

Biochar – potential to enhance carbon dioxide removal and gain financial benefit at carbon markets?

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The systemic transition towards circular economy can be enhanced by the utilization of agricultural and forest side streams as a raw material for biochar. Biochar provides an opportunity to increase carbon neutrality by binding carbon dioxide as carbon back to ground. Ravindiran *et al.*¹ presents in their article, “Production and modifications of biochar to engineered materials and its application for environmental sustainability: a review”, biochar’s multiple utilization opportunities *e.g.* as a soil enrichment, wastewater treatment, biogas production, construction industry, as well as an additive in composting. On the other hand, the main recognized challenges are about feedstock selection and availability, biochar production inconsistency, and technological barriers. The financial barriers are considered to be one of the biggest barriers for the commercial production of biochar. To enhance the financial balance of the production and utilization of biochar, the question of biochar as part of carbon dioxide (CO₂) removal in carbon markets has emerged.¹⁻² The Finnish R&D project, “Versatile uses of Carbon – Local production in the green transition – The era of biochar”³, studies the biochar value chain. Alongside with already mentioned barriers, to enhance the economical balance of production and lowering the biochar price for customers requires also the development of carbon dioxide removal crediting methodologies.

Introduction

Carbon (dioxide) removal (CRD) is one the key themes in national and corporate climate policy to achieve the Paris Agreement’s climate targets. The EU Commission is preparing the first EU-wide voluntary framework for the certification of high-quality carbon removals to boost innovative carbon removal technologies and carbon farming. Certification rules are set for the carbon farming, industrial carbon removals, as well as binding carbon in long-lasting products and materials (such as wood-based construction materials or biochar) (Fig.1).⁴

In the core of the agreed criteria is to ensure the correct removal of carbon and the basis of the removals is set on quantification, additionality, long-term period of storage (min. of 35 years), innovate new practices, as well as contribution to broader sustainability goals. The aim of the next four years is to establish EU registry to ensure the transparency about certified carbon removals.⁴

Voluntary Certification and Removal Platforms

The voluntary certification requires the EU level framework for the certification methodology.⁴ At the moment, there already exist certified CO₂ removal platforms such as the Puro.earth⁷ and Carbonfuture⁸. These kind of private or public certification schemes or markets needs the recognition by the Commission after the certification process is defined and Commission has issued the independent certification bodies. Estimations agree that from the 2028 forward there will be Union-wide CRCF registry.⁴

Fig 2. illustrates the basics of environmental safeguards and net negative emissions guarantee in carbon markets according to Puro.earth⁹. Puro.earth has developed a methodology for the CO₂ removal quantification for biochar over the time horizon of 100 years, which describes the requirements for the biochar production as well as the stability for it.¹⁰

Conclusions

As a conclusion, biochar has broad variety of potential to enhance utilisation of biobased side streams. Although, there lies technical and financial challenges to be overcome and therefore the need for the European Union-wide CRCF registry is urgent. The framework supports the development of certification rules and how the public and private voluntary removal platforms and carbon markets will be taken into account in the registry.

There lies potential to gain financial benefits from the carbon markets to cover the expenses of biochar production as the EU-level framework for the certification methodology and regulation is completed. On the other, the whole process in the context of CO₂ removal markets requires more research and applied study cases to gain better understanding about the whole system of biochar production and how to evaluate its sustainability.

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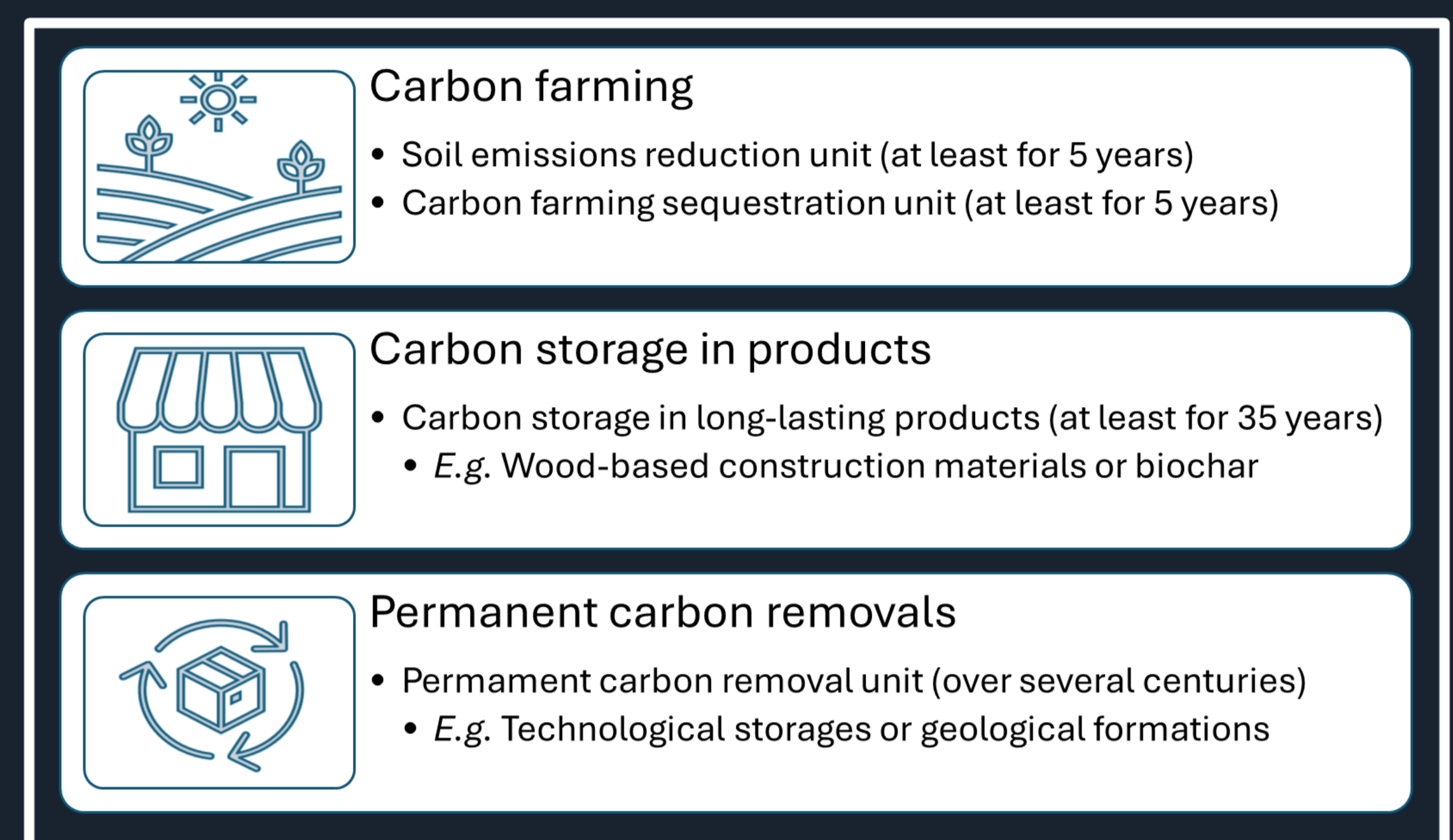


