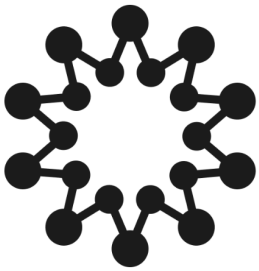

THE HBAR FOUNDATION

Input of The HBAR Foundation to the Article 6.4 Supervisory Body's Structured Public Consultation on CO_2 Removal Activities under the Article 6.4 Mechanism[1]

Sustainable Impact Fund
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INTRODUCTION

The HBAR Foundation Sustainable Impact Fund (THF-SIF) welcomes the opportunity to assist the Supervisory Body (SB) with respect to issues surrounding the governance of carbon dioxide removal (CDR) activities under Article 6.4, pursuant to the CMA's request (*see* decision 7/CMA.4, paragraph 22) for broader stakeholder inputs on the topic via a structured public consultation. THF-SIF is a climate tech-focused grant fund operating within the Hedera Hashgraph distributed ledger technology (DLT) ecosystem. We are focused on accelerating pro-climate and nature-positive behaviors that fight climate change, protect biodiversity, and help to achieve the United Nations' 17 Sustainable Development Goals (SDGs). Our mission is to promote climate action by catalyzing transformative, open-source climate accounting and climate finance solutions, ultimately bringing the balance sheet of the planet to the public ledger.

In offering the following input, we are mindful that, as the 58th session of the Subsidiary Body for Scientific and Technological Advice (SBSTA 58) commenced last week in Bonn, uncertainty continued to surround how the Article 6.4 Mechanism would operationalize the crediting of removals. We also take note of serious criticisms that have been raised against offset eligibility for nature-based removal projects, as a class, on one hand, and engineering-based removal projects, as a class, on the other. This is a highly impactful and complex topic that affects not just the success of Article 6.4, but also the likely growth trajectory of the voluntary carbon market (VCM) and dozens of existing and anticipated future emissions trading schemes in compliance markets worldwide. As the IPCC concluded with "high confidence" in its Sixth Assessment Report, rapidly upscaling deployment of CDR – both existing and newly developed methods – may be unavoidable to "counterbalance hard-to-abate residual emissions…if net-zero carbon dioxide or GHG emissions are to be achieved" and the worst effects of climate change avoided.

But serious questions have also been raised about the risk of mitigation deterrence as CDR techniques become more prevalent. Incremental fossil emissions take carbon from what is effectively permanent geologic storage and inject it into the atmosphere cumulatively, with long term consequences for radiative forcing. Few CDR approaches can ever hope match such a high degree of permanence, nor do they claim to – either in terms of how long fossilized carbon might remain safely sequestered if oil and gas stores were left undisturbed, or how long the resulting CO_2 might persist in the atmosphere and contribute to global heating if those stores are tapped. CDR is not a *substitute* for decarbonization and must not be allowed to diminish the urgency of reductions. It has a supplemental role to play.

Below, we argue for the adoption and deployment of DLT-enabled tools to avoid inadvertent use of methodologies that may work paradoxically to limit emissions reductions overall. Since its launch 15 months ago, THF-SIF has worked to reduce five systematic frictions in market-based systems, leveraging DLT to (1) make climate finance auditable; (2) digitize and open sourcing methodologies; (3) scale validation and verification capabilities; (4) discover a global climate asset price; and (5) improve the credibility of climate-related ESG reporting. Aided by DLT's ability to link transparent environmental and financial data to auditable climate assets, Article 6.4 could improve trust in climate negotiations, upgrade the integrity of existing decarbonization methods, and facilitate real-time visibility into the effectiveness of new emissions reduction and sequestration approaches. A DLT-enabled 6.4 Mechanism would become a vehicle for opening up new ambitions based on comprehensive market data, shifting private capital to climate finance, and incentivising project developers to accelerate market initiatives that enable environmental preservation and regeneration. Similarly, ESG and NDC disclosures on public ledgers create visibility into financial flows from sustainable debt markets to climate projects and their participant entities, from NGOs, to Enterprises, to market facilitators, democratizing ownership of the natural capital and reallocating economic power to those local communities in the Global South least responsible for, yet most vulnerable to climate impacts.

