Climate Benefits of Long-Lasting Wood Products in Construction Applications

Ilkka Leinonen
Natural Resources Institute Finland (Luke)

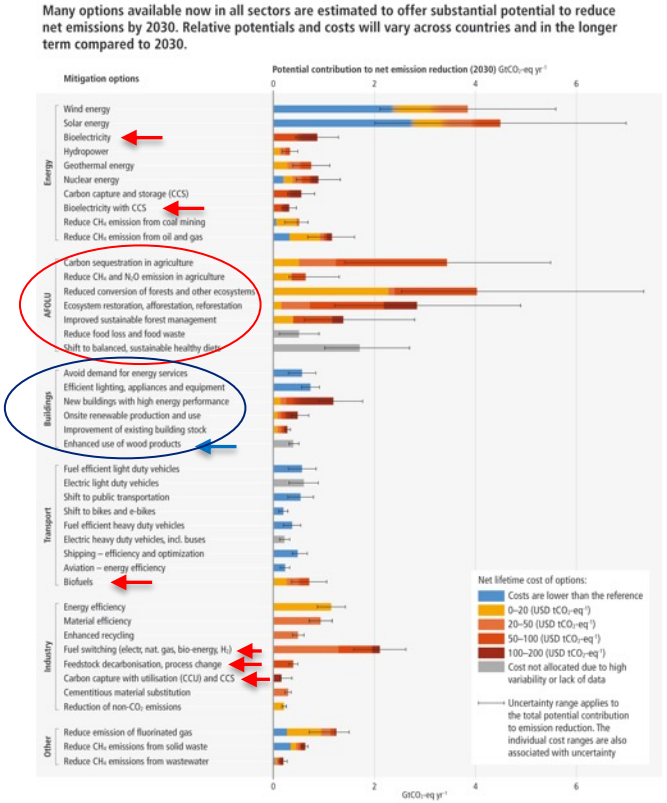
Outline

1) The role of wood construction **as part of climate solution**
    - Options to mitigate climate change
    - “Natural” and technological carbon sinks
    - Wood products as carbon sink
2) Quantifying the climate benefits of wood products
    - Principles of Life Cycle Assessment (LCA)
    - LCA results: fossil and wood-based construction materials

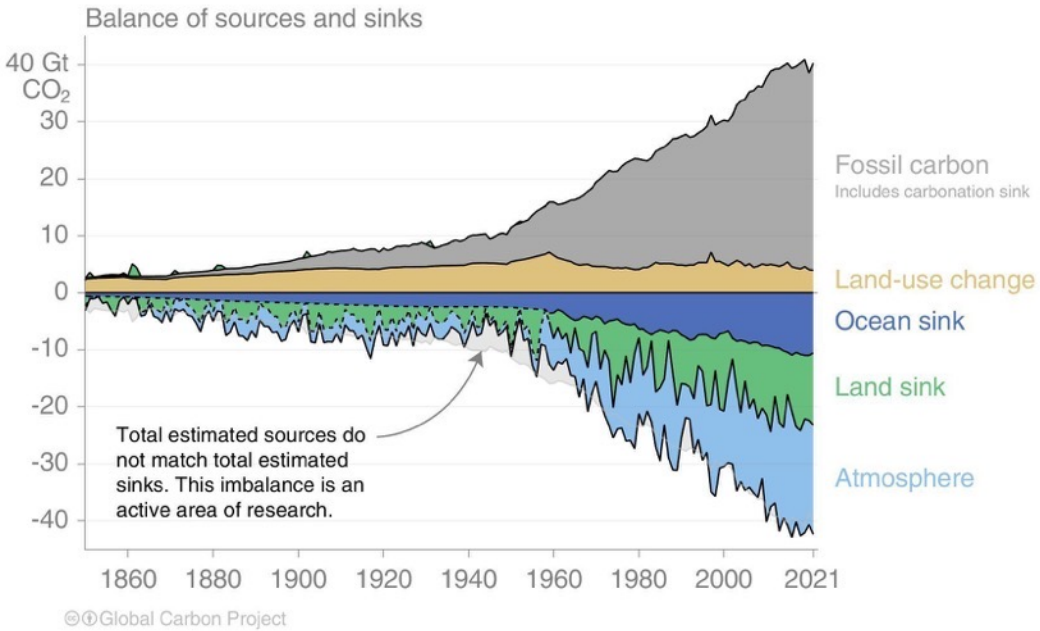
Biobased solutions in mitigating climate change (IPCC AR6 Synthesis Report 2023)

