

Carbon Dioxide Sequestration Using Wood and Its Long-Term Storage

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Under the conditions of global climate change, natural and low-energy methods for removing atmospheric carbon dioxide (CO₂) are gaining special importance. One promising approach is the so-called Wood Vault concept, which involves afforestation, harvesting of trees, and long-term anaerobic storage of the biomass.

The primary results of the study are presented, including the assessment of the CO₂ sequestration potential of common temperate-zone wood species (oak, pine, beech, fir). It is demonstrated that one mature oak tree can sequester approximately 724 kg of CO₂. The potential of this approach is analyzed for Georgian conditions, with a case study based on the Borjomi-Kharagauli National Park, which offers favorable climatic, ecological, and administrative parameters for implementing such pilot projects.

Several engineering design options for Wood Vaults are proposed, including underground and above-ground structures, which enable the creation of anaerobic conditions, control of moisture, and prevention of biodegradation.

The paper also explores the legal and international context for integrating this method (e.g., NDC, ISO 14064, VERRA), and briefly reviews the prospects for community involvement and the use of carbon credits.

The Wood Vault method represents a competitive and environmentally beneficial alternative mechanism for long-term CO₂ sequestration. It complements technological strategies and plays a meaningful role in the global effort to combat climate change.

References

1. (IPCC), I. P. *Good Practice Guidance for Land Use, Land-Use Change and Forestry, Chapter 3, Annex 3A.1, Table 3A.1.6.* (2003) IGES.
2. *IPCC Guidelines for National Greenhouse Gas Inventories: Volume 4 - Agriculture, Forestry and Other Land Use.* (n.d.). (2006) Retrieved from <https://www.ipcc.ch/report/2006-ipcc-guidelines-for-national-greenhouse-gas-inventories>
3. Batsatsashvili, K. M. *Pinus kochiana Klotzsch ex K. Koch Pinaceae. Ethnobotany of the Caucasus. European ethnobotany. Cham. Switzerland: Springer,* (2017) 491-8.
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