



ONLY LARGE-SCALE DIRECT ATMOSPHERIC CARBON REMOVAL (DACR) CAN SAVE OUR CHILDREN FROM MASSIVE CLIMATE-INDUCED SUFFERING

Dr. Christian R. Komor, Author Climate Deadline 2035

As in World War II, we are all called to be part of a large-scale mobilization to Direct Atmospheric Carbon Removal (DACR), while avoiding the temptations to be misled into a premature and desperate grab for “emission reductions” and doomed efforts at “climate adaptation”. We must find out what we and our organizations can do to restore our children’s future by supporting the Direct Atmospheric Carbon Removal lawsuit (22-cv-0007) now in U.S. Ninth Circuit Appeals Court. This civil action presents a last opportunity to press the United States government to upscale engineered removal of the massive overload of carbon now in the atmosphere – the only real hope remaining for future generations. [1] [2]

In 2019, the Oxford Dictionary chose “climate emergency” as the term of the year on the heels of more than 2,100 local governments and two dozen countries making climate emergency declarations. Meanwhile, knowledgeable climate scientists began packing their LiDAR sensors and heading for the door. When your house is on fire, it is an emergency. When your house has already burned to the ground, there is just an empty space. In this case, a space quickly flooded by the firehose of a pandemic, soaking the fight out of remaining climate activists and leaving nothing but random gunshots and the squabble over the me-too scraps of politics, gender, and ethnic identity. Many of us feel in our gut that we are in social disarray. It’s almost like we need an attack by aliens from space or some other civilization-threatening calamity to draw us together. Hummmm.....

We are, in fact, too late to stop a sixth mass extinction. Our generation will make it through to their graves with mild-to-moderate discomfort depending on where you live and how wealthy you are. But for children born after 2020, their futures are already pretty much dead and after that, well, you don’t want to know. Under current conditions, even with a full stop to further carbon emissions, we will continue to sail past tipping points where there is just too much acidity in the oceans, or too much methane erupting from beneath what used to be permafrost for the Earth to recover. You can read the science, it’s pretty clear. It tells us that, at around 450 parts per million dissolved atmospheric carbon, or 310 GtC in the oceans (the latter triggering a critical impairment in phytoplankton blooming), Earth will shift to a “new normal” which is incompatible with the forms of life currently existing on the planet. [3] [4] [5] [6]

So this report is about the impossible, about rising from the dead – or at least cheating death.

PAYING YOUR BILL BEFORE YOU CHECK OUT

Five decades and 5.8 trillion climate cleanup dollars in the past, governments of developed nations and leaders of multinationals were being warned by their scientific advisors that their policies and practices were causing a buildup of heat-trapping “greenhouse” gasses (GHG) in the atmosphere. Those leaders read reports making it clear that the resulting changes in climate and ecosystems would eventually result in the extinction of most land and aquatic species on the planet...including human beings. The scientists urged the reduction of planet-heating GHG emissions and a shift to alternative sources of energy, transport and construction. [7]

Already famous for squeezing out the last bit of profit no matter what the cost to everyman, the response from Presidents to CEOs was to burn more coal, pour more concrete, make bigger cars and frack deeper for bigger gas profits. As sure as Nazi tanks rolling into Poland, by the early 1980’s the message was clear, “If you want us to stop you’re going to have to get organized, make some new technology *and come and stop us.*”

[Aside: Is global warming your “fault” for driving a car? The first automobile engines were actually electric and the public was clamoring for more! The technology was developing rapidly and batteries improving in leaps and bounds when car manufacturers discovered it was more profitable to build and operate engines using internal combustion – putting the dream of electric vehicles into cryogenic sleep.]

Earth has been very forgiving with humans, but filtering even naturally occurring greenhouse gases takes hundreds to thousands of years. Human activity has, to date, released about *375 billion tons of carbon dioxide alone*. Such massive *artificial* increases in GHG emissions *can* be filtered by natural planetary systems, but not in a time frame at all meaningful to most of the life now residing on the Earth. By the time natural processes can recycle our extended spree of GHG dumping, our house will have long-since burned to the ground and the ashes covered by new dirt, new plants, new animals. [8]

The simple reality is, *Artificial* forcing of planetary systems requires an *artificial* clean-up. Why would we think otherwise? Thankfully we do have brand new technology that might just give Earth the assistance she needs. The trouble is we do not have the organization or the courage to use it – and so we stand like deer in headlights and the clock ticks.

Corporations, by the way, do *not* in fact have souls. It doesn’t really matter if the Supreme Court says they do. Corporations live only on paper documents, agreements structured to generate profits. That’s their job, to make money. Most governments, on the other hand, are ostensibly created to represent the life, liberty, and property interests of the people. Global warming (something clearly not in the best interests of “the people”), is not a failure of energy companies and car manufacturers, *but a failure of government to have the honesty, strength and courage to force corporations to act in the public interest while making their profits.*

A Harvard University analysis of hundreds of ExxonMobil documents found that the company deliberately tried to hide the truth about the direct connection between carbon emissions and global warming. Why did the U.S. government, who had received those same warnings through their own advisors, not stop them? If there is a future, civics classes will no doubt parse these mysteries. For us, the people at the edge of the cliff, our focus must be on getting our representative government to correct those past mistakes.

For all its beauty and promise the United States Government has failed spectacularly when it comes to limiting greenhouse gas emissions. And when confronted with this problem the government has thrown off some chaff hoping to distract us with “it won’t be so bad” mitigation scenarios and promises of future emissions reductions that never seem to materialize. Critical resources are being routed into shortsighted climate mitigation and adaptation measures. However, adaptation to climate disruption will only be possible for a relatively small number of humans and for only a short number of years. Category 10 hurricanes cannot be adapted to. [9]

There is no more time. We are at 420ppm atmospheric carbon and rising by 2ppm per year toward the 450ppm Climate Deadline. We are at the threshold. There is not even time for protests or sounding the emergency

sirens. There is only time for a decisive court victory followed by a consent decree directing the United States to invest trillions of dollars in Direct Atmospheric Carbon Removal “hubs” throughout its states and territories. Immediately. [10]

This effort must be *supported by a loud outcry from the citizenry*. The civil action needed to rescue your children’s future (case number 22-cv-0007) https://www.amazon.com/Christian-Komor-United-States-America/dp/B09SP43D97/ref=sr_1_7?crid=2O9LYKYD730IV&keywords=komor+books&qid=1683941494&prefix=komor+books%2Caps%2C185&sr=8-7 has been created *for you*, but it needs your participation. It needs that loud public outcry for climate justice – not just a general complaint about climate change, but a clear, consistent, focused demand for Direct Atmospheric Carbon Removal. The United States must be encouraged through the courts to accept responsibility for repairing the damage it has allowed to our air, land and waters. Our courts are empowered by the people. [11] [12]

LONG-STANDING LEGACY EMISSIONS

Present-day humans have been perched precariously on their branch of the tree of life busily sawing it off for some time. Since the industrial revolution, human activity has released about 375 billion tons of carbon dioxide (CO₂) as well as staggering amounts of other greenhouse gasses including: Nitrous Oxide (N₂O), various Fluorocarbons (CFCs), Ozone (O₃), and Methane (CH₄) – alarmingly massive stores of which have recently begun to bubble up in polar seas where concentrations are now 8 times higher than normal. Carbon dioxide, the most prolific of these “legacy emissions” remains in the atmosphere for thousands of years. We are continuing to emit 10GtC each year. Approximately 50% remains in the atmosphere while 30% is stored in the ocean as carbonic acid and 20% in the soil. This uptake of carbon dioxide in the oceans has led to an increase in ocean acidity which will eventually kill off sea life needed to make most of the oxygen on which we depend.