COMMENTS

To Improve Reversal Monitoring In Nature-Based CDR, Require Distributed Ledger Technology-Enabled Digital MRV

Questions have been raised surrounding the management of reversals in lower durability nature-based removal contexts. As a threshold matter, we acknowledge that *reductions* in emissions of CO_2 – as well as non-CO_2 GHGs such as methane – derived from the curtailment of fossil fuel production/use cannot be treated as indistinguishable from nature-based CDR at similar scales. Especially on longer time horizons, the environmental benefits of the former will vastly outweigh the latter.

Oil, gas, and coal stored in geological reservoirs is already safely outside the carbon cycle. Absent deliberate human extraction, this natural sequestration could persist indefinitely. By contrast, terrestrial reservoirs such as forestry and soil improvement projects are vulnerable to a wide and expanding array of reversal risks, both anthropogenic and natural (physical risks such as fires, droughts, hurricanes, floods, etc.). A reforestation project that removes 100 tonnes of CO_2 today but releases it in 2040 if that stand of trees is harvested or destroyed by wildfire may assist in hitting an enhanced 2030 NDC but fail as climate action with respect to the Paris Agreement's long-term temperature goals. This possibility has led various stakeholders to argue that

nature-based removals should be categorically ineligible for crediting as offsets under the Article 6.4 Mechanism.

We agree that the SB's first duty is to set and implement climate policies that prevent, not merely delay temporarily, the onset of harmful and effectively irreversible long-term changes in global surface temperatures. And yes, those depend on *cumulative* CO_2 emissions over the long run, which may not be significantly affected by proliferating short-term, land-based sinks. Nevertheless, permanently disallowing nature-based offsets under the Mechanism because of speculation that they might deter adoption of fossil emissions reduction strategies – e.g., phaseout of oil/gas/coal and the shift to renewables – would be a mistake. Policymakers have been urged to pursue those strategies for decades, but global GHG emissions still continued to rise sharply. The IPCC-documented results: widespread adverse impacts spanning the atmosphere, oceans, cryosphere, and biosphere, with concomitant losses and damages to ecosystems, biodiversity, natural resources, and vulnerable communities.

The Mechanism's purpose is not only to increase ambition, but also to enable the achievement of NDCs that Parties might otherwise fail to satisfy. Truly permanent anthropogenic CDR is difficult to attain, yes. But, as discussed below, the engineering-based removals most likely to achieve it are subject to their own fierce critiques. Fortunately, the SB is not called on to adjudicate between mitigation pathways in general. In real world application, nature-based solutions and engineered removals both suggest a complex profile of advantages and disadvantages. Careful study of each approach is necessary and should continue. If warranted by learnings from real-world operation of the Mechanism, it may be appropriate for the SB to amend 6.4's requirements in the future. What counts today, however, is driving engagement with the Mechanism in the first place. A growing literature suggests that market-based mechanisms *can* efficiently reduce GHG emissions. *See, e.g.,* Vrolijk, K. and Sato, M., "Quasi-Experimental Evidence on Carbon Pricing," *The World Bank Research Observer* (Oxford University Press, March 2023), available at https://doi.org/10.1093/wbro/lkad001 (using empirical data from the compliance markets to show that introducing carbon trading unambiguously leads to emission reductions, by as much as 20% in the EU ETS context). Moreover, even temporary land-based storage of carbon lasting a period of years may present non-trivial environmental and social benefits.

