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To: Supervisory Body
United Nations Framework Convention on Climate Change (UNFCCC)
Via email: Supervisory-Body@unfccc.int

Subject: Removal Activities under the Article 6.4 mechanism

Dear Supervisory Body:

These comments are submitted on behalf of Charm Industrial, Inc. (“Charm Industrial” or “Charm”). [Charm Industrial](#) is an innovative carbon sequestration company working to return the atmosphere to pre-Industrial Revolution CO₂ levels of 280 ppm. The company is composed of mechanical, electrical, and fabrication engineers who are focused on identifying the most innovative and impactful carbon reduction technologies. Charm greatly appreciates the opportunity to provide input to the Supervisory Body regarding SB005 2022 Annotated Agenda and Related Annexes, and specifically, the Information Note entitled “Removal activities under the Article 6.4 mechanism” ([A6.4-SB005-AA-A09 version 0.40](#)).

Charm Industrial is the world’s leading developer of bio-oil sequestration, having [announced delivery of over 6,000 tons CO₂e](#) removal since January 2021. As stated by Frontier in their recent announcement of a [112,000 ton offtake agreement with Charm](#), “Charm Industrial was one of the first companies to successfully remove carbon from the atmosphere permanently and today leads the market, having delivered 6,160 tons to date via pilot processes.”

Bio-oil sequestration strategies, such as Charm Industrial’s, convert biomass residues into carbon-rich bio-oil. The residue biomass, such as highly combustible forest residue and

agricultural residues, would have otherwise been left to burn or rot, releasing greenhouse gases into the atmosphere. The methodology follows four general steps: 1) produce bio-oil through fast pyrolysis of waste biomass, 2) transport the bio-oil to an injection well, 3) prepare the bio-oil for injection, and 4) inject the bio-oil into geological formations. This process performs well from a permanence standpoint because bio-oil is denser than brine and sinks within the containing formation, quickly hardening into a semi-solid material.

The bio-oil sequestration pathway includes both elements of “engineering-based” and “land-based” activities; distinctions used within the Information Note that Charm strongly urges the Supervisory body to reconsider. Charm’s approach, like many other carbon removal approaches, is a hybrid of nature and engineering, and in Charm’s case, delivers carbon removals in a safe, permanent, and scalable manner.

Furthermore, to the extent that bio-oil sequestration is an “engineering-based” system, we would ask the Supervisory committee to reconsider the blanket statement that “*Engineering-based removal activities are technologically and economically unproven, especially at scale, and pose unknown environmental and social risks.*” Nan Ransohoff, Head of Frontier, stated in the recent Frontier announcement regarding Charm that, “Charm Industrial has gone from concept to permanently removing thousands of tons of CO₂. They’ve charted a feasible path to high-volume, low-cost carbon removal, and set the bar for executing with speed and rigor.” As the market leader in permanent carbon removals, Charm has successfully proven the technology and economics of bio-oil sequestration, and done so in partnership with local farming communities and environmental regulators.

This process also leads to a number of economic and social co-benefits not recognized in the current Information Note, including economic benefits, wildfire resilience, and improved air quality.

- **Economic benefits:** Bio-oil sequestration produces local jobs, including collecting biomass residues (such as forestry residue), operating the pyrolyzers, and injecting the bio-oil.
- **Wildfire resilience:** Forestry residue is a potential biomass input that can be converted to bio-oil. Collecting this forestry residue brings a dual benefit of removing excess biomass that otherwise would have rotted and released greenhouse gas emissions while also removing flammable material that can accelerate the spread of wildfires.
- **Improved local air quality:** Bio-oil sequestration offers an alternative and cleaner disposal option for excess biomass than traditional methods. Pyrolysis, including Charm’s innovative approach, converts waste biomass into carbon intensive bio-oil that is safely and permanently stored underground. The agricultural waste and highly combustible forest residue used in the pyrolysis process would otherwise be burned - intentionally or due to forest fires - creating significant local air pollution.

We concur with the IPCC that while emissions reductions are the priority, carbon dioxide removal, such as the bio-oil sequestration conducted by Charm, along with a prioritization on emissions reductions, is now critical to achieving global greenhouse gas reduction goals. Given Charm's experience delivering permanent removals in a safe, scalable, economic manner, we look forward to seeing the full potential of these technologies reflected in future Information Notes. Thank you for your thoughtful consideration of these comments.

Sincerely,

Peter Reinhardt
CEO, Charm Industrial