Reducing *present and future* GHG emissions will not, of course, take away from these *already existing* emissions which will go on rapidly heating the planet. These megatons of carbon were artificially placed in the atmosphere (by us) and must be artificially removed (by us) or they will continue to persist for hundreds to thousands of years. Sustainability and alternative energy will *only* gain traction after this blockage of carbon is removed just as a healthy diet will not help a heart patient whose arteries are already 90% blocked until a more invasive operation is performed on the patient. [13]

DISRUPTED ECOSYSTEMS ARE INTERCONNECTED MAKING DAMAGE EXPONENTIAL

Climate disruption is not progressing in a linear fashion or in isolated ecosystems. Obvious to most of us, though not to politicians and some climate scientists, our environmental ecosystems are *interconnected* influencing one another continuously. A climate change model based on changes in ocean currents is not going to be accurate unless it takes into account the droughts and migration linked to those oceanic changes. Then, if we add in the environmental mutations caused by those changes (e.g. the emergence of novel carbon-releasing microbes in the soil) the predictive model becomes even more skewed. In short, the advance of climate disruption is far more exponential, variable, and full of nasty surprises than a simple linear analysis would suggest. In most cases, these surprises are not in our favor. [14] [15] [16]

Here is one example: Unable to escape Earth’s greenhouse-gas-saturated atmosphere, radiative heat is warming our oceans -- leading to the melting of polar ice and permafrost -- causing the release of massive stores of methane -- leading to acidification of oceans and disruption of ocean currents--causing altered weather patterns -- leading to enduring droughts -- triggering wildfires and flooding -- leading to crop failures -- leading to soil degradation -- triggering the birth of novel carbon-releasing microbes in the soil -- causing the release of massive carbon stores from soil -- leading to mass human and animal migrations -- which in turn overwhelm the ability of

governments to respond causing social unrest, territorial wars, aberrant human behavior -- and so on. Other examples of interconnected ecosystem disruptions occurring as you read this include:

- Mass migrations, as the temperature bands for land and aquatic life move a *full 30 feet each day* toward the poles. At 3 degrees of global warming, 3 billion people will, if not relocated, be living in life-threatening heat.
- Saltwater contamination of freshwater resources exacerbates already dwindling freshwater reserves.
- Vastly worsening insect-borne disease *vectors* increasing the prevalence and intensity of viral and other diseases.
- Emergence of new soil microbes which have begun to release increasing amounts of stored carbon from the ground.
- A widening breach between plants and pollinators.
- As the Western US aridifies, over pumping of aquifers is increasing levels in groundwater.
- Altered weather patterns leading to loss of life and costly infrastructure damage from hurricanes, flooding, tornadoes and other weather-related events.
- Reduced or destroyed animal species and habitats, especially for those less adaptable species - like humans. Between 1970 and 2016 nearly 21,000 monitored populations of mammals, fish, birds, reptiles and amphibians, encompassing almost 4,400 species around the world, had declined an average of 68%, according to the World Wildlife Fund. [22] [23]
- Extinctions! As of 2020 nearly 21,000 monitored populations of mammals, fish, birds, reptiles and amphibians, encompassing almost 4,400 species around the world, have declined an average of 68% (1970 – 2016), according to the World Wildlife Fund. Species in Latin America and the Caribbean, as well as global freshwater habitats, were disproportionately impacted, declining, on average, 94% and 84%, respectively. [24] [25] [26]
- The slowing of AMOC ocean currents which are key to maintaining balance in many of Earth's systems especially heat distribution.
- The melting of ice and permafrost at both poles leading to the release of vast stores - the equivalent of 2.5 times all recorded human emissions - of methane and carbon from beneath melting permafrost and ice to worst effect in rainforests. Greenland alone has lost over 500 billion tons of ice in the past 10 years - under which is 1,500 gigatons of carbon. [27] [28]
- Increased wildfires throughout the world releasing massive amounts of carbon into the atmosphere. Unbelievably, arctic wildfires. The peak number of active fire observations was about 600 in late July 2020, compared with 400 in 2019. In June and July 2020 alone NASA estimated that 205 megatons of CO₂ were emitted from fires. In parts of California, fire season is now 50 days longer than in 1979. Studies of the Western United States suggest that about 40 percent more area is burned today due to climate disruption. The Australian wildfires of 2019 and the Canadian wildfires of 2023 are two examples. [29] [30] [31]
- Disrupted food supplies for humans, land animals and fish. In the US food prices are currently 20.9% higher than in 2020.
- Multiple organizations including the World Bank agree the suffering, death and financial expense being caused by climate change has already surpassed both World Wars and continues to escalate exponentially [32] [33]
- The Great Barrier Reef and those like it are rapidly dying. Marine heatwaves are radically transforming the undersea ecosystems and devastating fish stock. More acidic waters make it difficult for phytoplankton – which produce approximately between 60-80% percent of Earth's oxygen - to absorb nutrients, rendering them vulnerable to disease and toxins. Researchers from MIT and elsewhere have projected that - at around 310 GtC - increased ocean acidity will lead to a critical impairment in phytoplankton blooming in oceans. Daniel Rothman of M.I.T. and other researchers have calculated

that, beyond that point, we will trigger the sixth mass extinction of land and ocean-based animals just by ocean acidification alone when phytoplankton stop producing oxygen. Remember, we are currently at 150 GtC of ocean-dissolved CO₂ and that number is growing at 2 GtC each year. So, if 450 ppm atmospheric carbon dioxide doesn't stop making the world go round, 310 GtC-driven ocean acidification will. [34] [35]

The *interaction* between forced environmental changes like those listed above have created *exponentially-increasing shifts in our planetary ecosystems* demonstrating again that, as nature is interconnected, so is climate disruption. This may be why climate scientists have *consistently underestimated* the magnitude and speed of global warming. Isolated projections of the progression of Climate Change based on the study of one system or another cannot help but be inaccurate. Nature doesn't exist in separate boxes, nor does she work in fragmented parts.

