The following statement is open for sign-on by civil society organizations. The one-page statement below is followed by two pages of background on methane and methane removal, which give further context and detail on the short statement below. To view the background text, scroll through the statement text and click the down arrows that appear underneath it. To sign the statement, scroll down further and fill out the blue signature field.

CIVIL SOCIETY STATEMENT ON METHANE REMOVAL

We, the undersigned, with the support of scientists and policy experts, call on national and subnational governments and international bodies to take urgent action to address the methane emergency, both by cutting methane emissions deeply and decisively, and by removing methane from the atmosphere.

In addition to decarbonizing as rapidly as possible, it's imperative that we also reduce atmospheric methane and other short-lived climate pollutants rapidly and aggressively. This is indispensable for slowing down global warming and avoiding potentially irreversible tipping points past which climate change would become catastrophic.

Methane levels are higher now than at any time for which we have records (800,000 years) and rising fast. Reducing manmade methane emissions is the fastest approach to reducing near-term temperatures, and the most important factor for shaving global peak temperatures (in conjunction with sustained carbon dioxide reduction). Cutting current anthropogenic methane emissions by 45% by 2030 through readily available emissions mitigation approaches has the potential to avoid nearly 0.3°C of warming by 2040.[1]

But not all methane emissions are susceptible to reduction. In addition to aggressively cutting and avoiding anthropogenic methane emissions wherever we can, we must also address methane emissions that can't be avoided. Hard-to-abate anthropogenic methane emissions and growing methane emissions from natural sources could be nearly neutralized with emerging methane removal technologies that accelerate the natural cycle of methane destruction in the atmosphere to bring atmospheric methane concentrations down.

Combining aggressive methane emissions reduction with methane removal could cut atmospheric methane from its current 1900 parts per billion[2] to around 700 ppb,[3] restoring methane to its pre-industrial level, potentially as soon as 2050. Achieving this would reduce average global temperatures by roughly 0.6 degrees C.[4]

We acknowledge the statement signed by scientists and policy experts[5] calling on national governments and relevant jurisdictions to take fast, credible action on methane emissions reduction and methane removal in order to reverse the rapid rise in methane concentrations and return atmospheric methane to its pre-industrial level.

We agree that achieving this will require funding and initiating programs to aggressively reduce methane emissions, monitor methane levels, and develop methane removal technologies,[6] as well as framing explicit governance to ensure that these efforts are safe, effective, sustainable, just, and additional to other crucial greenhouse gas reductions, including from the energy and land use sectors. We urge all governments and jurisdictions to take such actions rapidly and ask that relevant frameworks including the UN Framework Convention on Climate Change and the Paris Agreement address them.

Signed,

[1] United Nations Environment Programme and Climate and Clean Air Coalition (2021). Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions. Nairobi: United Nations Environment Programme.
[2] https://gml.noaa.gov/webdata/ccgg/trends/ch4/ch4_mm_gl.txt
[3] Nisbet Euan G., Jones Anna E., Skiba Ute M. and Pyle John A. 2021 Rising methane: is warming feeding warming? *Phil. Trans. R. Soc.* A.3792020045920200459 http://doi.org/10.1098/rsta.2020.0459
[4] I.e., compared to a scenario in which atmospheric methane levels are not lowered. For more on methane removal's potential for lowering global temperature see Abernethy S., O'Connor F. M., Jones C. D. and Jackson R. B. 2021, Methane removal and the proportional reductions in surface temperature and ozone *Phil. Trans. R. Soc. A.* 3792021010420210104 http://doi.org/10.1098/rsta.2021.0104
[5] https://methaneaction.org/letter-in-support-of-declaration-on-reducing-atmospheric-methane-2/
[6] https://methaneaction.org/catalogue-of-research-funding-needs-to-advance-methane-removal/

