June 3, 2022

James P. Sheesley, Assistant Executive
550 17th Street NW
Washington, DC 20429.

Re: Principles for Climate-Related Financial Risk Management for Large Financial Institutions

Dear Executive Assistant Sheesley,

On behalf of the Center for Human Rights and Environment (CHRE),[1] I would like to thank you and the Federal Deposit Insurance Corporation (FDIC) for seeking public commentary to contribute to a high-level framework for the safe and sound management of exposures to climate-related financial risks.[2]

There has never been a more important time to tackle this challenge. The latest climate science is warning us that global temperature increases are likely to exceed 1.5°C (as compared to pre-industrial times) during the 2030s, and 2°C by mid-century, unless we can rapidly reduce the emissions of greenhouse gases. This imminent breach of global warming beyond 1.5°C is extremely dangerous because surpassing this guardrail established by the Paris Agreement could lead to breaching irreversible climate tipping points, after which we would not only face more intense and much more severe climate impacts, but even more tragically, we would no longer be able to fix the climate crisis. Unfortunately, current global efforts to tackle climate change put the world on track for about 3.2°C of warming by 2100.[3] An urgent change of course on climate must be our top priority, as every 1/10 of a degree of warming translates to intense increases of climate impacts and to the deepened deterioration of our ecosystems.[4]

The FDIC draft Statement of Principles for Climate-Related Financial Risk Management for Large Financial Institutions could be significantly strengthened by more adequately contextualizing climate risk assessment and disclosure rules in terms of the short-term urgency of the climate crisis measuring risk according to how effectively society is taking the necessary steps to avoid imminent climate catastrophe. Climate risk assessment and related disclosure rules are currently mostly set in a long term scenario (mid to late century) and they are generally carbon-centric, a framework that is proving insufficient to adequately understand our immediate climate emergency. The benefits of decarbonization will not be reaped for centuries to millennia, whereas irreversible climate tipping points are only a few decades or even a handful of years away. Effectively reducing climate risk *is only* possible through achieving short-term aggressive reductions *of the most intense* climate *super pollutants*, including methane, black carbon, HFCs, and tropospheric ozone, which are tens, hundreds and even thousands of times more potent than CO_2 in terms of their climate-forcing impact, helping us cut the rate of global warming in half in the near term, giving the world a fighting chance to avoid imminent climate collapse for present and for future generations.[5]

With this in mind, the following are four key messages we would like to convey to the FDIC*:*

1. **The FDIC must incorporate a Fast Climate Mitigation approach to climate risk assessment policy and disclosure rules.** The climate emergency is deepening faster than previously thought. Society must reduce *the most* polluting greenhouse gases between now and 2030[6] (and not 2100 or 2050 as previously thought) to avoid catastrophic climate impacts and surpassing irreversible climate tipping points that will permanently destabilize global economies, augmenting financial and operational uncertainties and disruptions.[7] Climate risk assessment and related climate disclosure rules must conform to this short-term urgency with a short term risk horizon (2030) while concurrently evaluating whether the *most effective and immediate* emissions reductions strategies available are being employed to rapidly slow global warming.

2. **Evaluation of climate risk and disclosure rules must assess and steer the disclosure of information to reveal to what degree climate strategies in place and related risk are evaluated beyond decarbonization strategies and focus on the most aggressive pollutants in the short term.** Reducing carbon dioxide (CO_2), while necessary over the long term (by mid to end of century and beyond), is not sufficient to keep global warming to 1.5°C. Climate risk assessment and disclosure rules must help us evaluate and predict to what extent society is promoting strategies and actions that reduce the most aggressive climate pollutants (in addition to reducing CO_2) such as methane (CH_4), black carbon, hydrofluorocarbons (HFCs) and tropospheric ozone (O_3), which have many times the climate-forcing impact as CO_2 and can help avoid up to 0.6 °C of warming by 2050, greatly reducing financial risks related to climate.[8] Targeting super pollutant reductions also provides immediate local health benefits to the most climate-vulnerable communities.[9]
3. **The FDIC should encourage financial institutions to themselves contribute to climate solutions and not be part of the problem.** The current draft Statement of Principles centers on assessing the risk of financial investments that could be harmed by climate change but fails to consider the significant impacts (and subsequently the increased risk) of financial investments themselves on the climate. The FDIC should help steer financial institutions to be themselves part of the solution to our climate emergency. While many companies make significant efforts to reduce their GHG emissions and put aggressive climate policies into place (thereby reducing climate risk), the financial institutions that hold their deposits may in fact be working at odds with the climate, and through investments, be supporting industries that are the worst polluters (aggravating climate risk).[10] This needs to end and FDIC can help steer a more climate-sustainable pathway for the financial sector.
4. **The FDIC must incorporate an Environmental Justice dimension into its climate risk assessment policy and disclosure rules.** Climate change disproportionately impacts disadvantaged communities.[11] Without explicitly addressing environmental justice concerns in climate risk assessment or in disclosure rules, responses to climate change could be impaired by, and exacerbate, the lack of strategies to adequately address the climate emergency and persistent environmental and climate injustices faced by the most climate vulnerable.[12] Intergenerational climate equity considerations must also be considered in assessing present risk as compared to future generation risk of current policies and trends.[13] Climate policy can and should work in tandem with social equity policies and climate risk assessment and financial disclosures hence must also be considered in the context of social or *climate* equity dimensions and risks. The current draft rule is mostly lacking on environmental justice dimensions and could be greatly improved.

The FDIC has important leverage on many of our economy's largest financial institutions – namely those of a magnitude large enough to reduce global GHG emissions by considerable amounts on their own[14] or through their investments. The FDIC and the financial institutions that it regulates also have considerable influence on global markets. The FDIC has the unique opportunity to help steer the financial sector in the United States, and globally, towards adopting climate risk assessment tools and disclosure rules that can help steer climate policies, management practices, monitoring, and reporting to truly make an important contribution to an effective and decisive response to our escalating climate emergency and help keep us on the 1.5°C of warming pathway that climate scientists are warning us we should not breach.

We applaud the FDIC's effort to consider taking on this challenge and are at your service to help in any way we can to guide this rule-setting process.

Respectfully,

Jorge Daniel Taillant[15]
Executive Director
Center for Human Rights and Environment

The science behind why faster action on climate is paramount and why super pollutants are the leverage point for avoiding irreversible climate impacts.

Leading scientists—including those gathered through the Intergovernmental Panel on Climate Change (IPCC)—have concluded in their latest reports that we are losing the race to stop climate change. The world is heating up too fast and it will soon surpass irreversible climate tipping points, beyond which there will be no solutions left to stop global warming and its most devastating impacts. The Paris Agreement had set a limit to global warming levels, 1.5°C (2.7°F) of warming as compared to pre-industrial levels.[16] We've already warmed the planet by 1.2°C leaving only 0.3°C left before we simply get too hot to handle.