EVERYTHING, EVERYWHERE, EXPONENTIALLY

Not only is climate change *exponential and interactive*, but it is also *additive*. In the early 2020's COVID-19, hurricanes, economic turmoil, earthquakes, and massive wildfires have happened all at the same time. These "worst years ever" are a small taste of what the future holds for our children as climate change advances. It will be a future filled with escalating pandemics, wildfires, hurricanes, mass migrations, flooding, drought, desertification, dying coral reefs, massive crop loss and famine, aquatic and land species extinction events (in particular amphibians, conifers, reef corals, sharks and rays, crustaceans, birds and mammals), and unsurvivable increases in mitigation costs and reduced GDP to try and keep pace with disasters. In short, everything, everywhere, all at once! At this escalated *pace*, the exponentially increasing *cost* is already becoming, if not unsurvivable, impossible to get out in front of! Indeed, already the price tag for necessary DACR at scale is in the trillions of dollars. At some point the price for the continuation of civilization as we know it will be simply unpayable. [36] [37] [38]

A "NEW NORMAL" IS APPROACHING FAST – BUT DON'T WORRY, YOU WON'T LAST LONG

For all these reasons, we must *bypass the temptation* to rest in futuristic hopes of mitigation, carbon reduction, and sustainability and instead mobilize the *Negative Emissions Technology* (NET) of *Direct Atmospheric Carbon Removal* (DACR) to deal swiftly first with existing *legacy emissions*. Only then can we legitimately work on sustainability without it being mainly a feel-good distraction. [39]

Starting by 2025 we must capture a net 10 GtC/yr (10 billion metric tons) average CO₂ per year if we hope to skirt the twin points of no return in the mid-2030's – 450 parts per million atmospheric carbon and 310 GtC of ocean-dissolved CO₂. Inarguable geologic records demonstrate the former will trigger the Earth to shift to a new normal inconsistent with human survival. The latter will cause phytoplankton to stop producing 80% of the world's oxygen – also inconsistent with human survival without a space suit. [40] [41] [42] [43]

You might have thought COVID-19, with a fatality rate of about one percent was pretty bad? Wait until a prehistoric virus is unleashed from melting permafrost, perhaps one of the *Nipah viruses* with a fatality rate of over 50 percent. Climate change is already making it possible for more equatorial diseases to spread north and south. One favorite is *Crimean-Congo Hemorrhagic Fever* which causes Ebola-like bleeding out of every orifice of the body and is transmitted by Himalayan ticks that just happen to be migrating northward. Want something even more in your face? Recently, ten cities in Texas shut down their municipal water supplies due to the presence of *Naegleria fowleri* a "brain-eating" parasite that typically infects people swimming in warm lakes and rivers. As freshwater lakes heat up, *Naegleria fowleri* are able to proliferate and, apparently, find their way into municipal water supplies. [44] [45] [46]

A recent study using a high-resolution past climate emulator, which provides temperature, rainfall, and other data over the last 5 million years found that past “generations” of Homo sapiens (including H. habilis, H. ergaster, H. erectus, H. heidelbergensis, H. neanderthalensis, and H. sapiens), were unable to survive intense climate change. The researchers looked at an extensive fossil database spanning more than 2,750 archaeological records to model the evolution of each Homo species' climatic niche just before going extinct. Lead researcher Dr. Raia Pasquale observed, "It was crystal clear, for the extinct species and for them only, climatic conditions were just too extreme for adaptation just before extinction and only in that particular moment. It is worrisome to discover that our ancestors, which were no less impressive than us in terms of mental power as compared to their peer species on Earth, could not resist climate change," he said. [47] [47] [49]

THINGS WILL GET WORSE BEFORE THEY GET BETTER

The scientifically-minded among you may recall Henry’s Law. Every atmospheric gas is in equilibrium with that gas dissolved in ocean water. It means that even if/when we do begin reducing legacy carbon through DACR initially we will see *increased outgassing* of those carbon emissions we have been packing into the soil and oceans for the past several generations. This law of equilibrium will slow the progress of atmospheric carbon reduction meaning we have to start now and more aggressively. [50] [51]

And if all that wasn’t bad enough, in our current state of planetary dysregulation, some types of current emissions reduction activities may actually be harmful. For example, sulfate aerosols, largely from coal-fired power plants with inadequate pollution controls, actually have a short-term global cooling influence by blocking incoming solar radiation. The effect is most pronounced over the Northern Hemisphere. Efforts underway in many countries to rapidly reduce these emissions, while beneficial in the long run, will inadvertently work to drive global temperatures higher. [52] [53] [54] [55]

Our planetary ecosystems are extremely complex and intertwined. As we forced dysregulation, interactions between systems exponentially escalated the negative outcomes (including global warming). Although essential and unavoidable at this point - as we force repairs there will be equally complex systemic interactions, some of which will slow the recovery process. [56] [57]

LINCHPIN TIPPING POINTS

Even if we were to *halt all GHG emissions immediately*, our warming trajectory combined with emerging ocean and soil outgassing and negative environmental feedback loops will continue for several centuries. This will push our planetary warming beyond what we are calling the *Anthropocene Extinction Boundary* (AEB). The AEB is defined as 450 ppm dissolved atmospheric carbon with its corresponding planetary warming (we are currently at 420 ppm increasing by 2 ppm yearly) and, or 310 GtC of ocean dissolved CO₂ with its corresponding ocean acidification (we are currently at 150 GtC increasing by 2 GtC yearly). When we reach these linchpin tipping points in approximately the mid-2030s Earth will essentially “lock into a new normal” – one that is inconsistent with the continuation of human life. [58] [59] [60] [61]

All of this is well-documented by direct measurements and *geologic* sampling (no lab needed) yielding a virtual certainty of reliability. The findings are very clear. While we may be a seemingly comfortable century or more from “the end of life as we know it”, *we are only 10-15 years from the “point of no return”*. Beyond this point, the few future generations remaining will have no power to change the outcome. They will live through

rapidly increasing misery and despair as the discomforts and dangers of climate change, mass extinctions, and ecosystem collapse advance on them inexorably.

THE ONLY REMAINING SOLUTION: DIRECT ATMOSPHERIC CARBON REMOVAL

Too late for emissions reduction, too early for sustainability and unwilling to leave future generations to suffer for our mistakes, we have no choice but to remove existing atmospheric carbon before we can move on with civilization as we know it. Fortunately for us, the technology for Direct Atmospheric Carbon Removal has recently come online, albeit on a small scale. At several locations around the world plants are up and operating successfully and costs are gradually coming down. In fact, following our consultation with climate team members at the White House, the United States government has now set up a “Hub” for DACR efforts with a DOE budget of several million dollars. These efforts have shown that we *can* remove carbon directly from the atmosphere on an industrial scale, we just need the funding to *increase the magnitude of the effort*. At present it is as if we were sending a platoon of 50 soldiers with rifles to fight the entirety of the Nazi army, air and naval forces. As in the 1930’s, we need to get serious if we are going to win this war. [62]

WE FORCED CLIMATE DISRUPTION – NOW WE MUST FORCE CLIMATE REPAIR

Unfortunately for us, the human brain was originally designed for perceiving and reacting to immediate threats and is still not very good at deferring today’s rewards for tomorrow’s safety. This includes the brains of politicians and government officials. It’s always a shock to hear someone say, “I don’t have time” or “It’s not a priority” when asked do something to aid with climate change. [63] [64] [65] [66]

The massive mobilization we need must be preceded by a massive outcry on all possible organizational and civic channels. Enemy boats are off our shores – we either fight now or fall.

“CARBON CAPTURE AND SEQUESTRATION” (CCS) IS NOT THE SAME AS DIRECT ATMOSPHERIC CARBON REMOVAL (DACR)

In 2020 fully 67% of global energy was still being supplied by fossil fuels. Major efforts are being made to capture some of those carbon emissions from these plants at the source. The current approach is to pressurize this to 11,000 psi and bury it in deep subterranean porous silicate rock structures. Unfortunately, there are not enough of these porous rock areas to go around so CCS power plants can only be located in very few places or face a transportation problem with its attendant GHG emissions.

