

**Session Biosphere: April 11th 15.45 hrs**

**1S1b Models and tools for estimating circularity of alternative food and agricultural systems**

## **Negative Green House Gas (GHG) Emissions and long-time sequestration through the development of C-based products.**

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The transition towards a bio-based economy and sustainable development offers high perspectives for biomass utilization. Terrestrial and marine ecosystems provide us these resources. Additionally, the development of long-term carbon storage carbon in bio-products and substitution of fossil-based products could contribute to the reduction of atmospheric GHGs, supporting climate change mitigation. However, there is still a lack of integrated knowledge about the potential reduction of GHG emissions and the potential scale of the applications, as well as their environmental, social and economic effects.

The objectives of this project are:

- Provide insight on the potential of different bio-based products and their biomass flows to capture and store carbon through the use/substitution by bio-based materials.
- Develop a framework to evaluate three different products to be use in a European housing system. 1) Structural wood for construction products, 2) Miscanthus for use in insulation panels, 3) CaCO<sub>3</sub> aggregates from marine bivalve shells.

As results we have reviewed different in-house models to facilitate the understanding of carbon accounting dynamics during biomass growth and biomass availability in Europe.

-Carbon balance model (CO<sub>2</sub>FIX) forestry

-European Forest Information SCENario Model (EFISCEN)

-Generic model LINPAC (LINTul model for Perennial and Annual Crops)

-Dynamic Energy Budget (DEB) model Blue mussels

Additionally, the dynamic LCIA approach of Levasseur et al (2010) will also be used to visualize and quantify the temporal dynamics of GHG emissions and storage.

All these accounting strands will be brought together in an overarching framework, which is being developed to evaluate temporal components of carbon accounting and to support the understanding of such biobased systems. It will also help to answer relevant questions regarding the reduction of GHG emissions through the development of these long-term storage products.

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*Keywords: GHG reduction, bio-based products, temporal carbon storage, accounting tools*