In their efforts to stop and revert climate change, governments and the private sector are mostly centered on developing a pathway toward *decarbonization* with a target date of 2050-2100 to stabilize the climate. While we once believed this was a viable strategy, at our current rates of warming, the IPCC has indicated that these targets will no longer be sufficient. Forecasts have been revised, and the science now demands that certain time horizons be amended to 2030 – warning us that time is running out for climate solutions to be put in place. The key take home message is that cutting carbon dioxide emissions *alone* does not help us meet our 1.5°C of warming containment target. Fortunately, a solution is available.

In addition to decarbonizing (reducing CO_2 emissions) we must cut even more polluting greenhouse gas emissions by 2030 or it will be too late, as stated by the 2022 IPCC report.[17] IPCC Working Group III co-chair Jim Skea in a statement said, "it's now or never, if we want to limit global warming to 1.5°C (2.7°F)".[18] Because CO_2 is a pollutant that remains in the atmosphere for a very long time – up to hundreds or thousands of years – even if we were to cease all CO_2 emissions today, there would only be marginal benefits for the atmosphere by 2050, or 2100. We would certainly not cool the Earth before surpassing 1.5°C. To reach the looming short-term (2030) climate cooling targets, reducing super polluting greenhouse gases called *short-lived climate pollutants (SLCPs)* should be of *primary* concern. Methane (CH_4) is one of the most important super pollutants to focus on in the short term. With 86 times more potency as a climate polluter than CO_2, methane provides exponential benefits to the climate if emissions are reduced quickly. The great thing about reducing methane is that we know where it is and how to reduce it quickly and cost-effectively. About half of the world's methane emissions are from anthropogenic causes–landfills, wastewater, agriculture, and in the oil and gas sector. Methane is the key target for bending the warming curve in the next 10 or 20 years while we make a more long-term effort to transition to a low- or zero-carbon economy.[19] [20] [21] [22]

The landmark Global Methane Assessment demonstrates that reducing methane emissions by 45% by 2030 will avoid almost 0.3 degrees Celsius of warming globally and 0.5 degrees Celsius of warming in the vulnerable Arctic by the 2040s[23]. Indeed, one message has been made clear by the United Nations Environment Programme and the Climate and Clean Air Coalition's *Global Methane Assessment*, and the IPCC's Sixth Assessment reports: cut methane now or doom the planet. According to the recent IPCC reports, every added increment of climate pollution causes further irreversible harm. Record-shattering heatwaves and floods will become more and more frequent unless we slow the rate of warming as quickly as possible. We're seeing self-reinforcing feedbacks start to accelerate warming and learning that we're closer to crossing climate tipping points than previously thought.[24] [25]

Feedback loops and irreversible tipping points are what happens when, for example, melting glaciers or sea ice rapidly disappear. Arctic Sea ice, for instance, acts as a "white shield" reflecting incoming solar radiation back into space, cooling the planet.[26] When this ice melts, it reveals darker earth or the darker blue ocean underneath which then absorbs more heat than the ice's prior white surface which was reflecting heat back into space. As melting of this ice increases, progressively darker surfaces become exposed, causing a self-reinforcing cycle in which sea ice coverage decreases at an increasing rate causing global warming increases at an increasing rate.[27] This is an example of what we call *a feedback loop*.[28] [29] [30] Tipping points,

meanwhile, are climate thresholds that if breeched, could not be repaired, at least in reasonable human-relevant time periods. Glaciers, for instance, can take tens, hundreds or even thousands of years to be regenerated. In this way, melting glaciers, particularly large ones, would be an "irreversible" climate tipping point.[31] [32]

Methane is just one super pollutant, however. Other very intense climate pollutants include black carbon, a highly potent climate-warming aerosol that remains in the atmosphere for only a few days to weeks. It is a significant climate pollutant that absorbs solar radiation and emits heat. When deposited on glaciers because of a forest fire emitting soot into the air streams, or because of emissions from dirty combustion in engines or in home heating and cooking, soot accelerates ice melt by darkening glacier surfaces. Black carbon (or soot) also harms plants; and affects the microphysical properties of clouds by perturbing precipitation patterns. It also is very harmful to human health – contributing to respiratory problems, low birth rates, heart attacks, and lung cancer. Overall, on a 20-year time scale, black carbon holds a global warming potential greater than 3200 times that of carbon dioxide.

Hydrofluorocarbons (HFCs), meanwhile, are factory-made chemicals used in refrigeration and insulation foams that have a warming effect thousands of times more potent than carbon dioxide. As the emissions of HFCs grow by 10-15% per year, they have become a massive concern for global warming. Tropospheric ozone, is another short-lived climate pollutant. It is the main component of smog and is a major air and climate pollutant. It is similarly harmful for both warming and human health, making it the third most important gas behind carbon dioxide and methane.[33]

As mentioned in the Principles on Governance section, the board must have an adequate understanding of how to assess the potential impact of climate-related risks from a climate science perspective – rather than solely a financial-risk perspective – to address and oversee these risks within the institution's strategy and risk appetite, including an understanding of the potential ways in which these risks could evolve over various time horizons and scenarios. Question (7) is relevant here, because being informed by SLCPs will help financial institutions both better avoid and adapt to climate-risks in the short-term[34].

The context for FDIC engagement on Fast Climate Mitigation and Super Pollutant Strategies

The FDIC does not stand alone in its effort to advance key climate policies that can greatly curb global warming. In an all-of-government approach to tackling climate change, the United States, along with key global partners recently worked swiftly and collaboratively at the 2021 Climate Summit in Glasgow, to highlight the importance of tackling climate change more aggressively to reach GHG emissions reductions targets, earlier, by 2030. Climate change is a rapidly moving agenda and must be reflected in rapid actions by all government agencies in a position to leverage change and effectively tackle the climate emergency before we breech irreversible climate tipping points. The FDIC's leadership is key to guide the financial sector to adapt to new climate-related challenges.[35] The FDIC's role in steering the financial sector in this direction cannot be over-stressed.