The SB's challenge is one of accounting and oversight: how to ensure that CDR methodologies used by project developers accurately capture the true environmental benefits conferred by the offsets they create, avoiding false equivalencies between reductions and less permanent removals; and, further, how to design and deploy sufficiently robust Monitoring. Reporting, and Verification (MRV) capabilities that

reversals will be reliably detected and compensatory steps triggered pursuant to those methodologies over long time horizons. The increasing frequency and magnitude of climate-change fueled episodes of extreme heat, forest fire, drought, flooding, and related human social disruption casts doubt on the feasibility of conducting the kind of robust, ongoing, longitudinal monitoring necessary to compensate for the diminishing resilience of nature-based removal projects. But unlike engineering-based CDR, forestry and soil projects are readily available now, easily deployable without technical expertise, and far less costly. Consistent with Just Transition principles, that accessibility empowers climate action by diverse parties at multiple levels – by governments, corporations, and individuals alike, rather than by only a select few in rich countries. To preserve the viability of those projects as reversals become more common, credibly extending monitoring into the outyears becomes critical, and DLT-enabled "digital MRV" (dMRV) offers the solution.

Accordingly, the THF-SIF urges that all methodologies eligible under the Mechanism require the use of best available DLT-enabled dMRV, including transparent, auditable field measurements in combination with remote-sensing, IoT, and satellite data, with audit trails linked to decentralized identifiers for corresponding actors that issue verifiable credentials and verifiable presentations linked to tokenized climate assets, interoperable across climate account systems. Where analog MRV would require impractical levels of ongoing human capacity, involve economically unsustainable administrative costs, and present enforceability and liability challenges that scale faster than monitoring periods grow, digitization and reliance on environmentally sustainable public DLT networks such as Hedera allows us to greatly improve on traditional manual processes.

Embedding public DLT-based certification and verification tools into Article 6.4 will increase the Mechanism's credibility by enabling automated, cost-effective, and transparent verification of the performance of any nature-based removal project in the background, even over decades-long permanence periods. All data can then be recorded immutably in an openly discoverable and auditable way, so the progress of climate actors towards their mitigation goals is visible, galvanizing higher-ambition target-setting, and accelerating the impact of climate action in the aggregate without unduly compromising data privacy

To Ensure High Quality Offsets And Encourage Broad Participation, Digitize CDR Methodologies Into Searchable, Cross-Comparable Libraries

The policy implications of crediting CO_2 removals under Article 6.4 and the development/assessment of Mechanism methodologies to ensure that those removals

are high-quality are closely linked and complex. Numerous CDR methodologies already exist in wild, the lion's share validated and maintained by a small group of quasi-regulatory bodies in the VCM, such as Verra, Gold Standard, and the American Carbon Registry (ACR), but with a growing share promoted by lesser-known niche registries such as the California Air Resources Board (CARB), the Climate Action Reserve (CAR), and the Carbon Offsetting and the Reduction Scheme for International Aviation (CORSIA), among others. Separately, the Integrity Council for Voluntary Carbon Markets (IC-VCM) recently announced its Core Carbon Principles (CCPs), which are intended to establish minimum criteria for high-quality credits that embody verifiable climate impact and derive from the latest science and established best practices. Meanwhile, some large corporate buyers, such as Microsoft, have begun to address the lack of consensus on CDR quality by developing and communicating their own independent principles, standards, and guidance.

This fragmentation and lack of standardization presents a challenge to the SB's implementation of Article 6.4. Even with aggressive cuts to fossil emissions, meeting Paris temperature goals will require diverting enough capital to high-quality CDR projects to fund ~10 billion tonnes of CO_2 removal per year by midcentury. However, scaling CDR markets so aggressively will fail unless market participants currently sitting on the sidelines – especially major corporates and financial institutions – can be persuaded to believe that offsets in trade, be they ER6.4s or VCM credits, do in fact consistently embody real, quantified drawdowns of CO_2. The SB will raise trust and confidence in the environmental integrity of CDR activities, not by weighing the flaws of competing removal technologies to pick winners and losers – but by encouraging the Parties to formulate and drive wide adoption of transparent, science-based definitions and universal industry standards to govern CDR project quality across CDR markets, from the VCM to Article 6.4 to "cap-and-trade" compliance markets as well. Similarly helpful would be a commitment from the SB to harmonize existing CDR methodologies in the VCM with 6.4 Mechanism requirements. Achieving that alignment would have the dual benefits of discouraging price-sensitive developers from engaging in climate-governance arbitrage in the selection of CDR project methodologies while simultaneously improving – as well as increasing business certainty around – their expected returns-on-investment (ROI) at project start, which in turn liberates even more capital for CDR. However, neither is achievable without first giving climate project developers, carbon-removal buyers, and environmental regulators a fast, accessible, low-cost way to discover, audit, reference, and compare potential CDR methodologies – at high resolution, in large batches, apples-to-apples.