Background

Methane is a powerful greenhouse gas with a global warming potential more than 80 times that of carbon dioxide over 20 years. Due to human activities and human-induced processes, current atmospheric methane levels are higher than any time in the last 800,000 years (the period for which we have ice core records), and rising much faster than CO2. Atmospheric methane concentrations jumped more in 2021 than in any year of the past 35. According to the Intergovernmental Panel on Climate Change (IPCC), methane has caused at least a third of modern warming, contributing at least half as much warming as carbon dioxide since the late 1800s.[7, 8]

Cutting atmospheric methane levels will contribute to and support necessary deep cuts in carbon dioxide emissions, particularly in the fossil fuel and land use sectors, including steeply reducing deforestation. This will help us get on a trajectory for limiting warming to 1.5 degrees Celsius, which is a matter of survival for many ecosystems, vulnerable communities, and entire countries such as low-lying island nations.

The term "methane removal" means destroying methane in scientifically and environmentally sound, safe, and sustainable ways, for example by oxidizing it using catalysts, so that methane's impact as a climate forcer and a warming agent gets drastically reduced and potentially eliminated.

Methane removal technologies can be applied to methane in the ambient atmosphere that has already been emitted, or to current and future methane emissions that can't be avoided, including natural or biogenic emissions as well as anthropogenic emissions. It can also be applied near large, hard-to-abate methane emission sources, whether anthropogenic, such as coal mines or large livestock operations, or natural occurring/biogenic sources, such as wetlands or permafrost. Methane removal is different from carbon dioxide removal in that it converts methane to water vapor and CO2, so it requires no sequestration and no storage to keep it from reentering the atmosphere.

In addition to reducing global warming, methane removal has important food security and health co-benefits, since besides being a powerful greenhouse gas, methane is also a precursor to other pollutants such as ground-level ozone. Ozone reduces crop yields and damages human respiratory health. Methane removal would therefore positively impact crop yields and human health. According to the Global Methane Assessment, cutting methane emissions by 45% would prevent 255,000 premature deaths and 26 million tons of crop losses annually.[9]

Of the scenarios laid out in the 2021 IPCC Sixth Assessment Report (AR6) of Working Group 1, all the ones that meet the Paris Agreement goal of keeping warming within 1.5°C depend heavily on lowering atmospheric methane levels. Mitigating methane emissions is the most urgent and important part of this equation and should be prioritized to keep the 1.5°C target within reach. To that end, 121 countries and counting have signed a new Methane Pledge spearheaded by the US and EU to cut methane emissions 30% below 2020 levels by 2030. This is an indispensable step forward.

At the same time, we recognize that lowering atmospheric methane concentrations to levels consistent with the goal of limiting warming to 1.5°C will likely require *both* aggressive cuts in methane emissions *and* removal of methane from the atmosphere. While it's critical to cut methane emissions as deeply as possible, some methane emissions are endemic, and others will be very difficult to mitigate. The largest source of anthropogenic methane emissions globally is the agricultural sector, whose methane emissions are impossible to eliminate completely. Hard-to-abate emissions from the livestock sector and rising emissions from natural methane sources challenge conventional mitigation strategies. For such emissions, methane removal may be the best option.

We can and should avoid agricultural methane emissions by shifting demand and consumption patterns, and by shifting agricultural production from industrial methods toward agroecology, agroforestry and adopting more sustainable practices. For example, anaerobic digestion of farm waste lowers agricultural methane emissions by capturing the biogases that would otherwise be released into the air as the waste decomposes, processing it instead into high quality soil amendments and renewable fuel and electricity that displace carbon-intensive fuels and fertilizers. But one of the most impactful ways to reduce agricultural emissions is to adopt more sustainable diets. Industrial beef production to satisfy growing demand from middle- and upper-income consumers worldwide is a major source of methane emissions and should be scaled back. At the same time, rice cultivated by millions of smallholder farmers is

[7] As observed on average for 2010 to 2019, relative to average temperatures in the late 1800s. IPCC, 2021: Summary for Policymakers. In: *Climate Change* 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