Climate change is increasingly impacting business worldwide with trillions of dollars of financial impacts.[36] Climate change, deforestation, and water scarcity are likely to put $1.26 trillion of suppliers' revenue at risk over the next five years.[37] Indeed, the Paris Agreement demonstrated that reaching 2030 targets are key to facing the least impacts to global GDP – 4% losses are projected for 1.5°C while 11% losses are projected for 2°C.[38] Super pollutant emissions and mitigation plans are material information for understanding a registrant's financial position, making then directly tied to climate-related risks and adaptation costs.[39] [40]

The Task Force on Climate-Related Financial Disclosures (TCFD), charged with promoting better-informed decisions related to investment, credit, and insurance had made significant inroads to promoting climate disclosures. The TCFD framework has become reliable for climate-related financial reporting and has garnered a total market capitalization of 25$ trillion in support for the TCFD.[41] The inevitable effects that climate impacts have on public companies' ability to be insured is increasing, and it is necessary that investors are able to access disclosers on their investments likeliness to be affected by impacts like flooding on coastal properties. For example, some insurance companies have withdrawn from wildfire-prone areas or are retreating from climate-vulnerable regions like California[42] and Florida.[43]

The Securities Exchange Commission has also shown resolve in advancing more effective corporate climate policies in its Proposed Rules to Enhance and Standardize Climate-Related Disclosure to Investors.[44]

Nationally, Congress and the federal government have taken action to curb super pollutant emissions, and companies must proactively prepare for this shifting legal and regulatory environment. In December 2020, Congress passed the American Innovation and Manufacturing (AIM) Act, which phases down HFCs in the United States.[45] The Senate has passed, and the House of Representatives is expected to pass, a resolution to reinstate methane-control regulations for the oil and gas sector.[46] Pursuant to President Biden's Executive Order 13,990, every executive agency has been directed to review existing regulations and develop regulations that combat the climate crisis.[47] Additionally, in April 2021, EPA proposed regulations to implement the AIM Act.[48] EPA also announced stakeholder meetings in anticipation of a new regulation for methane emissions from new oil and gas sources,[49] and the Office of Management and Budget requested comments on the social costs of carbon, methane, and nitrous oxide.[50]

Internationally, the federal government has established stringent 2030 GHG reduction targets that include targets for reducing super pollutants. Under the Paris Climate Agreement, the US committed to reducing GHG (including SLCP) emissions by 50–52% below 2005 levels in 2030.[51] In announcing this commitment, the White House emphasized the importance of reducing super pollutants to keep 1.5°C within reach.[52] The US also committed to enhanced actions to reduce black carbon emissions.[53] Additionally, together with energy ministries from Canada, Norway, Qatar, and Saudi Arabia, the US established the Net-Zero Producers Forum that will advance methane abatement, among other net-zero strategies for the oil and gas sector.[54]

Meeting these international commitments will require action across sectors, and companies must quickly adapt themselves to the challenges – including costs, risks, and required disclosures – that arise amid this evolving crisis. As mentioned in the Principle on Governance section, responsibility and accountability may be integrated within existing organizational structures or by establishing new structures for climate-related financial risks and should be informed by the emerging climate science, rather than from a purely financial standpoint.[55] Through the promotion of fast mitigation and short-lived pollutant climate-related disclosures, the FDIC can help reduce climate risk and help investors and other stakeholders better understand how registrants are getting ahead of or responding to the changes in the legal and regulatory environment.

Including Environmental Justice Framework

There is increasing evidence in media and in academics of policy decisions that have been taken over many decades to intentionally concentrate environmental pollution in minority and disadvantaged communities, in practices known as redlining.[56] Environmental discrimination of this sort has resulted in increased climate vulnerability of minority and other disadvantaged communities, due to, for example, the lack of adequate infrastructure to promote cooling on very hot days (such as urban tree canopy or energy efficient buildings),

or poor air quality due to proximity to polluting industries or polluting transit routes which concentrate particulate matter, just to name a few.

Environmental justice dimensions of climate policy are gaining ground and policy responses to climate change received increased investment budgets from state authorities. In parallel, corporations, including financial institutions that have been complicit in redlining practices (and the sector as a whole more broadly), must assume past responsibility for contributing to these inequities, but are in a particularly important position to evaluate how their current emissions affect the most climate vulnerable communities as well as how their current climate policies can not only contribute to tackle climate change, but also help revert past inequities of climate burdens.

Given that budgets are mostly constrained, and financing for both tackling climate change as well as addressing past environmental injustice are not limitless. Financial institutions can help promote policy, disclosure, and actions that do both. The SEC, for example, is considering in the draft rules, the issue of zip codes in terms of identifying climate risk areas for a reporting entity. Conversely, zip codes can also be important indicators of climate vulnerability, linking a reporter's area of operations with climate vulnerability for stakeholders. Question (1) of the FDIC statement asks for additional factors, including location, to inform financial institutions adoption of these principles. It is our belief that financial institutions that are located in both climate hotspots and around disproportionately vulnerable regions should take extra precautions to integrate climate mitigation and resilience strategies. Knowing where a corporations GHG emissions are released and the associated vulnerability of impacted communities, would allow risks to be weighted to distinguish which communities tend are exposed to the most waste facilities, emissions, and environmental degradation of the reporter.

Question (5) can be addressed by technologies like CalEnviroScreen map,[57] [58] which is a database that outlines the characteristics – including mean income and minority concentration – of specific communities. This could be used to better understand the climate vulnerability and financial risks of affected communities. Users can easily determine whether emissions disproportionately target certain zip codes. In essence, protecting the wellbeing and interests is a question of ethics, and there are a growing number of investors who want to contribute to social, economic, and environmental conscious considerations.

NOTES

[1] See: https://center-hre.org. CHRE has extensive experience in policy advising related to combating climate change . More specifically, on the role of greenhouse gases (GHGs) including short-lived climate pollutants (SLCPs) such as methane, black carbon, and hydrofluorocarbons HFCs. Being a core focus of the Intergovernmental Panel on Climate Change (IPCC), the immediate reduction of SLCPs indicates their importance to avoiding irreversible climate catastrophe – or achieving rapid climate cooling by 2030 and remain below 1.5°C of warming noted in the Paris Agreement.

[2] FDIC: SUMMARY: The Federal Deposit Insurance Corporation (FDIC) is requesting comment on draft principles that would provide a high-level framework for the safe and sound management of exposures to climate- related financial risks. Although all financial institutions, regardless of size, may have material exposures to climate- related financial risks, these draft principles are targeted at the largest financial institutions, those with over $100 billion in total consolidated assets. The draft principles are intended to support efforts by large financial institutions to focus on key aspects of climate-related financial risk management.

[3] Emissions Gap Report 2021, UNEP. 2021 See: https://www.unep.org/resources/emissions-gap-report-2021

[4] IPCC. (2022). "Summary for Policymakers". Section C.1.

[5] UN News (2021) *Access to a healthy environment, declared a human right by UN rights council*, (last accessed 18 November 2021). https://news.un.org/en/story/2021/10/1102582.