THF-SIF's modular, open-source, Policy Workflow Engine, the Guardian, was purpose-built with these goals in mind. Historically, methodologies in the VCM have taken years to crawl from submission to approval, with frequent errors and upfront

costs to project developers often exceeding hundreds of thousands of dollars. The Guardian lowers those barriers to entry. It does so by digitizing existing methodologies and encoding their requirements into standardized workflows that go beyond the rule, and act as the operating system for climate asset production following a specific methodology. Coupled with the Guardian's requirements-based tokenization implementation, best-in-class identity management, DLT libraries, account-to-account traceability, visibility into corresponding actions, and data submissions keyed to actor and role, methodology digitization yields faster search and discovery, more comprehensive analysis, simplified referencing and cross-referencing, as well as a level of granularity in comparisons between next-best-alternative policies that earlier analog processes could never support.

The upshot: CDR project developers (and every other carbon-market participant) who previously lacked the capacity to efficiently search, analyze, reference out, cross compare, and identify relevant differences between existing and newly added methodologies within, and certainly across, registry libraries now have a flexible tool for matching CDR project ideas with the best, most cost-effective, fit-for-purpose digital/digitized methodology currently available. We regard this DLT-enabled flexibility as likely essential if the SB hopes to catalyze the kind of rapid and sustained CDR upscaling necessary to draw down billions of tonnes of atmospheric CO_2 per year by midcentury while simultaneously encouraging broad participation in 6.4 Mechanism activities, pursuant to ¶ 33, §2.4.15 of the RMP.

We certainly agree, whatever criteria the SB ultimately adopts for A6.4ER eligibility, Mechanism methodologies that qualify should be required to "bake in" robust safeguards against negative environmental and social impacts. Nevertheless, after nearly three decades of failed struggle by the global community to curb GHG emissions, with catastrophic levels of warming all-too-near on the horizon, THF-SIF believes that limiting global temperature rise below 2°C *must* take precedence. And in that endeavor, there are no more risk-free paths. The IPCC concedes that existing and emerging CDR techniques, particularly if deployed at scale, could each involve significant uncertainties, knowledge gaps, risks of harm, as well as other unintended consequences for human and natural systems alike. Of course, IPCC guidance *also* reports that 100% of known emissions pathways capable of limiting planetary warming to 1.5°C by 2050 without overshoot are unavoidably dependent on large-scale atmospheric CDR. Even reducing ambition to 2°C, that figure only drops to 87%.

Where human cultural, socio-political, and behavioral economic dynamics intersect with global climate system models projected forward decades and centuries, the SB has few certainties to rely on ex ante. If they exclusively rely (or even just over index) on the wrong CDR pathway now – however wrongness is later defied ex post –

that mistake could easily impair the Mechanism's effectiveness. But if the SB chooses to reject *both* nature-based and engineered removals simultaneously, the harm could be far worse. Article 6.4 is an important tool for shifting private capital to CDR. Abstaining from using it to scale-up *any* credible removal pathway may lead to hundreds of nature-positive, co-benefit rich forestry and soil projects currently planned for the Global South never breaking ground, and high-durability but capital-intensive emerging CDR technologies like DAC never deploying at scale.