[8] More recent research indicates methane may be responsible for as much as half of modern warming. See Gabrielle B. Dreyfus, Yangyang Xu , Drew T. Shindell, Durwood Zaelke and Veerabhadran Ramanathan, "Mitigating climate disruption in time: A self-consistent approach for avoiding both near-term and long-term global warming." *PNAS* Vol. 119 No. 22, May 23, 2022. https://doi.org/10.1073/pnas.2123536119

[9] United Nations Environment Programme and Climate and Clean Air Coalition,"Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions." Nairobi: United Nations Environment Programme (2021).

critical for food security in developing countries and should not be scaled back. Methane emissions from rice production are very small compared to large emissions from luxury consumption in various sectors, such as emissions from driving large, inefficient cars.

We should reduce anthropogenic methane emissions however and wherever we can -- in line with new, sustainable, scientifically proven innovations -- without compromising food security. In particular, we must cut methane emissions from the fossil fuel industry deeply and decisively. Mitigation measures like stopping fugitive methane emissions from oil and gas infrastructure and capping abandoned oil and gas wells are urgent. Phasing out methane- and carbon-intensive fossil fuels, including shale gas, whose contribution to methane emissions and global warming was long overlooked and underestimated, would be required to achieve optimal methane reduction in the energy sector. But while it is necessary to stop methane leakage from the energy sector, and critically important to phase out fossil fuels altogether, achieving these things won't be sufficient by themselves to lower atmospheric methane to safe levels.

Anthropogenic emissions from fossil fuels, agriculture, waste, and other sectors account for about 60% of overall methane emissions. The other 40% of methane emissions are from natural biogenic sources, such as wetlands. Current research indicates that methane emissions from wetlands are increasing as temperatures rise. Some scientists warn that more methane may get released from thawing permafrost soils and methane clathrates in warming shallow waters of the Arctic. Continued warming is likely to intensify methane emissions from natural sources.

Although these "natural" GHG emissions are not accounted for in the national governmental inventories submitted to the UNFCCC, they should still be considered part of the impact of human activities. While "natural" according to a narrow definition of the word, these methane emissions are indirectly human-induced, just as "natural" phenomena like bigger, more frequent forest fires aggravated by heat waves and droughts are indirectly caused by humans.

While we must conserve and restore the ecological functions of wetlands and other ecosystems, if large, sudden methane releases from natural sources occurred, they would be difficult to abate. Methane removal is therefore an important tool for managing the risk of such releases and reducing their potential impact on warming.

In order to lower atmospheric methane concentrations to levels consistent with keeping warming within 1.5°C, we must avoid and mitigate methane emissions wherever possible. But we must also address natural and anthropogenic methane emissions that we can't effectively reduce or eliminate. That will require developing and deploying the capability to remove methane, both near major emissions sources and from the ambient atmosphere.

Methane removal is no substitute for nor alternative to other necessary climate actions, such as aggressively cutting methane emissions at their sources, phasing out dirty energy, implementing renewables and energy efficiency, protecting and restoring forests and other ecosystems, adopting ecological and regenerative agricultural practices, and reducing overall carbon emissions 50% or more by 2030. Cutting CO2 is essential for stabilizing temperature throughout this century and beyond. These are all mission-critical for establishing and following a 1.5°C-compliant pathway for all nations.

But while methane removal cannot replace other necessary climate actions, it is very likely to be a key, additional, complementary strategy which, in combination with others, will be necessary to help keep the goal of limiting warming to 1.5°C within reach. Methane removal would help lower atmospheric methane levels. In fact, if done at scale, it could complement methane emissions cuts and help restore atmospheric methane to pre-industrial levels, potentially as soon as 2050. Achieving this would reduce average global temperatures by roughly 0.6 degrees C. Methane removal should therefore be part of the climate policy agenda and be directly addressed in the United Nations Framework Convention on Climate Change (UNFCCC) framework.