[6] IPCC. (2022). "Headline Statements: Understanding Global Warming of 1.5 C". ("Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. (high confidence)")

[7] See: https://www.ccacoalition.org/en/resources/global-methane-assessment-full-report

[8] Xu Y. & Ramanathan V. (2017) *Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes*, Proc. Nat'l. Acad. Sci. 114(39): 10315–10323, 10321 ("The SP [super pollutant] lever targets SLCPs. Reducing SLCP emissions thins the SP blanket within few decades, given the shorter lifetimes of SLCPs (weeks for BC to about 15 years for HFCs). The mitigation potential of the SP lever with a maximum deployment of current technologies … is about 0.6 °C by 2050 and 1.2 °C by 2100 (SI Appendix, Fig. S5B and Table S1).").

[9] *See:*

United Nations Environment Programme & Climate & Clean Air Coalition (2021) GLOBAL METHANE ASSESSMENT: BENEFITS AND COSTS OF MITIGATING METHANE EMISSIONS, 8 ("Reducing human-caused methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of warming and contribute significantly to global efforts to limit temperature rise to 1.5°C. Available targeted methane measures, together with additional measures that contribute to priority development goals, can simultaneously reduce human-caused methane emissions by as much as 45 per cent, or 180 million tonnes a year (Mt/yr) by 2030. This will avoid nearly 0.3°C of global warming by the 2040s and complement all long-term climate change mitigation efforts. It would also, each year, prevent 255 000 premature deaths, 775 000 asthma related hospital visits, 73 billion hours of lost labour from extreme heat, and 26 million tonnes of crop losses globally."). United Nations Environment Programme & World Meteorological Organization (2011) INTEGRATED ASSESSMENT OF BLACK CARBON AND TROPOSPHERIC OZONE, 193, 201 ("Implementing all measures could avoid 2.4 million premature deaths (within a range of 0.7–4.6 million) associated with reductions in PM2.5, associated with 5.3–37.4 million years of life lost (YLL), based on the 2030 population."; "Total global production gains of all crops ranges between 30 and 140 million tonnes (model mean: 52 million tonnes). The annual economic gains for all four crops in all regions ranges between US$4billion and US$33 billion, of which US$2–28 billion in Asia.").

McPherson E. G. & Muchnick J. (2005) *Effects of Street Tree Shade on Asphalt Concrete Performance*, J. ARBORIC. 31(6): 303–310.

Romanello M., *et al.* (2021) *The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future*, THE LANCET 398(10311): 1619–1662.

Lundgren K. & Kjellstrom T. (2013) *Sustainability Challenges from Climate Change and Air Conditioning Use in Urban Areas*, SUSTAINABILITY 5(7): 3116–3128.

[10] See: The Carbon Bankroll. The Climate Impact and Untapped Power of Corporate Cash. By the Climate Safe Lending Network, The Outdoor Policy Outfit, and BankFWD. (2022) https://static1.squarespace.com/static/6281708e8ff18c23842b1d0b/t/6283204b3556a5125ce13b37/1652760661661/The+Carbon+Bankroll+Report+%285-17-2022%29.pdf

[11] Allen, M.R., *et al.* (2018) *Summary for Policymakers*, *in* Intergovernmental Panel on Climate Change (IPCC) GLOBAL WARMING OF 1.5°C, MassonDelmotte, V., *et al*. (eds.), 9 ("Populations at disproportionately higher risk of adverse consequences with global warming of 1.5°C and beyond include disadvantaged and vulnerable populations, some indigenous peoples, and local communities dependent on agricultural or coastal livelihoods (*high confidence*). Regions at disproportionately higher risk include Arctic ecosystems, dryland regions, small island developing states, and Least Developed Countries (*high confidence*). Poverty and disadvantage are expected to increase in some populations as global warming increases; limiting global warming to 1.5°C, compared with 2°C, could reduce the number of people both exposed to climate-related risks and susceptible to poverty by up to several hundred million by 2050 (*medium confidence*). {3.4.10, 3.4.11, Box 3.5, Cross-Chapter Box 6 in Chapter 3, Cross-Chapter Box 9 in Chapter 4, Cross-Chapter Box 12 in Chapter 5, 4.2.2.2, 5.2.1, 5.2.2, 5.2.3, 5.6.3}"); *see also* D. Simmons (29 July 2020) What is 'climate justice'?, *Yale Climate Connections* ("Climate change, an inherently social issue, can upset anyone's daily life in countless ways. But not all climate impacts are created equal, or distributed equally. From extreme weather to rising sea levels, the effects of climate change often have disproportionate effects on historically marginalized or underserved communities.").

[12] World Economic Forum (2021) *The Global Risks Report 2021*, 5 ("Our analysis centres on the risks and consequences of widening inequalities and societal fragmentation. In some cases, disparities in health outcomes, technology, or workforce opportunities are the direct result of the dynamics the pandemic created. In others, already present societal divisions have widened, straining weak safety nets and economic structures beyond capacity. Whether the gaps can be narrowed will depend on the actions taken in the wake of COVID-19 to rebuild with a view towards an inclusive and accessible future. Inaction on economic inequalities and societal divisiveness may further stall action on climate change—still an existential threat to humanity.").

[13] See Taillant, Jorge Daniel. The Climate Equity Paradox: time, key pollutants and fast climate action to ensure intergenerational climate equity. (2022) https://center-hre.org/wp-content/uploads/The-Climate-Equity-Paradox-by-Jorge-Daniel-Taillant-April-2022.pdf

[14] Forbes: AEP emits the equivalent of 130 million metric tons of carbon dioxide per year, accounting for about 2% of the annual total, with Duke at 127 million tons and Southern Co. at 118 million.

[15] Sophie Crawford of McGill University contributed to the drafting and editing of this document