Important role:

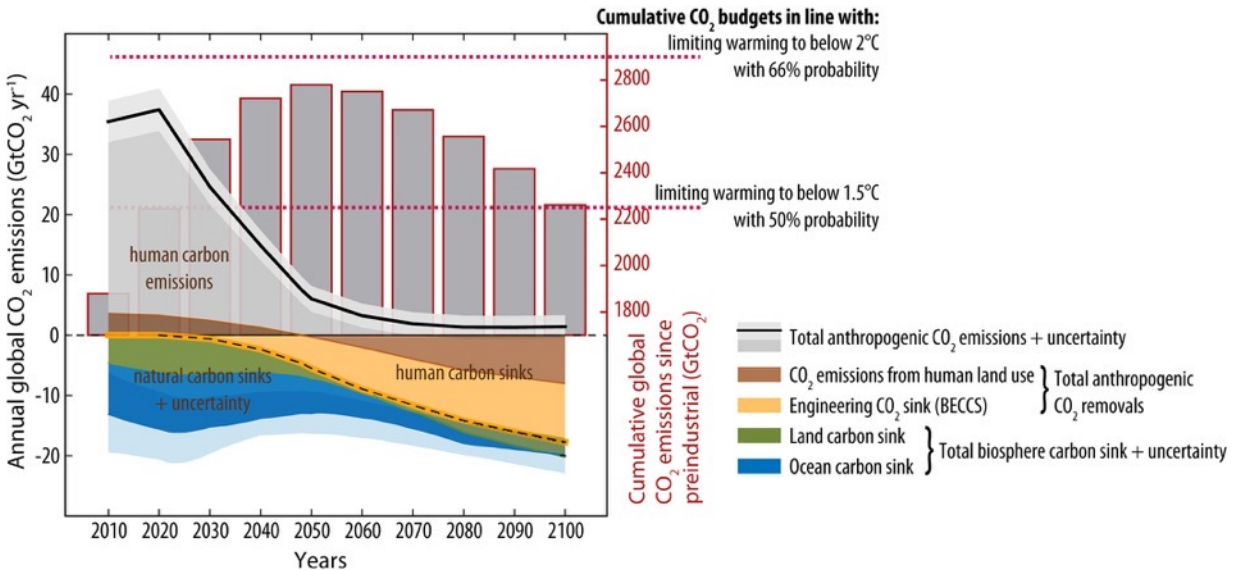
- wood products
- biofuels, bioelectricity + BECCS
- afforestation and sustainable forest managemet



The short history of “natural carbon sinks”

