Supervisory Body
United Nations Framework Convention on Climate Change (UNFCCC)
By Email: Supervisory-Body@unfccc.int
RE: Structured Public Consultation – Removal Activities

Dear Supervisory Body:

We at Cella Mineral Storage, Inc. would like to thank you for your continuing efforts to ensure that the UNFCCC considers carbon dioxide removal (CDR) as an essential component for a just energy transition to limit warming to 1.5 °C. Cella is a start-up that provides permanent carbon dioxide removal (CDR) services by means of carbon mineralization. We partner with carbon capture companies (e.g., direct air capture or "DAC") to remove carbon from the atmosphere and lock it away underground, generating negative emissions sold as carbon removal credits. Kenyan basalt has a vast carbon storage potential (Okoko and Olaka, 2021) uniquely co-located with large scale geothermal energy infrastructure, which combined can support a robust and expanding carbon removal industry. In this public consultation and comment period surrounding the mechanism, we would like to offer our unique perspective as a company working on carbon mineralization in Kenya to include a more comprehensive definition of CDR to be codified in Article 6.4.

In regards to our operations, Cella is a technology startup company that aims to develop mineral carbon storage in Kenyan basalts and scale the technology to mitigate the impacts of climate change. Our technology entails dissolving CO2 into water, injecting water-charged CO2 into basaltic rock, and enhancing natural geochemical reactions that dissolve the basalt and subsequently cause the precipitation of carbonate minerals for permanent storage underground (Oelkers et al., 2008, Gislason and Oelkers, 2014). Carbon storage in basalt offers secure, long-term CO2 storage due to the potential for mineralization. This method involves in-situ injections of carbon into basaltic formations, where carbon is sequestered in mineral form through geochemical reactions (Oelkers et al., 2008, Gislason and Oelkers, 2014). This process simply accelerates nature's long-term carbon cycle, where dissolved carbon (e.g., carbonic acid) chemically weathers silicate minerals hosted in volcanic rocks. Engineered mineralization of carbon in basalt has been proven to be a safe and permanent storage option for carbon dioxide. Mineral storage is entirely permanent and durable, with storage persisting for millions of years.

In addition to scaling up our novel carbon mineralization technology, Kenya boasts a wealth of opportunity for facilitating two of our key partnerships: geothermal energy and DAC.

One of the main co-benefits of deploying this technology in the East African Rift Valley is the potential to partner with pre-existing infrastructure. Kenya's vast geothermal energy potential can be attributed to The Rift Valley's volcanic activity, high temperature gradients, abundant geothermal resources, and governmental facilitation of geothermal energy expansion and integration. With large public and private sector funding encouraging geothermal energy development in the region, it is crucial for us to partner with geothermal for low-carbon energy sources for operations and materials input, as mentioned above.

Additionally, DAC is often criticized for its high energy intensity with estimations placing energy demand at 2-3MW/h per ton of CO2 captured constituting a large percentage of the cost of carbon removal via DAC. Moreover, the partnership between Cella and DAC companies, like Octavia Carbon in Nairobi, gives them an option for permanent and secure storage of their captured carbon–increasing the efficiency and scale of carbon removal and storage in the global South. DAC technology aligns with several Sustainable Development Goals (SDGs), including SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action). By utilizing geothermal and renewable energy sources for DAC and carbon mineralization operations, countries like Kenya can promote clean energy access and reduce carbon emissions, thus contributing to their sustainable development targets.

Finally, the last facet we want to emphasize to the SB is the importance of codifying Monitoring, Reporting, and Verification (MRV) into Article 6.4. MRV aims to develop the standards to quantify the impact of the different solutions that exist to mitigate climate change and remove atmospheric CO2. Regarding our approach to MRV, we will track the movement of CO2 gas in the soil by comparing it to the measurements taken at the site since 1993. We will follow the procedure described by Fridriksson et al. (2006), measuring once a month in the first year and then once a year. In areas with high temperatures in monitoring wells, we will use the geothermal sampling and analysis method explained by Arnorsson et al. (2006) and Clark et al. (2020). To assess how easily fluids can flow, we will measure the outflow rate of the monitoring fluid over time, making sure there are no changes in the permeability of the ground (Gunnarsson et al., 2018). We will collect samples of the monitoring fluid every two weeks in the first year, every two months for the following five years, and twice a year for the rest of the well's lifetime. These samples will be analyzed using the methods outlined in Snæbjörnsdóttir et al. (2017) and Nelson et al. (2022).

To ensure the long-term effectiveness of carbon dioxide removal (CDR), we will assess its durability by examining mineralization. In the pilot and Phase 1 of this DAC project, we will inject reactive and unreactive tracers as described in Matter et al. (2016). By comparing mass balance calculations with measured data, we will determine the amount of CO2 that has been mineralized. Ongoing monitoring of the fluid's chemical properties will be conducted to ensure

continuous mineralization. Additionally, we will analyze samples using our specialized monitoring technique to ensure the highest quality verification of mineralization.

We are extremely grateful for the opportunity to offer our work to contribute to the structured public consultation around the Article 6.4 Mechanism. We trust that our response can be of use to the SB as it moves forward with deliberating on this very significant topic.

Sincerely,

Nicklaus K. Smith
Policy and Public Engagement Intern
Cella Mineral Storage, Inc.

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