[16] https://www.bbc.com/news/science-environment-60984663
[17] Allen, M.R., *et al.* (2018) *Summary for Policymakers*, *in* Intergovernmental Panel on Climate Change (IPCC) GLOBAL WARMING OF 1.5°C, MassonDelmotte, V., *et al*. (eds.), 18 ("Pathways that limit global warming to 1.5°C with no or limited overshoot show clear emission reductions by 2030 (*high confidence*). All but one show a decline in global greenhouse gas emissions to below 35 GtCO2eq yr−1 in 2030, and half of available pathways fall within the 25–30 GtCO2eq yr−1 range (interquartile range), a 40–50% reduction from 2010 levels (*high confidence*). Pathways reflecting current nationally stated mitigation ambition until 2030 are broadly consistent with cost-effective pathways that result in a global warming of about 3°C by 2100, with warming continuing afterwards (*medium confidence*). {2.3.3, 2.3.5, Cross-Chapter Box 11 in Chapter 4, 5.5.3.2}"); *see also* Xu Y., Ramanathan V., & Victor D. G. (2018) *Global warming will happen faster than we think*, NATURE, Comment, 564(7734):30–32, 30–31 ("But the latest IPCC special report underplays another alarming fact: global warming is accelerating. Three trends—rising emissions, declining air pollution and natural climate cycles—will combine over the next 20 years to make climate change faster and more furious than anticipated. In our view, there's a good chance that we could breach the 1.5 °C level by 2030, not by 2040 as projected in the special report (see 'Accelerated warming'). The climate-modelling community has not grappled enough with the rapid changes that policymakers care most about, preferring to focus on longer-term trends and equilibria.").
[18] https://www.bbc.com/news/science-environment-60984663
[19] CCAC (2021) GLOBAL METHANE ASSESSMENT, 21 ("Methane mitigation offer a way of rapidly reducing the rate of near-term warming. Also, mitigation of methane, along with non- fossil greenhouse gases including some hydroflurocarbons (HFCs) and black carbon-rich sources of particulate matter (PM), is the only plausible way of decreasing warming relative to a reference case with minimal changes in current policies over the next 20 years. This is because a realistically paced phase-out of fossil fuels, or even a rapid one under aggressive decarbonization, is likely to have minimal net impacts on near-term temperatures due to the removal of co-emitted aerosols (Shindell and Smith 2019). As methane is the most powerful driver of climate change among the short-lived substances (Myhre *et al*. 2013), mitigation of methane emissions is very likely to be the most powerful lever in reducing near-term warming. This is consistent with other assessments; for example, the Intergovernmental Panel on Climate Change Fifth Assessment Report (IPCC AR5) showed that methane controls implemented between 2010 and 2030 would lead to a larger reduction in 2040 warming than the difference between RCPs 2.6, 4.5 and 6.0 scenarios. (The noted IPCC AR5-era scenarios are called representative concentration pathways (RCPs, with the numerical value indicating the target radiative forcing in 2100 (Kirtman *et al*. 2013)).").
[20] CCAC (2021) GLOBAL METHANE ASSESSMENT, 8 ("Reducing human-caused methane emissions is one of the most cost-effective strategies to rapidly reduce the rate of warming and contribute significantly to global efforts to limit temperature rise to 1.5°C. Available targeted methane measures, together with additional measures that contribute to priority development goals, can simultaneously reduce human-caused methane emissions by as much as 45 per cent, or 180 million tonnes a year (Mt/yr) by 2030. This will avoid nearly 0.3°C of global warming by the 2040s and complement all long-term climate change mitigation efforts. It would also, each year, prevent 255 000 premature deaths, 775 000 asthma- related hospital visits, 73 billion hours of lost labour from extreme heat, and 26 million tonnes of crop losses globally (Figure ES1).").
[21] Cutting HFCs and black carbon (soot) as well as tropospheric ozone (O3)will similarly help rapidly reduce warming by 2050. The CCAC estimates that widespread action to reduce methane, HFCs, and black carbon will avoid 0.6°C of global warming by 2050. We can see that tackling SLCPs have significant, critical, and immediate benefits as climate strategies to keep to 1.5°C by mid-century. Conversely, if we don't reduce SLCPs quickly, we fall off of the climate cliff and plunge into irreversible climate collapse where we trigger irreversible climate tipping points. Avoiding surpassing 1.5°C is crucial to minimizing risks to market participants, companies, and communities
[22] Swiss Re Institute (2021) *The economics of climate change: no action not an option*, 1 ("Recent scientific research indicates that current likely temperature-rise trajectories, supported by implementation of mitigation pledges, would entail 2.0–2.6°C global warming by mid-century. We use this as the baseline to simulate the impact of rising temperatures over time, while also modelling for the uncertainties around most severe possible physical outcomes. The result is that global GDP would be 11–14% less than in a world without climate change (ie, 0°C change). Under the same no climate change comparative, the Paris target too result in negative GDP impact, but less much so (–4.2%). We also consider a severe scenario in which temperatures rise by 3.2°C by mid-century, with society doing nothing to combat climate change. In this scenario, the global economy would be 18% smaller than in a world without warming, reinforcing the imperative of, if anything, more action on climate change.").
[23] https://www.ccacoalition.org/en/resources/global-methane-assessment-full-report
[24] World Meteorological Organization (2021) *The State of the Global Climate 2020* ("In 2020, GMST was 1.2 ± 0.1 °C warmer than the pre-industrial baseline (1850-1900). Despite developing La Niña cooling conditions, 2020 was one of the three warmest years on record.").
[25] Kopp R. E., *et al.* (2017) *Potential surprises – compound extremes and tipping elements*, *in* CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME I ("Negative feedbacks, or self-stabilizing cycles, within and between components of the Earth system can dampen changes (Ch. 2: Physical Drivers of Climate Change). However, their stabilizing effects render such feedbacks of less concern from a risk perspective than positive feedbacks, or self-reinforcing cycles. Positive feedbacks magnify both natural and anthropogenic changes. Some Earth system components, such as arctic sea ice and the polar ice sheets, may exhibit thresholds beyond which these self- reinforcing cycles can drive the component, or the entire system, into a radically different state."); Lenton T. M., Rockstrom J., Gaffney O., Rahmstorf S., Richardson K., Steffen W., & Schellnhuber H. J. (2019) *Climate tipping points—too risky to bet against*, NATURE, Comment, 575(7784):592–595, 594 ("In our view, the clearest emergency would be if we were approaching a global cascade of tipping points that led to a new, less habitable, 'hothouse' climate state11. Interactions could happen through ocean and atmospheric circulation or through feedbacks that increase greenhouse-gas levels and global temperature. Alternatively, strong cloud feedbacks could cause a global tipping point12'13.We argue that cascading effects might be common. Research last year14 analysed 30 types of regime shift spanning physical climate and ecological systems, from collapse of the West Antarctic ice sheet to a switch from rainforest to savanna. This indicated that exceeding tipping points in one system can increase the risk of crossing them in others. Such links were found for 45% of possible interactions14. In our view, examples are starting to be observed. ... If damaging tipping cascades can occur and a global tipping point cannot be ruled out, then this is an existential threat to civilization. No amount of economic cost–benefit analysis is going to help us. We need to change our approach to the climate problem. ... In our view, the evidence from tipping points alone suggests that we are in a state of planetary emergency: both the risk and urgency of the situation are acute....").
[26] IGSD & CHRE (2021) *The Need for Fast Near-Term Climate Mitigation to Slow Feedbacks and Tipping Points* ("Over the past several decades the Arctic air temperature has been warming at three times the global average according to NOAA and NASA, and up to four times the global average for the area above 70°N, [12] with even greater warming over the Arctic ocean. As a result, the extent of Arctic sea ice—a white shield reflecting incoming solar radiating safely back to space— is shrinking.") (internal citations omitted).
[27] Pistone K., Eisenman I., & Ramanathan V. (2014) *Observational determination of albedo decrease caused by vanishing Arctic sea ice*, PROC. NAT'L. ACAD. SCI. Annual mean temperature trends over the Arctic during the past 40 years show that over this period, where satellite data are

