain a critical role in energy systems well beyond 2030.

7. French farmers

LONGVILLIERS, France, Jan 29 (Reuters) - Long lines of tractors blocked highways near Paris and across France on Monday, as angry farmers sought to put pressure on the government to do more to help them face inflation, compete with cheap imports and make a living. The protests follow similar action in other European countries, including Germany and Poland, ahead of European Parliament elections in June in which the far right, for whom farmers represent a growing constituency, is seen making gains.

"It's just too much, we're really fed up," said 46-year-old farmer Geraldine Grillon, speaking at a blockade on the A10 highway south of Paris. Grillon blamed President Emmanuel Macron and the European Union - where many agricultural rules, and subsidies, are decided - for the farmers' woes.

It's that type of comment that has prompted the government, wary of seeing the protests escalate and with an eye on the European elections, to drop plans to gradually reduce subsidies on agricultural diesel and promise to ease environmental regulations. France also said it would push its EU peers to agree to ease regulations on fallow farmland and promised that more measures would be announced shortly.

With farmers angry over cheap imports, Macron has insisted to the European Commission that it was impossible to conclude trade deal negotiations with South America's Mercosur bloc and understands the EU has put an end to the talks, his office said on Monday.

8. Solid state batteries update

Extracts from an article by Peter Valdes-Dapena, CNN, 23 November 2023

Electric cars are supposed to be the future, but they still have issues that are keeping away many car buyers. The range is too short. The batteries are too heavy and expensive. They take too long to charge. But a number of companies

say they have the technology to solve many — maybe even all — of these problems.

Toyota, has said it might be on the cusp of such a breakthrough. Other automakers are also working with various battery companies on versions of this new technology. The would-be breakthrough is called a “solid state battery,” and the only problem is that — much like other vaunted Earth-changing technologies — for a few years now, it’s always been just a couple of years away.

Car companies including Stellantis, Hyundai and Volkswagen have also teamed up with firms working on solid state batteries. The technology holds the promise of batteries that are smaller and lighter while providing more power. They could be safer with less chance of catching fire in a crash. If a liquid electrolyte battery is broken or punctured, the two sides of the electrolyte can ooze together, which can lead to an uncontrolled energy flow, followed by a fire.

Meanwhile, there are competing battery technologies for which manufacturing techniques are well established.

There’s still no clearly superior technology, said William Kephart, a battery researcher at the consulting firm P3 Group. Fast charging times, a key consumer demand, is one challenge for solid-state batteries. Generally, it takes the lithium ions in the batteries used currently more time to move through a rigid material than a liquid, Kephart said. That tends to make it take longer to receive energy, which slows charging times, and makes it slower to release energy — which drags on a vehicle’s acceleration.

Solid-state battery company QuantumScape claims that its solid-state batteries — which use some liquid, but not for the electrolyte — have been tested and can charge even faster than typical lithium ion batteries. QuantumScape also say its battery design eliminates graphite, reducing expense and, the company claims, greatly reduces carbon emissions from manufacturing

A company called Factorial, which counts Stellantis and Mercedes as investors, claims its solid-state battery technology uses less lithium than traditional batteries, which could potentially reduce costs, especially as production ramps up.

At the same time, though, some other battery companies are working to improve traditional liquid-electrolyte batteries, improvements that could make that existing technology better.

Just changing the one piece of the battery by adding silicone could yield big improvements in performance at relatively low cost. That’s what’s proposed by a company called OneD Battery Sciences, in which GM has invested. OneD’s technology allows production processes to stay roughly the same while promising big improvements in performance, according to the company. That means less trouble and expense for battery manufacturers and automakers.

Other companies are working on semi-solid state batteries that combine parts of each type of battery, providing some of the benefits of solid state without completely ditching the standard fluid-based design.

Ultimately, there probably will never be one battery technology used in all EVs, GM spokesperson Phil Lienert said. The type of batteries will be matched to the vehicle and the specific market where it's sold. It's similar to how automakers use different engines in various models and in different markets. GM's Ultium electric vehicle design, which underlies all of GM's EV models, was specifically engineered to enable the use of all different sorts of batteries.

9. Information from Energy Source and Distribution magazine, Jan/Feb 2024

The Western Australian Government recently announced that battery systems are now in place at the Kwinana Battery Stage Two. Synergy has installed containerised battery systems at what will be WA's biggest grid-connected battery energy storage system proving 200MW of power with 800MWh of energy storage. Once complete the new battery system will be capable of powering 370,000 average homes for approximately 4 hours. The Western Australia Government is investing more than \$6 billion towards renewable energy generation, transmission and storage.

The Australian Renewable Energy Agency (ARENA) has shortlisted applicants to submit a full application in the next stage of the \$2 billion Hydrogen Headstart Program. Under the program, projects seeking to produce renewable hydrogen or derivatives such as renewable ammonia or methanol at scale can apply for a production credit delivered over 10 years to bridge the commercial gap between the cost of producing renewable hydrogen and the market price.

South Korean solar panel maker Qcells will supply Microsoft with 12GW of American-made solar panels through 2032 in one of the largest deals of its kind.

State-owned Norwegian hydropower and renewable energy company Statkraft has announced a major investment programme, with plans to pump up to Euro 6 billion into its hydro and wind facilities, and for the construction of new wind farms. Hydropower accounts for approximately 88% of Norway's energy production, and wind power 11%.

France may need to build more than 14 new nuclear power plants instead of the 6 currently in order to meet its energy transition goal of reducing fossil fuel dependence from 60% to 40% by 2035.

India's minister for power and new and renewable energy RK Singh said the country would reduce its coal power capacity to 33% by 2030, down from 68% in 2014. Singh said emission reduction was a priority for India, with the government aiming to add 80GW of thermal capacity by 2030 in order to meet the rising power demand while working towards tripling its renewable capacity to 500GW in the same timeframe.

10. Some recent statistics

2023 was the planet's hottest on record by a substantial margin and likely the world's warmest in the last 10,000 years, according to the European Union's Copernicus Climate Change Service (C3S).

The concentration of CO₂ in Earth's atmosphere increased from around 278 parts per million (ppm) (0.028%) in 1750 to 417 ppm (0.042%) in 2022, according to Copernicus data. Note: February 2, 2024 Mauna Loa Observatory CO₂ level was 422.21 ppm. Year change +2.40 ppm or +0.57%.

Worldwide, net emissions of greenhouse gases from human activities increased by 43 percent from 1990 to 2015. Emissions of carbon dioxide, which account for about three-fourths of total emissions, increased by 51 percent over this period. (Source: EPA US).

Global mean sea level has risen about 21–24 cm since 1880. The global mean water level in the ocean rose by 3.6 mm per year from 2006–2015, which was 2.5 times the average rate of 1.4 mm per year throughout most of the twentieth century (Source: NOAA).

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