To avoid jeopardizing the Paris Agreement's long-term temperature goals, prudence demands keeping the full menu of CDR pathways accessible under the Mechanism. To that end, we urge the SB (1) to require that CDR methodologies newly developed for the Article 6.4 Mechanism be digitally native; (2) to undertake to digitize, in a reasonable time or for Article 6.4 purposes, all existing libraries of analog methodologies in use or owned by the UNFCCC using best available technology (BAT); and (3) to release a technical support document enabling carbon registries and CDR project developers interested in participating in Mechanism activities to convert eligible CDR methodologies in the VCM from analog to digital format, along with guidance on any/all upgrades necessary to align with Mechanism requirements.

THF-SIF respectfully submits the Guardian as a candidate for BAT to accomplish this digital transformation goal. As of this writing, we know of no other scalable system, which enables project developers, registries, and standards bodies alike to produce digitized methodologies. They and their corresponding projects are comparable with respect to enforcement rules, operational data, and project participants, and enabled for independent review through a free and open-source format that directly links climate assets to their corresponding audit trail. For that reason, to the UNFCCC – as well as every other VCM participant considering engagement with or expansion into Article 6.4, from registries to CDR project developers to environmental regulators – we offer the close technical support of the Hedera sustainability ecosystem and developer community. Compared with analog norms in the VCM, Parties will be able to leverage these innovations for dramatic increases in process efficiency. This opens the door to UNFCCC repositories containing net-new digitized CDR methodologies that can power Article 6.4 Mechanism engagement, growth, and, ultimately, concrete, measurable climate outcomes aligned with Paris Agreement targets. Whatever advice, counsel, and guidance may be helpful in creating, documenting, and operationalizing a DLT-enabled, Guardian-centered process workflow for digitizing repositories of analog CDR methodologies into the SB's Article 6.4 Mechanism requirements framework, THF-SIF and its network of partners stands ready to provide.

This represents a high-impact opportunity for the SB to give carbon-market participants access to industrial-scale workflows capable of onboard hundreds of new

digital and newly digitized methodologies quickly and at low cost. Historically, custody and control of environmental methodologies was concentrated in the hands of a small number of expert gatekeepers, creating a bottleneck. With the Article 6.4 Mechanism entering into force, the speed, transparency, and diligence with which CDR project methodologies are vetted, approved, compared, and selected must increase dramatically. Success of market-based mechanisms like Article 6.4 requires a Cambrian Explosion in high quality, transparent, and standardized, as well as equitable and inclusive, digital climate methodologies. And for the digital environmental assets resulting from those methodologies to narrow the climate finance gap and deliver measurable progress towards net-zero, we need democratized, decentralized access to the social and environmental datasets underlying their valuations. To maintain public trust in their veracity over time, any participant, from project developer, to institutional investor, to corporate buyer, also needs a way to audit the data at the project level in real time without extensive training or excessive cost. DLT-enabled tools such as the Guardian are critical to building the empirical knowledge structures necessary to meet those needs, and we urge the SB to embrace them. Hedera's open-source, accessibility-first strategy has already built the world's largest repository of digital/digitized climate-action methodologies – including dozens from VCM participants such as Verra and Gold Standard, the Clean Development Mechanism, among others – but far more is needed.

To Meet Long-Term Temperature Goals Under The Paris Agreement, Remain Open To High-Permanence Engineered Removals But Assess Methodologies Case-By-Case

THF-SIF is also mindful of harsh criticisms leveled in recent months against engineering-based removals, some by Article 6.4 stakeholders, others by UNFCCC itself, but most culminating in dire warnings about the dangers of reliance on technological solutions followed by urgently worded recommendations to block the whole CDR pathway from Mechanism eligibility categorically. In general, THF-SIF views these criticisms as unpersuasive and their proposed remedy both disproportionate and likely to be counterproductive with respect to the objectives of the Article 6 Mechanism. Unlike nature-based removals, engineered solutions promise highly durable, near permanent CDR outcomes over long time horizons, while forests and soils are limited in their ability to serve as durable long-term sinks due to their susceptibility to physical disturbances and CDR-reversal. Forestry and soil projects also have geologic and land-use constraints on long-term project feasibility, from MRV costs, to saturation limits, to the biophysical dimensions of unused, arable land. *See, e.g.,* Smith, H.B., Vaughan, N.E., and Forester, J., "Long-term national climate strategies bet on forests and soils to reach net-zero," 305 *Communications Earth & Environment* 3 (2022).