available, major portions have warmed by more than 1 °C per decade (Fig. 1a, red colours and outlined portion; a warming of 4 °C within 40 years is hereafter referred to as 1 °C per decade). ... Using a criterion based on the speed of near-surface air temperature warming over the past four decades, we find that the current Arctic is experiencing rates of warming comparable to abrupt changes, or D–O events, recorded in Greenland ice cores during the last glacial period. [During the last glacial period (120,000–11,000 years ago), more than 20 abrupt periods of warming, known as Dansgaard–Oeschger (D–O) events, took place18'19.] Both past changes in the Greenland ice cores and the ongoing trends in the Arctic are directly linked to sea-ice retreat—in the Nordic Seas during glacial times and in the Eurasian Arctic at present. Abrupt changes have already been experienced and could, according to state-of-the-art climate models, occur in the Arctic during the twenty-first century, but climate models underestimate current rates of change in this region.").

[28] Slater T., Lawrence I., Otosaka I. Shepherd A., Gourmelen N., Jacob L., Tepes P., Gilbert L., & Nienow P. (2021) *Earth's ice imbalance*, THE CRYOSPHERE 15(1):233–246, 233 ("Arctic sea ice (7.6 trillion tonnes), Antarctic ice shelves (6.5 trillion tonnes), mountain glaciers (6.1 trillion tonnes), the Greenland ice sheet (3.8 trillion tonnes), the Antarctic ice sheet (2.5 trillion tonnes), and Southern Ocean sea ice (0.9 trillion tonnes) have all decreased in mass .... [T]here can be little doubt that the vast majority of Earth's ice loss is a direct consequence of climate warming.").

[29] Overland J. E., *et al.* (2014) *Future Arctic climate changes: Adaptation and mitigation time scales*, EARTH'S FUTURE 2:68–74, 68 ("The climate in the Arctic is changing faster than in midlatitudes. This is shown by increased temperatures, loss of summer sea ice, earlier snow melt, impacts on ecosystems, and increased economic access. Arctic sea ice volume has decreased by 75% since the 1980s. Long-lasting global anthropogenic forcing from carbon dioxide has increased over the previous decades and is anticipated to increase over the next decades. Temperature increases in response to greenhouse gases are amplified in the Arctic through feedback processes associated with shifts in albedo, ocean and land heat storage, and near-surface longwave radiation fluxes. Thus, for the next few decades out to 2040, continuing environmental changes in the Arctic are very likely, and the appropriate response is to plan for adaptation to these changes. For example, it is very likely that the Arctic Ocean will become seasonally nearly sea-ice free before 2050 and possibly within a decade or two, which in turn will further increase Arctic temperatures, economic access, and ecological shifts. Mitigation becomes an important option to reduce potential Arctic impacts in the second half of the 21st century. Using the most recent set of climate model projections (CMIP5), multimodel mean temperature projections show an Arctic-wide end of century increase of +13 oC in late fall and +5 oC in late spring for a business- as-usual emission scenario (RCP8.5) in contrast to +7 oC in late fall and +3 oC in late spring if civilization follows a mitigation scenario (RCP4.5). Such temperature increases demonstrate the heightened sensitivity of the Arctic to greenhouse gas forcing."); *see also* Overland J. E. & Wang M. (2013) *When will the summer Arctic be nearly sea ice free?*, GEOPHYSICAL RESEARCH LETTERS 40:2097–2101, 2100 ("Direct extrapolation of sea ice volume, by trendsetters, gives loss projections of 2016 [Maslowski et al., 2012] (Peter Wadhams, 2012, personal communication), which may be minimizing the potential effects of year-to-year variability. Stochasters acknowledge current conditions and the range of projections suggested by model results yet point to the lack of being able to forecast the next rapid sea ice loss event. They are saved in part as it will possibly take several such events to reach the nearly sea ice-free threshold, thus adding some averaging to the final date prediction (hence stochastic). Observations and citations in this article support the conclusion that current rapid Arctic change, especially loss of multiyear sea ice, is likely out of sample for most CMIP5 models. Thus, time horizons for summer sea ice loss of these three approaches turns out to be roughly 2020, 2030, and 2040 respectively for trendsetters, stochasters, and modelers. Predictions depend on the weight given to data, understanding of Arctic change processes, and the use of model projections. It is reasonable to conclude that Arctic sea ice loss is very likely to occur in the first rather than the second half of the 21st century, with a possibility of loss within a decade or two.").

[30] Pistone K., Eisenman I., & Ramanathan V. (2019) *Radiative Heating of an Ice-Free Arctic Ocean*, GEOPHYS. RSCH. LETT. 46(13):7474–7480, 7477 ("This heating of 0.71 W/m^2 is approximately equivalent to the direct radiative effect of emitting one trillion tons of CO_2 into the atmosphere (see calculation in Appendix A). As of 2016, an estimated 2.4 trillion tons of CO_2 have been emitted since the preindustrial period due to both fossil fuel combustion (1.54 trillion tons) and land use changes (0.82 trillion tons), with an additional 40 billion tons of CO_2 per year emitted from these sources during 2007–2016 (Le Quéré et al., 2018). Thus, the additional warming due to the complete loss of Arctic sea ice would be equivalent to 25 years of global CO_2 emissions at the current rate."). *See also* IGSD's Plain Language Summary of Pistone K., *et al.* (2019), Institute for Governance & Sustainable Development.

[31] Drijfhout S., Bathiany S., Beaulieu C., Brovkin V., Claussen M., Huntingford C., Scheffer M., Sgubin G., & Swingedouw D. (2015) *Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models*, PROC. NAT'L. ACAD. SCI. 112(43):E5777–E5786, E5777 ("Abrupt transitions of regional climate in response to the gradual rise in atmospheric greenhouse gas concentrations are notoriously difficult to foresee. However, such events could be particularly challenging in view of the capacity required for society and ecosystems to adapt to them. We present, to our knowledge, the first systematic screening of the massive climate model ensemble informing the recent Intergovernmental Panel on Climate Change report and reveal evidence of 37 forced regional abrupt changes in the ocean, sea ice, snow cover, permafrost, and terrestrial biosphere that arise after a certain global temperature increase. Eighteen out of 37 events occur for global warming levels of less than 2°, a threshold sometimes presented as a safe limit."). *See also* Lenton T. M., Rockstrom J., Gaffney O., Rahmstorf S., Richardson K., Steffen W., & Schellnhuber H. J. (2019) *Climate tipping points—too risky to bet against*, NATURE, Comment, 575(7784):592–595, 593 ("A further key impetus to limit warming to 1.5 °C is that other tipping points could be triggered at low levels of global warming. The latest IPCC models projected a cluster of abrupt shifts between 1.5 °C and 2 °C, several of which involve sea ice. This ice is already shrinking rapidly in the Arctic....").