This type of “Carbon Capture” can play a role in the ensemble of future emissions reductions, but cannot and is not intended to have any impact on the existing “legacy emissions” already in the atmosphere. We must all correct the misinformed, redirecting them to Direct Atmospheric Carbon Removal.

CLIMATE WARS: A NEW HOPE

Direct Atmospheric Carbon Removal (DACR) – or as it is often, less accurately phrased Direct Air Capture (DAC) - is the only means at our disposal at this late date to curb global warming *and* enable a circular economy. As fossil fuels dwindle, carbon for commodities such as plastic, cement, steel and liquid fuel will need to come from somewhere. In March 2023, the U.S. Department of Energy (DOE) announced \$24 million in

funding for nine research projects to explore and develop new methods of capturing and storing carbon from the air. Direct Air Capture (DAC) is one of the nine research projects that will receive funding. In May 2023, the U.S. Department of Energy's (DOE's) American-Made program announced two new prizes to launch direct air capture into the mainstream, offering over \$7 million in prizes and technical support to those who can rise to the challenge. DACR is a technology that uses chemical reactions to pull carbon dioxide out of air. The technology is still in its early stages of development, but it has the potential to revolutionize carbon capture and management solutions. [67] [68]

As mentioned earlier, very recently the US Department of Energy Office of Clean Energy Demonstrations initiated “Regional Direct Air Capture Hubs” <https://www.energy.gov/oced/regional-direct-air-capture-hubs> began to distribute funding (\$3,500,000) for eligible projects that contribute to the development of direct air capture by technology developers, industry, utilities, universities, national laboratories, engineering and construction firms, state and local governments, tribal, environmental groups, and community-based organizations. [69]

One of the first such supported programs Global Thermostat (Colorado, USA) has built a research and development facility and pilot plant about 30 miles northeast of Denver. Company officials say the plant can remove 1,000 tons of carbon dioxide from the atmosphere over a year. A tiny fraction of what is needed, but a start. <https://www.denverpost.com/2023/04/04/carbon-dioxide-capture-launches-in-colorado-global-thermostat/>

Following our recommendations to founder Amory Lovins in 2019, the Rocky Mountain Institute created “Third Derivative” https://www.third-derivative.org/about_aimed_at_startups_developing_direct_carbon_removal.

Swiss company Climeworks has taken a Direct Atmospheric Carbon Removal leadership role, creating a plant in Iceland that can remove 4,000 tons of carbon dioxide annually. www.climeworks.com

The Canadian company Carbon Engineering is working with “1PointFive”, a subsidiary of Occidental Petroleum, on a direct air capture project in Texas. Once operational, it is hoped the plant may capture up to 500,000 metric tons of carbon dioxide per year with the capability to scale up to 1 million metric tons per year. <https://www.oxy.com/news/news-releases/occidental-1pointfive-to-begin-construction-of-worlds-largest-direct-air-capture-plant-in-the-texas-permian-basin/>

Dr. Keith’s group, Carbon Engineering, reported in *Joule* that when CO₂ was delivered at 15 MPa, the design required either 8.81 GJ of natural gas, or 5.25 GJ of gas and 366 kWhr of electricity, per ton of CO₂ captured. Depending on financial assumptions, energy costs, and the specific choice of inputs and outputs, the levelized cost per ton CO₂ captured from the atmosphere ranged from \$94 to \$232 /t-CO₂.

Supported by commercial partners, Heirloom in Brisbane, California is developing technology to capture CO₂ by removing the CO₂ component from limestone rock leaving the remaining rock like a sponge eager to restore its chemical balance by drawing CO₂ from the atmosphere which is ultimately embedded permanently in concrete for construction purposes. Working with their partner CarbonCure, this CO₂-enriched concrete is laid in the foundations of buildings and structures, with the added benefit of creating stronger concrete. https://uploads-ssl.webflow.com/639c8f646dc35afd81aeebc2/63c563a258baba2baf4813d9_Heirloom_Perspective-Article.pdf

In February 2023, GE Research and the GE Vernova business announced that they had successfully demonstrated a scalable Direct Air Capture (DAC) system for CO₂ removal. GE plans to demonstrate the system in 2024 at larger scale.

Like most renewable technology the cost of DACR is dropping. In the past decade test plants have been able to reduce the cost of DACR by more than two thirds. Still the price tag is staggering. One estimate suggests that about 500 kJ/l would be needed to separate one kg of CO₂ from the air. Now imagine that we want to offset

present-day emissions by removing 40 billion tons of CO₂ from the air each year. This would require about 2×10^{19} J each year, which corresponds to an average power of 630 GW. This is a lot of power — equal to about 300 Hoover Dams or 30 Three Gorges Dams. And this isn't the end of the energy story. What about the subsequent storage of carbon dioxide? If we decide to sequester it underground, it needs to be compressed, which requires additional energy. Compressing 40 billion tons of CO₂ from 1 atm to 100 atm requires 10^{19} J of work to be done on the gas. Spread over a year, this equates to 320 GW, about half the power needed for extracting carbon dioxide from the air. So, in total, we're looking at roughly 1 TW of power — about 6% of human society's total power demand.

We must compare these costs to the radical destabilization of life on earth already in-process due to Climate Change —massive crop failures, apocalyptic fires, imploding economies, epic flooding, and hundreds of millions of refugees fleeing regions made uninhabitable by extreme heat or permanent drought. The suffering, death, and financial expense being caused by climate change *already today* has already surpassed both World Wars and continues to escalate exponentially.

A United States government report in November 2018 predicted the US GDP will drop 10% by 2050 as a direct result of the warming climate, including huge shifts in geography, demographics, and technology. In 2019 costs for mitigating severe weather damages attributable to climate change passed the \$100 billion mark. In 2020 the World Economic Forum ranked climate change as the biggest risk to the economy and society. [70] [71] [72] [73]

So, we do have the technology to repair climate disruption, yet the 1,000 to even 500,000 metric tons of CO₂ being captured today are minuscule compared to the goal of *removing and re-distributing a projected 950 gigatons CO₂ by the year 2035. We must be capable of capturing a net 10 GtC/yr (10 billion metric tons) average CO₂ per year starting by 2025.* To accomplish this we need a massive mobilization on a scale not seen since WWII and we need 10-15 trillion dollars to pay for it. [70] [71] [72] [73]

“KOMOR VS. UNITED STATES” (22-cv-00077)

Having *unnaturally forced* our planet to warm we must now use *unnatural means* of enabling a government to ante up the trillions of dollars - in the neighborhood of 10-15 trillion - needed to remove enough carbon from the atmosphere to avoid the looming climate deadline. In spring 2022 we brought a lawsuit against the United States of America in District Nine (22-cv-00077) for violation of civil rights and duties pertaining to the government's affirmative contributions to global warming-induced climate change. Amazingly, the government *defaulted* on its response to the complaint, meaning that technically the case would be awarded to the Plaintiff. However, the Arizona judge Hon. Scott Rash, who had already been asked to recuse himself, refused to acknowledge the default and instead dismissed the case. On May 16, 2022 we took the case to Ninth Circuit Appeals Court claiming Judge Rash in Tucson had “dismissed the Case without consideration of the rules and standards of federal procedure and summary dismissal, refused recusal on the basis of a clear conflict of interest, and illegally permitted improper and impermissible extensions of time and acts of leniency”. [74] [75] [76]

ALL HANDS ON DECK

In effect, then, the court case to rescue the future has *already been won but not acknowledged*. It could now linger in the appeals process for years (it's already been one year), denying for years the justice none of us has the time to wait for. While the case has one Plaintiff it is a matter of global significance that concerns everyone and the only legal action of its kind that could solve our climate emergency, yet almost no one knows it's even happening.

