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Very Long-Term Sequestration of Solid-Phase Carbon: Geoengineering Facilities for Biochar Storage

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Biochar is a breakthrough technology allowing for efficient and cheap sequestration of atmospheric carbon in the solid phase. In comparison to gas-phase storage of sequestrated carbon, biochar storage offers the additional advantages of world distributed production, and cheap, efficient, and stable transport and storage. Large storage built-facilitates could be designed for geologic, marine or surface sites and would represent a geoengineering application with a low level of geointervention.

However, the major menace to the stability of biochar in the very long term (ie, millennia) is smouldering fire. Biochar, as all carbon-rich solids, is known to be a reactive material and prone to self-heating. Self-heating is the natural process of spontaneous oxidation reactions taking place at ambient temperature. Initially small amounts of heat are released and accumulate during longer times and the process self-accelerates, leading to a smouldering fire without external intervention. This would lead to the accidental release to the atmosphere of the sequestrated carbon.

The methods for designing stable very-long-term storage facilities use technological concepts borrowed from infrastructure protection such as size limits, compartmentation, sealing, inertation, cooling and wetting. This talk presents the science and technology to understand the problem and allowing for the design of economic and efficient facilities to store sequestrated carbon in large volumes for very long times.