[32] Lenton T. M., Rockstrom J., Gaffney O., Rahmstorf S., Richardson K., Steffen W., & Schellnhuber H. J. (2019) *Climate tipping points—too risky to bet against*, NATURE, Comment, 575(7784):592–595, 594 ("In our view, the clearest emergency would be if we were approaching a global cascade of tipping points that led to a new, less habitable, 'hothouse' climate state11. Interactions could happen through ocean and atmospheric circulation or through feedbacks that increase greenhouse-gas levels and global temperature. Alternatively, strong cloud feedbacks could cause a global tipping point12'13.We argue that cascading effects might be common. Research last year14 analysed 30 types of regime shift spanning physical climate and ecological systems, from collapse of the West Antarctic ice sheet to a switch from rainforest to savanna. This indicated that exceeding tipping points in one system can increase the risk of crossing them in others. Such links were found for 45% of possible interactions14. In our view, examples are starting to be observed. ... If damaging tipping cascades can occur and a global tipping point cannot be ruled out, then this is an existential threat to civilization. No amount of economic cost–benefit analysis is going to help us. We need to change our approach to the climate problem. ... In our view, the evidence from tipping points alone suggests that we are in a state of planetary emergency: both the risk and urgency of the situation are acute...."); *see also* Steffen W., *et al*. (2018) *Trajectories of the Earth System in the Anthropocene*, PROC. NAT'L. ACAD. SCI. 115(33):8252–8259, 8254 ("This analysis implies that, even if the Paris Accord target of a 1.5 °C to 2.0 °C rise in temperature is met, we cannot exclude the risk that a cascade of feedbacks could push the Earth System irreversibly onto a "Hothouse Earth" pathway. The challenge that humanity faces is to create a "Stabilized Earth" pathway that steers the Earth System away from its current trajectory

toward the threshold beyond which is Hothouse Earth (Fig. 2). The human created Stabilized Earth pathway leads to a basin of attraction that is not likely to exist in the Earth System's stability landscape without human stewardship to create and maintain it. Creating such a pathway and basin of attraction requires a fundamental change in the role of humans on the planet. This stewardship role requires deliberate and sustained action to become an integral, adaptive part of Earth System dynamics, creating feedbacks that keep the system on a Stabilized Earth pathway (Alternative Stabilized Earth Pathway).").

[33] Primer of Short-Lived Cliamte Pollutants: Institute for Governance and Sustainable Development (IGSD) Pg. 11-17

[34] The board should have adequate understanding and knowledge to assess the potential impact of climate-related risks on the financial institution and to address and oversee these risks within the institution's strategy and risk appetite, including an understanding of the potential ways in which these risks could evolve over various time horizons and scenarios.

[35] SEC, *SEC Response to Climate and ESG Risks and Opportunities* (*last visited* 09 June 2021) ("As investor demand for climate and other environmental, social and governance (ESG) information soars, the SEC is responding with an all-agency approach.").

[36] CDP (2021) *Transparency to Transformation: A Chain Reaction,* 13 ("This is easily justified by the scale of the problem. In 2020, suppliers reported that they were exposed to some US$1.21 trillion in potential financial impact related to climate change.").

[37] CDP (2021) *Transparency to Transformation: A Chain Reaction,* 9 ("In 2020, over 8,000 suppliers disclosing through CDP reported that US$1.26 trillion of revenue is likely to be at risk over the next five years due to climate change, deforestation and water insecurity. The anticipated financial risk covers potential loss of revenue due to changing consumer preferences, loss of access to capital, and increased operational costs. The increased costs alone amount to as much as US$120 billion, and are caused by physical environmental impacts as well as addressing regulation and market changes.").

[38] Swiss Re Institute (2021) *The economics of climate change: no action not an option*, 1 ("Recent scientific research indicates that current likely temperature-rise trajectories, supported by implementation of mitigation pledges, would entail 2.0–2.6°C global warming by mid-century. We use this as the baseline to simulate the impact of rising temperatures over time, while also modelling for the uncertainties around most severe possible physical outcomes. The result is that global GDP would be 11–14% less than in a world without climate change (ie, 0°C change). Under the same no climate change comparative, the Paris target too result in negative GDP impact, but less much so (–4.2%). We also consider a severe scenario in which temperatures rise by 3.2°C by mid-century, with society doing nothing to combat climate change. In this scenario, the global economy would be 18% smaller than in a world without warming, reinforcing the imperative of, if anything, more action on climate change.").

[39] Swiss Re Institute (2021) *The economics of climate change: no action not an option*, 1 ("Recent scientific research indicates that current likely temperature-rise trajectories, supported by implementation of mitigation pledges, would entail 2.0–2.6°C global warming by mid-century. We use this as the baseline to simulate the impact of rising temperatures over time, while also modelling for the uncertainties around most severe possible physical outcomes. The result is that global GDP would be 11–14% less than in a world without climate change (ie, 0°C change). Under the same no climate change comparative, the Paris target too result in negative GDP impact, but less much so (–4.2%). We also consider a severe scenario in which temperatures rise by 3.2°C by mid-century, with society doing nothing to combat climate change. In this scenario, the global economy would be 18% smaller than in a world without warming, reinforcing the imperative of, if anything, more action on climate change."); World Economic Forum (2021) *The Global Risks Report 2021*, 7 ("Among the highest likelihood risks of the next ten years are extreme weather, climate action failure and human-led environmental damage; as well as digital power concentration, digital inequality and cybersecurity failure. Among the highest impact risks of the next decade, infectious diseases are in the top spot, followed by climate action failure and other environmental risks; as well as weapons of mass destruction, livelihood crises, debt crises and IT infrastructure breakdown.").

[40] Press Release, Ceres (13 May 2021) *Major investors demand ambitious methane* ("As the Biden administration prepares to revise federal methane regulations, 147 oil and gas industry investors representing $5.35 trillion in assets under management signed on to a statement calling for comprehensive regulations to curb dangerous GHG emissions — and more stringent enforcement mechanisms to back them up. As "prudent fiduciaries", the statement says, the signatories believe that virtually eliminating methane emissions supports the financial goals of companies and investors. "By taking action on methane emissions, government can achieve valuable greenhouse gas reductions while helping American industry become cleaner and more competitive," it continues. In 2019, U.S. oil and gas operations emitted 16 million metric tons of methane emissions, with a near-term climate impact greater than all U.S. coal-fired power plants.").