We support assessing every CDR technique, nature-based and engineered removal candidates alike, on their merits, case-by-case, using a criteria-based approach. To justify a highly restrictive policy solution like a categorical ban, the SB would need clear, data-driven arguments reflecting the totality of the evidence, a positive benefit-cost ratio, and no other more proportional, less burdensome means reasonably available to accomplish the remedial objective. In our view, disqualifying engineered removals from the Mechanism as a class fails this test.

Yes, technological solutions to CDR have a range of important constraints. In its role as climate policymaker, it is entirely appropriate for the SB to weigh those constraints and draw conclusions about eligibility in particular cases using best-available evidence. THF-SIF would readily agree, for example, that bioenergy with carbon capture and storage (BECCS) raises troubling concerns. BECCS requires vast land areas and staggering amounts of tree-cutting to produce the biomass pellets to fire BECCS plants. Scaling CO_2 capture using BECCS at levels necessary to achieve 2050 net-zero emissions scenarios risks deforestation at a faster rate than any nature-based project could regenerate, arguably doing more harm than good. We encourage the SB to be skeptical of any technique that looks to decarbonize by mobilizing biomass that is itself an effective carbon sink.

Not all critiques of technology-based CDR raise such weighty concerns, however. Many attacks on solutions like DAC hang on claims that it is technologically and economically proven, which could be said of most new technologies in the beginning. DAC is admittedly at an early stage of development and demonstration, with many technological and economic bridges to cross. Today at least, using chemical methods to achieve geologic storage is costly, and harboring doubts about the capacity of such approaches to deploy at scale is rational. But this feasibility point misunderstands technological and economic readiness as an "all or nothing" binary. Like other industries, engineered CDR would be expected to fall in cost over time naturally as firms learn by doing. Moreover, private- and public-sector teams from Heirloom, to Global Thermostat, to Carbon Engineering, to Climeworks have already begun to demonstrate technological efficacy, deploying operational DAC facilities at various scales worldwide, with more coming online soon. In parallel, demand from large-scale corporate and institutional offset buyers is rising, with companies like Microsoft and JPMorgan Chase increasingly looking to address historical and residual emissions with DAC forward offtake deals worth hundreds of millions of dollars. History is replete with examples of emerging technologies prematurely dismissed as feasibility constrained or economically nonviable, only to have what is unproven today become tomorrow's indispensable gold standard.

Maturity of engineered removal technology also being hastened by rising government policy support. The United Kingdom's £100m DAC competition is funding research and development to bend the cost curve, while their Net-Zero Strategy sets out specific targets for engineered removals through 2050. Belgium, Sweden, and the EU have set engineered removal targets. In the United States, the Infrastructure Investment and Jobs Act of 2021 authorized the U.S. Department of Energy to invest $3.5 billion to support four regional direct air capture (DAC) hubs over five years, while the Inflation Reduction Act of 2022 broadened the scope of existing tax credits in section 45Q of the Internal Revenue Code to include geologic storage of CO_2, either from the atmosphere via DAC or captured at point sources.

For these reasons, we favor – and respectfully urge the SB to embrace – inclusion of *both* nature-based and engineered removal pathways in Article 6.4. We note again the IPCC's finding that successfully hitting Paris Agreement temperature goals will require more than nature-based removals alone. But it certainly does not follow that every current or future technology-based solution must be compatible with the Mechanism. The SB's challenge is to announce criteria and deploy tools enabling the Parties to sort out low-quality techniques efficiently and effectively. To that end, THF-SIF stands ready to assist the UNFCCC in creating a library of digital/digitized engineering-based CDR methodologies on Hedera utilizing the Guardian. To our knowledge, there is no better way of enabling clear visibility into, transparent analysis of, and easy cross-comparison between methodologies' key attributes, from technological readiness, to contributions to sustainable development, to capacity to meet NDCs.