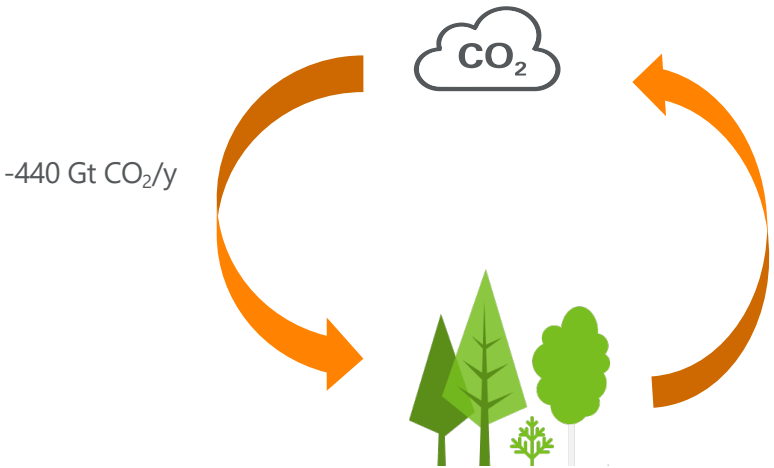


Zero carbon global roadmap: the role of technological carbon sinks



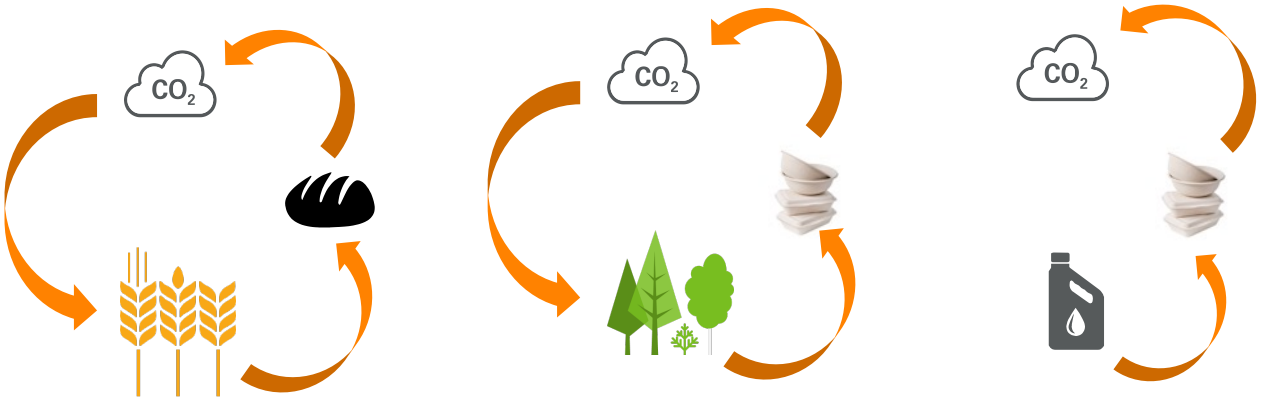
Rockström et al. 2016. Earth's Future 4: 465-470

The key process in mitigating climate change: the biogenic carbon cycle

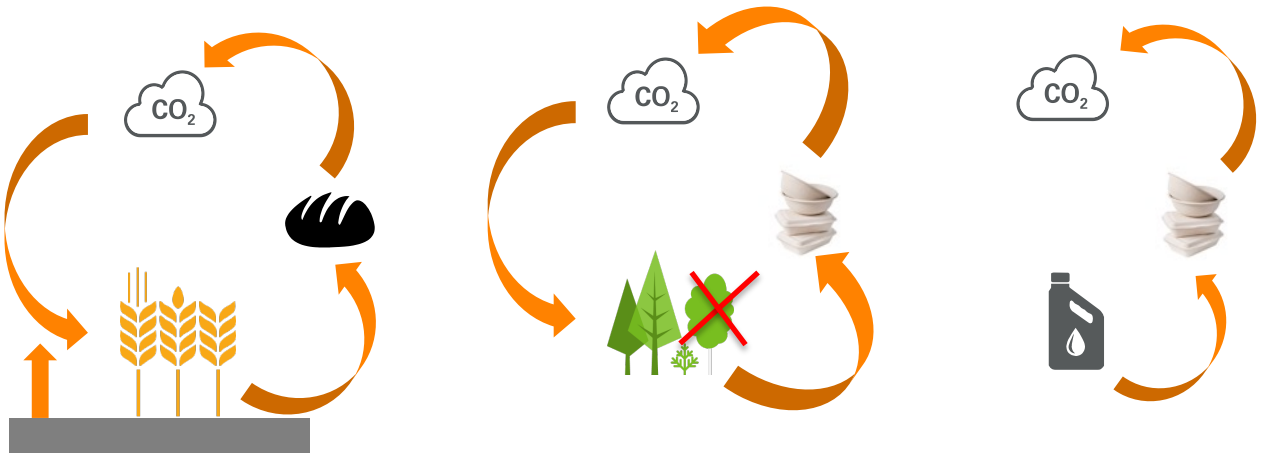


(Fossil emissions 34 Gt CO_2/y)