[41] PG. 65, SEC Draft Rule

[42] See: At the end of 2021, securing homeowner's insurance became more complicated for individuals in California.

[43] See: Property insurance companies continue to drop Florida customers

[44] See: https://www.sec.gov/news/press-release/2022-46

[45] Consolidated Appropriations Act, 2021, H.R. 133, 116th Cong., Div. S §103 (2020)(enacted); *see also* Environmental Protection Agency, *AIM Act* (*last visited* 09 June 2021) ("On December 27, 2020, the American Innovation and Manufacturing (AIM) Act of 2020 was enacted as section 103 in Division S, Innovation for the Environment, of the Consolidated Appropriations Act, 2021 (H.R. 133 (116th): Consolidated Appropriations Act, 2021 [Including Coronavirus Stimulus & Relief]). The AIM Act directs EPA to address HFCs by providing new authorities in three main areas: to phase down the production and consumption of listed HFCs, manage these HFCs and their substitutes, and facilitate the transition to next-generation technologies.").

[46] S.J.Res.14, 117th Cong. (2021) ("Providing for congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Environmental Protection Agency relating to "Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review".").

[47] Exec. Order No. 13,990, 86 Fed. Reg. 7037 (Jan. 20, 2021) ("To that end, this order directs all executive departments and agencies (agencies) to immediately review and, as appropriate and consistent with applicable law, take action to address the promulgation of Federal regulations and other actions during the last 4 years that conflict with these important national objectives, and to immediately commence work to confront the climate crisis."); *see generally* Vizcarra, H. & Perls, H. (2021) *Biden's First 100 Days of Climate Action*, HARVARD LAW SCHOOL ENVIRONMENTAL & ENERGY LAW PROGRAM.

[48] EPA, Proposed Rule – Phasedown of Hydrofluorocarbons: Establishing the Allowance Allocation and Trading Program under the AIM Act (*last visited* 09 June 2021) ("This proposed rule is the first regulation under the American Innovation and Manufacturing (AIM) Act of 2020 to address the production and consumption of hydrofluorocarbons (HFCs), which are potent greenhouse gases commonly used in refrigerators, air conditioners, and many other applications. This proposed rule would set the HFC production and consumption baseline levels from which reductions will be made, establish an initial methodology for allocating HFC allowances for 2022 and 2023, and create a robust, agile, and innovative compliance and enforcement system.").

[49] News Release, EPA (14 May 2021) EPA Announces Public Listening Sessions and Trainings on Upcoming Oil and Natural Gas Methane Rule ("Today, the U.S. Environmental Protection Agency (EPA) is taking the first step to develop a proposed rule to reduce methane and other harmful pollutants from new and existing sources in the oil and natural gas industry, beginning with a broad public outreach effort to gather

community and stakeholder input. These activities include holding training sessions on the rulemaking process and how to participate in it, convening listening sessions for stakeholders, and opening a public docket for pre-proposal comments.").

[50] Notice of Availability and Request for Comments, 86 Fed. Reg. 24,669 (May 7, 2021) ("The Office of Management and Budget (OMB), on behalf of the co-chairs of the Interagency Working Group on the Social Cost of Greenhouse Gases, including the Council of Economic Advisors (CEA) and the Office of Science and Technology Policy (OSTP), request comments on "*Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990,"* released on February 26, 2021, available at: *https://www.whitehouse.gov/ wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.* The estimates of the social cost of carbon (SC-CO_2), social cost of methane (SC-CH_4), and social cost of nitrous oxide (SC-N_2 O), collectively called the Social Cost of Greenhouse Gases (SC-GHG), are used to estimate the value to society of marginal reductions in greenhouse gas emissions, or conversely, the social costs of increasing such emissions, in the policy making process.").

[51] The United States of America Nationally Determined Contribution, UNFCCC NDC Registry (Submitted 22 April 2021) ("After a careful process involving analysis and consultation across the United States federal government and with leaders in state, local, and tribal governments, the United States is setting an economy-wide target of reducing its net greenhouse gas emissions by 50-52 percent below 2005 levels in 2030. The National Climate Advisor developed this NDC in consultation with the Special Presidential Envoy for Climate, and it was approved by President Joseph R. Biden Jr..").

[52] White House (23 April 2021) FACT SHEET: President Biden's Leaders Summit on Climate ("Enhancing climate ambition and enabling the transformations required to reach net-zero emissions by 2050. President Biden is galvanizing efforts by the world's major economies to reduce emissions during this critical period. From reducing short-lived climate pollutants and supporting the most vulnerable to investing in nature-based solutions, these transformational changes are critical to keep a 1.5 degree C limit on global average temperature rise within reach. Just as importantly, they will create new, good-paying jobs today to drive tomorrow's economy.").

[53] White House (23 April 2021) FACT SHEET: President Biden's Leaders Summit on Climate ("Reducing emissions from international shipping. The international shipping sector contributes approximately three percent of global greenhouse gas (GHG) emissions, and the sector's emissions are only projected to increase. In support of the global effort to keep within reach a 1.5 degree C limit on global average temperature increase, and in support of global efforts to achieve net-zero GHG emissions no later than 2050, the United States is committing to work with countries in the International Maritime Organization (IMO) to adopt a goal of achieving zero emissions from international shipping by 2050 and to adopt ambitious measures that will place the sector on a pathway to achieve this goal.").

[54] White House (23 April 2021) FACT SHEET: President Biden's Leaders Summit on Climate ("Establishing a Net- Zero Producers Forum. In support of efforts to achieve net-zero emissions by midcentury, the United States, together with the energy ministries from Canada, Norway, Qatar, and Saudi Arabia, representing 40 percent of global oil and gas production, established a cooperative forum that will create pragmatic net-zero strategies, including methane abatement, advancing the circular carbon economy approach, development and deployment of clean-energy and carbon capture and storage technologies, diversification from reliance on hydrocarbon revenues, and other measures in line with each country's national circumstances.").

[55] Responsibility and accountability may be integrated within existing organizational structures or by establishing new structures for climate-related financial risks. Where dedicated units are established, the board and management should clearly define these units' responsibilities and interaction with existing governance structures.

[56] See Map

[57] See: CalEnviroScreen is a mapping tool that helps identify California communities that are most affected by many sources of pollution, and where people are often especially vulnerable to pollution's effects.

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