Figure 1. The carbon removal activities and the scopes of certification according to Article 1 and of CRCF Regulation. (Modification based on Holzleitner, 2023⁵ and European Commission, 2024⁶.)

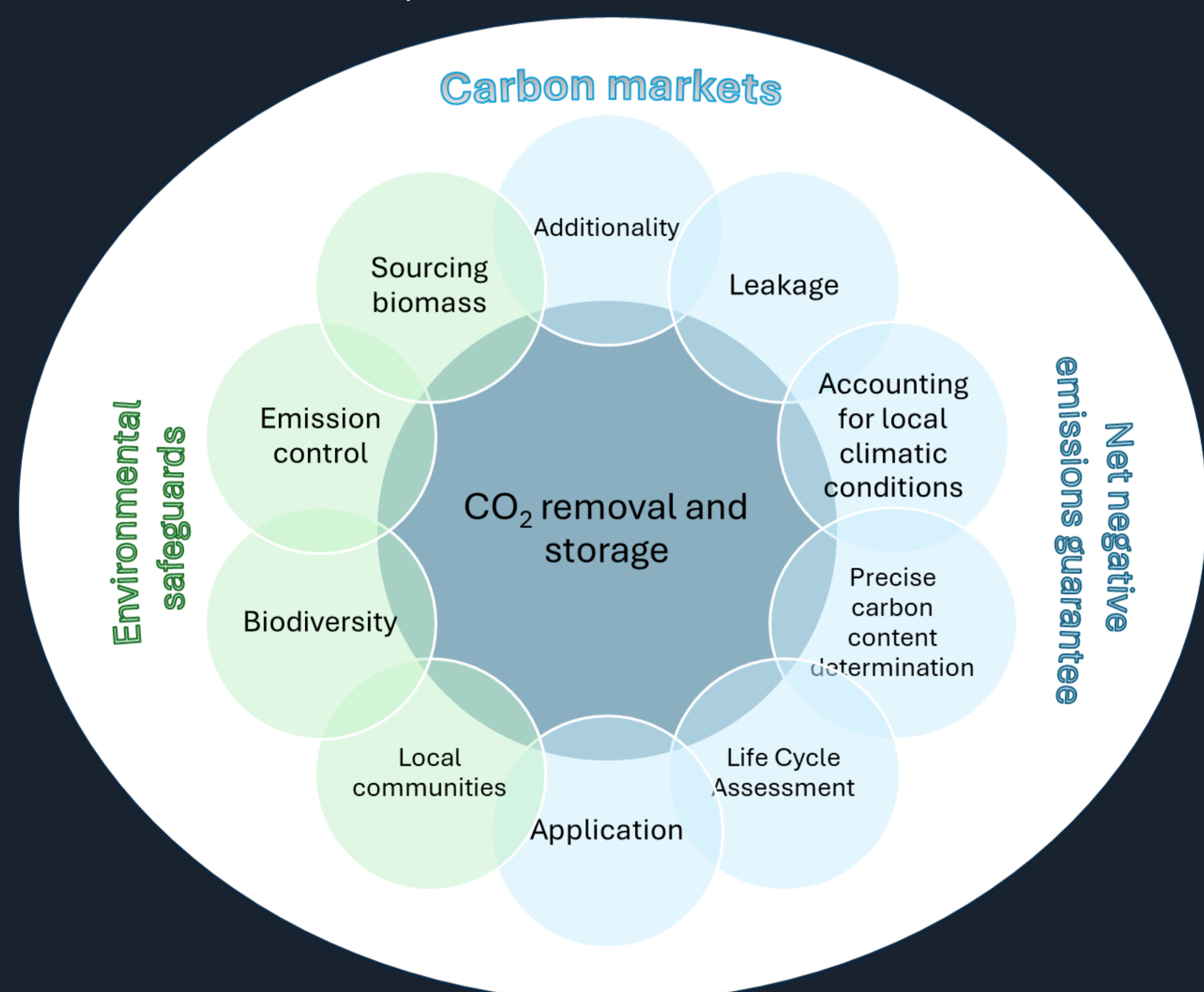


Figure 2. The CO₂ removal and storage: environmental safeguards and net negative emissions guarantee according to Puro.earth. (Modification based on Puro.earth, n.d.⁹.)