CONCLUSION

THF-SIF appreciates the effort by the UNFCCC and the SB to operationalize the Article 6.4 Mechanism in an equable, nature-positive manner that balances climate justice and sustainable development, especially in the Global South, against the worldwide imperative to meet the Paris Agreement's long-temperature goals and hold off the array of negative human impacts widely predicted to occur if we overshoot 2°C. There are no risk-free paths or solutions without tradeoffs.

Criticisms of nature-based removals as unsuitable for crediting under the Mechanism relate primarily to the inconvenient reality that forests and soils make poor long-term carbon sinks because permanence is naturally low and reversal risks are increasing as the climate worsens. Offsetting value and in turn credit pricing collapses in the face of reversals, with potential greenwashing liability if such erosion is not timely detected and disclosed. Yet, traditional analog MRV is ill equipped to guarantee integrity over a period of many decades to centuries.

Does it follow, as various stakeholders have argued, that nature-based removals should be disqualified as a class? No. Deploying DLT-enable dMRV incorporating automated, continuous data flows from remote sensors and satellite imagery, coupled with machine learning tools for error correction, AR/VR visualization and mapping advances, and various other fast-emerging digital infrastructure technologies for which applications are still being devised, will significantly mitigate the reversal challenge by extending in time the feasibility of high-quality monitoring. THF-SIF therefore urges the SB to require nature-based CDR methodologies to adopt it as a prerequisite for eligibility under the Mechanism. Admittedly, neither public ledgers nor dMRV cures the problem entirely, but that fact alone does not support excluding nature-based removals entirely – at least not unless we believe that the necessary reductions in fossil emissions will occur in the absence of a surge in climate finance and action, which the Mechanism is expected to trigger. And THF-SIF is aware of no evidence to warrant such optimism.

By contrast, the permanence benefits of engineered removal are largely uncontested. Instead, critics argue that engineered removal is technologically and economically unproven, while claiming, largely without any direct evidence or plausible theories of causation, that emerging techniques such as DAC have negative social and environmental consequences, or are incompatible with sustainable development or implementation in the Global South. Again, engineering-based CDR is admittedly still young, but that is hardly an argument to disqualify it from Mechanism eligibility unless the Parties already have the tools necessary to meet their NDCs and maintain a 1.5°C trajectory. They plainly do not. Moreover, sophisticated CDR market participants are improving technological and economical day-by-day, with development, demonstration, deployment, and commercialization activities well-underway at various stages around the world, and buy-side demand for future offtake agreements worth hundreds of millions of dollars and growing. THF-SIF would strongly oppose any move to ban engineered removal from Article 6.4 because that could recklessly chill innovation in a nascent but promising high-durability CDR pathway which the IPCC tells us will be critical to achieving long-term temperature control, mitigating residual and hard-abate emissions, and drawing down historic CO_2 overhead from the atmosphere.

The solution is to enable the full menu of policy options with an "all of the above," criteria-driven portfolio approach, and the key to its success will be a dramatic increase in access to a transparent, searchable public repository of high-quality digital Mechanism methodologies. These must be auditable and comparable against their next best alternatives, so project developers can effectively weigh the tradeoffs made by each methodology (all imply tradeoffs) and make fully informed, strategic choices between candidates based on scientific data and optimal project fit. Buyers, government regulators, the press, and general public will in turn better understand precisely what a

digital environmental asset traded under the Mechanism actually represents, down to the metric tonne.

Accordingly, the THF-SIF invites the SB to partner with us and the Hedera ecosystem to stand up a global library of climate methodologies under Article 6.4, amongst other Paris agreement mechanisms, and, in tandem, to engage with major registries in the VCM to digitize and ultimately improve and build upon their existing libraries. These are certainly not the only policy steps or innovative new technologies necessary to raising ambition and catalyzing action, but the urgency of our global climate crisis justifies expediency in embracing them.