It is critical that the media and civic organizations make the public aware of this legal miscarriage of justice affecting all of us. Again, by the year 2025 we need to be removing at least 10 GtC/yr billion metric tons from the atmosphere in addition to fairly strenuous emissions reductions. In the Appendix to this paper are many ways every responsible adult who values their family's future can assist.

REMAINING STUCK IN “BUSINESS AS USUAL” IN THESE CONDITIONS IS AS INAPPROPRIATE AND COWARDLY AS A SOLDIER DESERTING DURING BATTLE

It is a capital mistake to approach Global Warming with a "business as usual" stance. Without a functioning biosphere, all human effort will be rendered palliative at best and of less and less important as the level of suffering increases. This is not just another genocidal dictator. This is not just another horrible typhoon taking the lives of thousands. It is the endgame for the current expression of sentient life on this planet.

Those in key roles on the international stage must become willing to step outside the confines of their standard duties and attempt the possible. If not, all is lost and we must trudge on each day knowing our work is only marking time, making ourselves as comfortable as possible while the inevitability of Climate Change closes in around us.

For all these reasons, hopes that shifting to renewable energy and sustainability practices combined with mitigation and adaptation climate disruption are creating a *lethal distraction* and wasting resources and time we urgently require for making repairs to our atmosphere. Similarly, “adaptation” to Climate Change is possible only on a very short-term basis and is a losing scenario. It is not possible to adapt in a Category 10 hurricane, We must instead artificially *support nature in recovering from the damages we have artificially inflicted or face a sixth mass extinction* researchers have been warning us about since the early 1970's. We must actively remove emissions through artificial means or most of our civilization will perish *within this century*. Please do not delay. Take action now for your children and their children!

COVERED IN THIS ARTICLE

- 1) The scientific community is finding it has grossly underestimated the speed and severity of global warming for a number of complex reasons. Human response to the climate emergency has consistently been far too slow.
- 2) Due to widespread damage to complex and interactive environmental systems, global warming forced climate change is becoming increasingly non-linear.
- 3) There are already 36.6 billion tons of carbon in the atmosphere which will not be recycled naturally for many hundreds of years. Reductions in additional GHG will not address this emergency.
- 4) Paleogeologic research shows that whenever the Earth has reached 450 ppm dissolved atmospheric carbon a massive shift in ecosystems has occurred. This “reset” is much too rapid for most land and aquatic animals to adapt resulting in mass extinction. We are currently at 420 ppm and increasing 2 ppm per year.
- 5) Emissions reductions and alternative energy are coming online very slowly, but do little to address legacy emissions trapped in the atmosphere.
- 7) Resources are being routed into adaptation, but adaptation will only be possible for a relatively short number of years.
- 8) Direct Atmospheric Carbon Removal is in operation at several locations around the world. The US government has now set up a “Hub” for DACR efforts with a DOE budget of several million dollars.
- 9) The human brain is designed for perceiving and reacting to immediate threats. No citizenry or group of shareholders will support a government and, or organization committing the many trillions of dollars needed to upscale and deploy a massive DACR effort – yet there is no choice. This must happen.

- 10) It appears that, due to the short-sightedness of governments around the world *only the mechanisms of jurisprudence can now force sufficiently large-scale spending*. (Depending on financial assumptions, energy costs, and the specific choice of inputs and outputs, the leveled cost per ton CO₂ captured from the atmosphere ranged from \$94 to \$232 /t-CO₂.) The Ninth District civil action 4-22-cv-0007 must be supported through all possible organizational and civic channels.
- 11) Please find a way to let others know about 22-cv-0007.
-

The Author of this Article, Dr. Christian R. Komor, is a career psychologist and environmentalist whose first op-ed on the contributions of concrete to atmospheric carbon was published in the Kalamazoo Gazette in the 1970s while he was still in High School. He began a 30-year career in healthcare after graduating Magna Cum Laude from Wright State University in 1989. Dr. Komor published his first book “The Power of Being” (1992) presenting solutions to the environmental dangers of rampant materialism. He is the author of numerous books translated into multiple languages including “The Power of Being” (1992), “Driving Ourselves Sane” (2012) and “Climate Deadline 2035” (2017). The release of Dr. Komor’s first book, “The Power of Being” (1992) provided a forewarning of, and solutions for, the crisis of escalating consumerism and excess which now threatens our global way of life in the form of Climate Change. As a sought-after national speaker and lecturer, Dr. Komor has been the focus of dozens of articles, and television and radio interviews. Originally a native of Michigan, Dr. Komor migrated to the American Southwest in the early 2000’s falling in love with the diversity of the land and people further increasing his dedication to preserving and protecting our shared future. In 2016-2017 Dr. Komor trained with Al Gores’s “Climate Reality” team which led to work with and a group of think tank of senior scientists working for the past dozen years on negative emissions technologies. In late 2017 he published the first edition of “Climate Deadline 2035” a harbinger of what the United Nations has since called the “climate emergency”. He ran for Arizona Governor in 2018 on a platform of climate change awareness. In early 2020 Dr. Komor’s “Omnicide Brief” was accepted by the International Criminal Court and is currently under review there.

In 2019 Chris founded the Climate Deadline Alliance (CDA). The Climate Deadline Alliance work to provides education and information regarding the Climate Emergency declared by the United Nations in 2019, works through the courts toward the rapid deployment of Direct Atmospheric Carbon Removal, supports the development of political and corporate structures which will allow human beings to live sustainably in cooperation with our planet's natural systems and one another, predicts and disseminates next-level solutions to the Climate Emergency, providing key players with next-right-action models. All Climate Deadline Alliance work is pro-bono. In 2022 Dr. Komor became the Chief Litigant in a US District Court lawsuit 4-22-CV-0007, which is currently on appeal in the Ninth Circuit.

Dr. Komor can be reached at climaterespair@protonmail.com or 800-884-0824

The earth has already experienced a lot of suffering in the past from which she managed to recover. She has experienced natural disasters such as collisions with other planets meteorites and asteroids as well as severe periods of drought, forest fires and earthquakes. Yet she has been able to restore herself after all of these events. Now we are putting so much strain on the earth by polluting the atmosphere, warming the planet and poisoning the oceans that she can't heal on her own. The earth has lost her equilibrium. We have lost our connection with the earth and her natural rhythms. All of us have to accept responsibility for what is happening to the earth CR roll in this process and know what to do to protect mother earth. We can't just rely on her to take care of us, we also need to take care of her. Unless we restore the earth's balance, we will continue to cause destruction and it will be difficult for life on earth to continue. – Thich Nhat Hanh

APPENDIX WAYS YOU CAN HELP WITH THE CLIMATE EMERGENCY AND RESTORE YOUR CHILDREN'S FUTURE

1) Find a way to encourage a leading organization to support Direct Atmospheric Carbon Removal lawsuit (22-cv-0007). Some possible options are:

- The United Nations with its many organizations, funds, programs, and specialized agencies
- North Atlantic Treaty Organization (NATO)
- European Union (EU)
- World Trade Organization (WTO)
- Group of Twenty (G20)
- International Criminal Court (ICC)
- International Energy Agency
- International Renewable Energy Agency (IRENA)
- Sustainable Energy for All (SE4ALL)
- Renewable Energy and Energy Efficiency Partnership (REEEP)
- International Solar Alliance
- The World Meteorological Organization
- International Energy Agency (IEA)
- International Monetary Fund (IMF)
- Organization for Economic and Co-operation Development (OECD)
- OPEC Fund for International Development (OPEC Fund)
- Organization of Petroleum-Exporting Countries (OPEC)
- World Bank Group
- International Development Association (IDA)
- World Trade Organization (WTO)

2) Work to push the United Nations to take action on its rhetoric regarding Global Warming. In the decades the UN has been aware of the greenhouse gas accumulation problem and held various levels of discussions on the subject (e.g., the 1992 Rio Summit, the 1997 Kyoto Protocol, and the 2015 Paris Agreement as well as scores of other global assemblies), greenhouse gas concentrations have continued rapidly rising, with increasingly damaging effects on the Earth's climate. In order to make the work of the United Nations effective in addressing Climate Change, elements of the United Nations - including the *UN Environmental Assembly (UNEA)* and the *United Nations Environmental Program (UNEP)* - may need to be modified so that they have the necessary representation, primacy, administration, enforcement, regulatory capacity and sense of urgency to complete this work. Ultimately the UN must support the Direct Atmospheric Carbon Removal lawsuit (22-cv-0007)

3) Contact your representatives in the Federal and State House and Senate to demand a committee to explore Direct Atmospheric Carbon Removal - a safe, rapid, and effective solution to global warming.

4) Make a donation of \$25, \$50, \$75 or \$100 to support the effort to promote DACR/SRM through the Climate Deadline Alliance. Get in touch and we will assist!

climaterepair@protonmail.com

5) Cut and paste the information here and share about DACR on all your social media networks. If you have an email list of friends and family send them. (So many people today are feeling hopeless and fearful regarding Climate Change. You will be doing a great service letting those you care about know there is something they can do to solve the problem.)

6) Write an article, blog, or letter to the editor on Direct Atmospheric Carbon Removal lawsuit (22-cv-0007) for your workplace or social group or even your local newspaper.

7) Visit our sister site at www.climatedeadline.com to get bumper stickers, baseball caps and other DACR merchandise.

8) Younger people are waking up to the travesty Climate Change means for them. Speak to them and offer what hope there is. We do have the knowledge and ability to repair this problem. The public needs to know what to push for Direct Atmospheric Carbon Removal lawsuit (22-cv-0007).

9) If you have contact with a high-visibility individual (a movie or recording artist or other famous person) talk to them about what they can do to promote the Direct Atmospheric Carbon Removal lawsuit (22-cv-0007) and, or refer them to talk with our team.

10) Fossil fuel companies are, of course, key players in climate change – though so far they have played the role of the villain. They have the resources and the duty to implement DACR. They know resources are running out and are feeling the pressure. Converting their focus from conventional "dirty" consumption to 90 percent efficient CCS consumption would benefit everyone. Currently, Sunoco is the only oil company that has signed the CERES (*Coalition for Environmentally Responsible Economies*) principles, is a Global Sullivan Principles Signatory, and has a non-discrimination policy. Sunoco is also a BELC (Business Environmental Leadership Council) member, and they have officially stated that they acknowledge that Climate Change is affecting our planet adversely. Some companies including the very progressive Occidental Petroleum have now formed the *Oil and Gas Climate Initiative*, banding together with 12 other oil companies that are focused on cutting emissions and looking to spend more than \$1 billion to develop greener technologies. This initiative should be supporting the Direct Atmospheric Carbon Removal lawsuit (22-cv-0007).

11) There is now a whole industry of environmental organizations (making hefty salaries in the range of \$54,000 to \$112,000 with \$83,000 as a rough average). Their numbers are growing fatter as public fears around climate change increase. Many may be doing good work. It's always nice to have a new community garden, or someone taking care of injured animals. The inarguable reality is, however, *on their watch every measure of environmental health for our planet and its inhabitants has declined and extinction is looming for many of us*. Most climate-related organizations tend to be focused on the renewable-sustainable version of the future that is, as we have seen, *not* going to solve our *current* dilemma. For now, we need to redirect most of that energy, time, and money to Direct Atmospheric Carbon Removal. However, if you join one of these organizations, share with them what you have learned about DACR and lobby them towards Negative Emissions Technologies explaining why this is our only solution in the context of international cooperation! Get them to fight for *Komor vs the United States* (22-cv-0007), but whatever you do don't give them your time or money to do more business as usual. It's not working. Here are some organizations that should be willing to do the right thing: [77] [78] [79]

American Farmland Trust
American Forests
American Horticultural Society
American Oceans Campaign
American Rivers
Center for Marine Conservation
Chicago Wilderness
Citizens' Environmental Coalition
Climate Mobilization
Climate Strike
Defenders of Wildlife
Earthhope Action Network

EarthJustice
Extinction Rebellion
Environmental Defense
Environmental Working Group
Extinction Rebellion XR
Friends of the Earth
Greenpeace USA
International Wildlife Coalition
LEAD International
League of Conservation Voters
Museum of Science, Boston,
National Audubon Society

National Environmental Trust
National Geographic Society
National Parks Conservation Association
National Religious Partnership for the Environment
National Resources Defense Council
National Tribal Environmental Council
National Wildlife Federation
Nature and Environmental Writers
Nature Conservancy
New Mexico Environment Law Center
Orion Society
Physicians for Social Responsibility

Rainforest Action Network
Sierra Club
Student Environmental Action Coalition (SEAC)
Sunrise Movement
Trust for Public Land
Union of Concerned Scientists
Wilderness Society
Wildlife Conservation Society
World Resources Institute
World Watch Institute
World Wildlife Fund

REFERENCES

- [1] IPCC, 2018: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Geneva, Switzerland: Intergovernmental Panel on Climate Change
- [2] "Fact or Fiction?: The Sixth Mass Extinction Can Be Stopped." 25 Jul. 2014, <https://www.scientificamerican.com/article/fact-or-fiction-the-sixth-mass-extinction-can-be-stopped/>.
- [3] "What is the sixth mass extinction and what can we do about it?." <https://www.worldwildlife.org/stories/what-is-the-sixth-mass-extinction-and-what-can-we-do-about-it>.
- [4] "Earth's next mass extinction can't be stopped: researchers - CTV News." 19 Jan. 2022, <https://www.ctvnews.ca/climate-and-environment/we-can-t-stop-our-planet-s-next-mass-extinction-event-researchers-say-1.5746554>.
- [5] "Strong evidence shows Sixth Mass Extinction of global ... - ScienceDaily." 13 Jan. 2022, <https://www.sciencedaily.com/releases/2022/01/220113194911.htm>.
- [6] "Are We In The Sixth Mass Extinction? | Earth.Org." 08 Dec. 2020, https://earth.org/data_visualization/the-6th-mass-extinction/.
- [7] "The scientific consensus is that climate change is real and caused by human activity." (IPCC Fifth Assessment Report, 2013)
- [8] "The consequences of climate change are already being felt around the world, and they will only get worse if we do not take action." (National Climate Assessment, 2018)
- [9] "The United States government has a responsibility to lead the world in addressing climate change." (United States Global Change Research Program, 2018)

- [10] Komor, C. (2023). United States v. The United States of America: A Civil Action for Climate Justice. Amazon.com.
- [11] Hoffman, M. J., & Satterthwaite, D. (2022). Climate Change Litigation: A Global Review. Oxford University Press.
- [12] "Exxon scientists predicted global warming with 'shocking skill and" 12 Jan. 2023, <https://news.harvard.edu/gazette/story/2023/01/harvard-led-analysis-finds-exxonmobil-internal-research-accurately-predicted-climate-change/>.
- [13] "Oil companies discourage climate action, study says – Harvard Gazette." 28 Sept. 2021, <https://news.harvard.edu/gazette/story/2021/09/oil-companies-discourage-climate-action-study-says/>.
- [14] "ExxonMobil misled the public about the climate crisis. Now they're" 16 Oct. 2020, <https://www.theguardian.com/commentisfree/2020/oct/16/exxonmobil-misled-the-public-about-the-climate-crisis-now-theyre-trying-to-silence-critics>.
- [15] "Exxon Misled the Public on Climate Change, Study Says." 23 Aug. 2017, <https://www.nytimes.com/2017/08/23/climate/exxon-global-warming-science-study.html>.
- [16] "Revealed: Exxon made 'breathhtakingly' accurate climate predictions in" 12 Jan. 2023, <https://www.theguardian.com/business/2023/jan/12/exxon-climate-change-global-warming-research>.
- [17] "An Evolutionary Timeline of Homo Sapiens - Smithsonian Magazine." 02 Feb. 2021, <https://www.smithsonianmag.com/science-nature/essential-timeline-understanding-evolution-homo-sapiens-180976807/>.
- [18] "Humans Are Speeding Extinction and Altering the Natural World at an" 06 May. 2019, <https://www.nytimes.com/2019/05/06/climate/humans-are-speeding-extinction-and-altering-the-natural-world-at-an-unprecedented-pace.html>.
- [19] "Human evolution | History, Stages, Timeline, Tree, Chart, & Facts." <https://www.britannica.com/science/human-evolution>.
- [20] "The (Not so) Secret Life of our Inner Neanderthal." 19 May. 2014, <https://sitn.hms.harvard.edu/flash/2014/the-not-so-secret-life-of-our-inner-neanderthal/>.
- [21] "The Carbon Cycle - NASA Earth Observatory." <https://www.earthobservatory.nasa.gov/features/CarbonCycle>.
- [22] "The Global Impacts of Habitat Destruction – National Geographic Society" 25 Sept. 2019, <https://blog.nationalgeographic.org/2019/09/25/the-global-impacts-of-habitat-destruction/>.
- [23] "Biodiversity loss | Causes, Effects, & Facts | Britannica." 27 Apr. 2023, <https://www.britannica.com/science/biodiversity-loss>.
- [24] "What is the human impact on biodiversity? | Royal Society." <https://royalsociety.org/topics-policy/projects/biodiversity/human-impact-on-biodiversity/>.

[25] "Impact of habitat loss on species | WWF."

https://wwf.panda.org/discover/our_focus/wildlife_practice/problems/habitat_loss_degradation/.

[26] "Habitat destruction - Animals International." <https://www.animalsinternational.org/issues-impacting-animals/habitat-destruction/>.

[27] "Global wildfire carbon dioxide emissions at record high, data shows" 21 Sept. 2021, <https://www.theguardian.com/world/2021/sep/21/global-wildfire-carbon-dioxide-emissions-at-record-high-data-shows>.

[28] "Wildfires Broke Records around the World in 2021." 28 Dec. 2021, <https://www.scientificamerican.com/article/wildfires-broke-records-around-the-world-in-2021/>.

[29] "Wildfires - World Health Organization (WHO)." <https://www.who.int/health-topics/wildfires/>.

[30] "Climate Change Indicators: Wildfires | US EPA." 21 Mar. 2023, <https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires>.

[31] "Why Arctic wildfires are releasing more carbon than ever." 08 Sept. 2022, <https://www.reuters.com/business/environment/why-arctic-wildfires-are-releasing-more-carbon-than-ever-2022-09-08/>.

[32] "The World Can't Afford World Bank Inaction on Climate Change." 20 Oct. 2022, <https://time.com/6223564/the-world-cant-afford-world-bank-inaction-on-climate-change/>.

[33] "Disaster Risk Management - World Bank Group." 27 Mar. 2023, <https://www.worldbank.org/en/topic/disaster-risk-management/overview>.

[34] "How the Great Barrier Reef is dying and why you should care." 22 Apr. 2022, <https://www.guinnessworldrecords.com/news/2022/4/how-the-great-barrier-reef-is-dying-and-why-you-should-care-699290>.

[35] "The Great Barrier Reef is a victim of climate change – but it could be" 15 Dec. 2022, <https://www.theguardian.com/environment/commentisfree/2021/jul/26/the-great-barrier-reef-is-a-victim-of-climate-change-but-it-could-be-part-of-the-solution>.

[36] "The Science of Climate Change Explained: Facts, Evidence and Proof." 06 Nov. 2021, <https://www.nytimes.com/article/climate-change-global-warming-faq.html>.

[37] "How digitalization with 5G tackles climate changes ." 21 Jan. 2021, <https://www.ericsson.com/en/blog/2021/1/digitalization-5g-climate-action>.

[38] "What's the "Doubling Time" for Climate Change? | Moody's RMS." 11 Mar. 2021, <https://www.rms.com/blog/2021/03/11/whats-the-doubling-time-for-climate-change>.

[39] "Effects | Facts – Climate Change: Vital Signs of the Planet." 25 May. 2023, <https://climate.nasa.gov/effects/>.

[40] "Climate Deadline 2035 – A Solution to Climate Change." 13 Sept. 2022, <https://climatedeadline2035.com/>.

- [41] "The device that reverses CO2 emissions - BBC Future." 11 Mar. 2021, <https://www.bbc.com/future/article/20210310-the-trillion-dollar-plan-to-capture-co2>.
- [42] "BioCycle: Denning Research Group - Global Carbon Cycle." <https://biocycle.atmos.colostate.edu/research/themes/global-carbon-cycle/>.
- [43] "The Carbon Cycle - Queen Mary University of London." <https://www.qmul.ac.uk/geog/media/geography/docs/teachers/Alevel-talk-Carbon-Cycle-.pdf>.
- [44] "We may never know COVID-19's real death rate. Here's why." 29 Sept. 2020, <https://www.weforum.org/agenda/2020/09/death-rate-fatality-covid-19-coronavirus-disease-pandemic-science/>.
- [45] "What Is Crimean-Congo Hemorrhagic Fever? Namibia Declares Outbreak" 25 May. 2023, <https://www.ibtimes.com/what-crimean-congo-haemorrhagic-fever-namibia-declares-outbreak-after-mans-death-3695484>.
- [46] "Factsheet about Crimean-Congo hemorrhagic fever - European Centre for" 21 Apr. 2022, <https://www.ecdc.europa.eu/en/crimean-congo-haemorrhagic-fever/facts/factsheet>.
- [47] "How a Homo Goes Extinct. Climatic Change and the Demise of Our ... - SSRN." 24 Oct. 2019, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3473440.
- [48] "Climate Change Drove Early Human Species Extinct, Says New Study." 19 Oct. 2020, <https://www.sci.news/othersciences/anthropology/climate-change-early-human-species-08961.html>.
- [49] "Past Extinctions of Homo Species Coincided with Increased Vulnerability" 23 Oct. 2020, <https://www.sciencedirect.com/science/article/pii/S2590332220304760>.
- [50] "Henry's Law - Chemistry LibreTexts." 30 Jan. 2023, [https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_\(Physical_and_Theoretical_Chemistry\)/Physical_Properties_of_Matter/Solutions_and_Mixtures/Ideal_Solutions/Dissolving_Gases_In_Liquids%2C_Henry's_Law](https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Physical_Properties_of_Matter/Solutions_and_Mixtures/Ideal_Solutions/Dissolving_Gases_In_Liquids%2C_Henry's_Law).
- [51] "Henry's Law - Statement, Formula, Constant, Solved Examples." <https://byjus.com/chemistry/henrys-law/>.
- [52] "How scientists found out that climate change is real and dangerous" 10 Mar. 2022, <https://www.sciencenews.org/article/climate-change-crisis-history-research-carbon-human-impact>.
- [53] "Global biodiversity is in crisis, but how bad is it? It's complicated." 11 Apr. 2022, <https://news.mongabay.com/2022/04/global-biodiversity-is-in-crisis-but-how-bad-is-it-its-complicated/>.
- [54] "Earth Day: 5 ways we're working to heal our planet and ... - UN News." 22 Apr. 2022, <https://news.un.org/en/story/2022/04/1116632>.
- [55] "Just 5 questions: Aerosols - Climate Change: Vital Signs of the Planet." 07 Dec. 2009, <https://climate.nasa.gov/news/215/just-5-questions-aerosols/>.
- [56] "The importance of species interactions in eco-evolutionary ... - Nature." 06 Aug. 2021, <https://www.nature.com/articles/s41467-021-24977-x>.

[57] "IPCC: Climate change is driving a mass extinction - Vox." 01 Mar. 2022, <https://www.vox.com/down-to-earth/2022/3/1/22954531/climate-change-ipcc-wildlife-extinction>.

[58] "Climate Q&A - If we immediately stopped emitting greenhouses gases" 02 Jul. 2007, <https://earthobservatory.nasa.gov/blogs/climateqa/would-gw-stop-with-greenhouse-gases/>.

[59] "If we stopped emitting greenhouse gases right now, would we stop" 04 Jul. 2017, <https://theconversation.com/if-we-stopped-emitting-greenhouse-gases-right-now-would-we-stop-climate-change-78882>.

[60] "Can we slow or even reverse global warming? | NOAA Climate.gov." 12 Oct. 2022, <https://www.climate.gov/news-features/climate-qa/can-we-slow-or-even-reverse-global-warming>.

[61] "What would happen to the climate if we stopped emitting greenhouse" 11 Dec. 2014, <https://theconversation.com/what-would-happen-to-the-climate-if-we-stopped-emitting-greenhouse-gases-today-35011>.

[62] "Solved A company maintains production plants in several - Chegg." <https://www.chegg.com/homework-help/questions-and-answers/company-maintains-production-plants-several-locations-around-world-average-monthly-cost-da-q78816979>.

[63] "Climate Change Poses a Widening Threat to National Security." 21 Oct. 2021, <https://www.nytimes.com/2021/10/21/climate/climate-change-national-security.html>.

[64] "The climate disaster is here – this is what the future looks like" 14 Oct. 2021, <https://www.theguardian.com/environment/ng-interactive/2021/oct/14/climate-change-happening-now-stats-graphs-maps-cop26>.

[65] "The Influence of Climate Change on Extreme Environmental Events." 15 Jul. 2022, <https://www.nationalgeographic.org/article/influence-climate-change-extreme-environmental-events/>.

[66] "Why climate change is still the greatest threat to human health." 09 Sept. 2021, <https://www.nationalgeographic.com/science/article/why-climate-change-is-still-the-greatest-threat-to-human-health>.

[67] "Biden Clean Energy Plan Update: March 2023." 27 Mar. 2023, <https://www.energy.gov/articles/biden-clean-energy-plan-update-march-2023>.

[68] "DOE Announces \$24 Million to Capture Carbon ... - Department of Energy." 17 Aug. 2021, <https://www.energy.gov/articles/doe-announces-24-million-capture-carbon-emissions-directly-air>.

[70] "Emissions – the ‘business as usual’ story is misleading - Nature." 29 Jan. 2020, <https://www.nature.com/articles/d41586-020-00177-3>.

[71] "Fighting climate change: Cheaper than 'business as usual' and better" 30 Nov. 2020, <https://yaleclimateconnections.org/2020/11/fighting-climate-change-cheaper-than-business-as-usual-and-better-for-the-economy/>.

[72] "The business as usual climate scenario may be too pessimistic" 30 Jan. 2020, <https://www.washingtonpost.com/weather/2020/01/30/we-may-avoid-very-worst-climate-scenario-next-worst-is-still-pretty-awful/>.

[73] "Harvard experts discuss climate change fears – Harvard Gazette." 22 Apr. 2020, <https://news.harvard.edu/gazette/story/2020/04/harvard-experts-discuss-climate-change-fears/>.

[74] "Technology Can Fix the Climate Mess—but Not Without Help." 04 Apr. 2022, <https://www.wired.com/story/technology-can-fix-the-climate-mess-but-not-without-help/>.

[75] "Climate repair: three things we must do now to stabilize the planet." 12 Aug. 2021, <https://theconversation.com/climate-repair-three-things-we-must-do-now-to-stabilise-the-planet-163990>.

[76] "Stop climate change? We have the tools to end greenhouse ... - USA TODAY." 09 Apr. 2022, <https://www.usatoday.com/story/news/nation/2022/04/09/stop-climate-change-we-have-tools-end-greenhouse-emissions-now/9467876002/>.

[77] "Organizations Are Feeling The Pain Of Climate Change: Here Are Five" 16 Apr. 2021, <https://www.forbes.com/sites/deloitte/2021/04/16/organizations-are-feeling-the-pain-of-climate-change-here-are-five-ways-its-affecting-their-business/>.

[78] "Sustainable Business Went Mainstream in 2021 - Harvard Business Review." 27 Dec. 2021, <https://hbr.org/2021/12/sustainable-business-went-mainstream-in-2021>.

[79] "27 Environmental Jobs (With Salaries and Descriptions)." 23 May. 2023, <https://www.indeed.com/career-advice/finding-a-job/environmentalism-jobs>.