Carbon cycle and biobased products: carbon neutrality



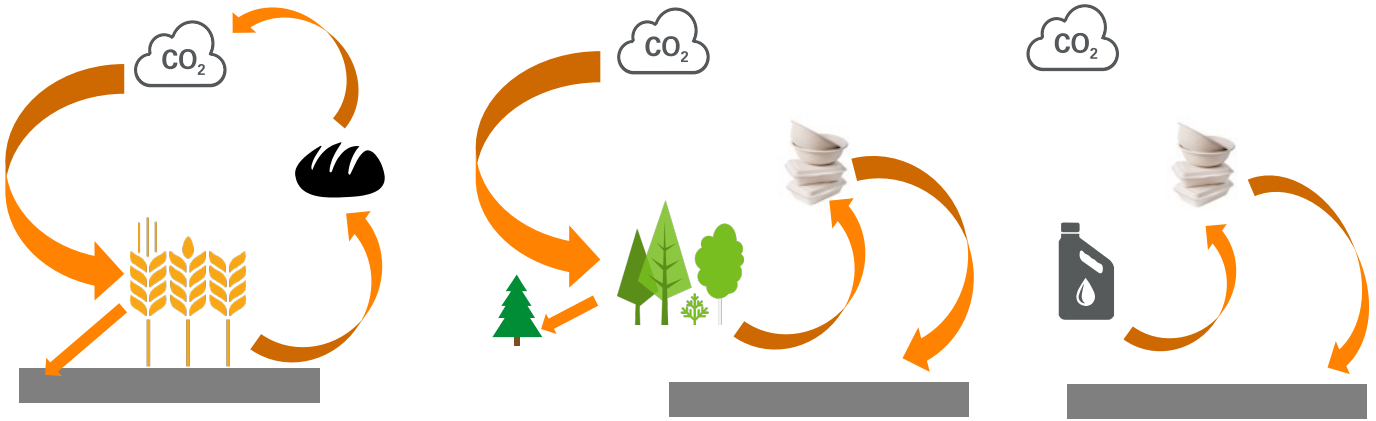
Losses of carbon stocks: LULUC emissions



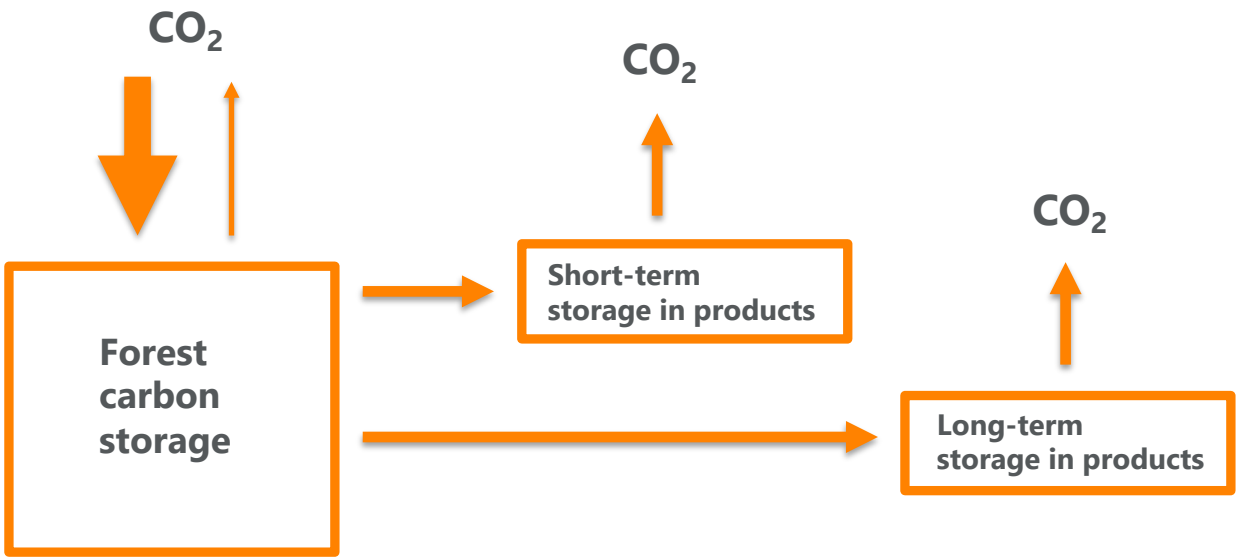
Removing carbon from the global cycle: soil and biomass carbon sinks

Leinonen 2022. The International Journal of Life Cycle Assessment 27, 1038–1043

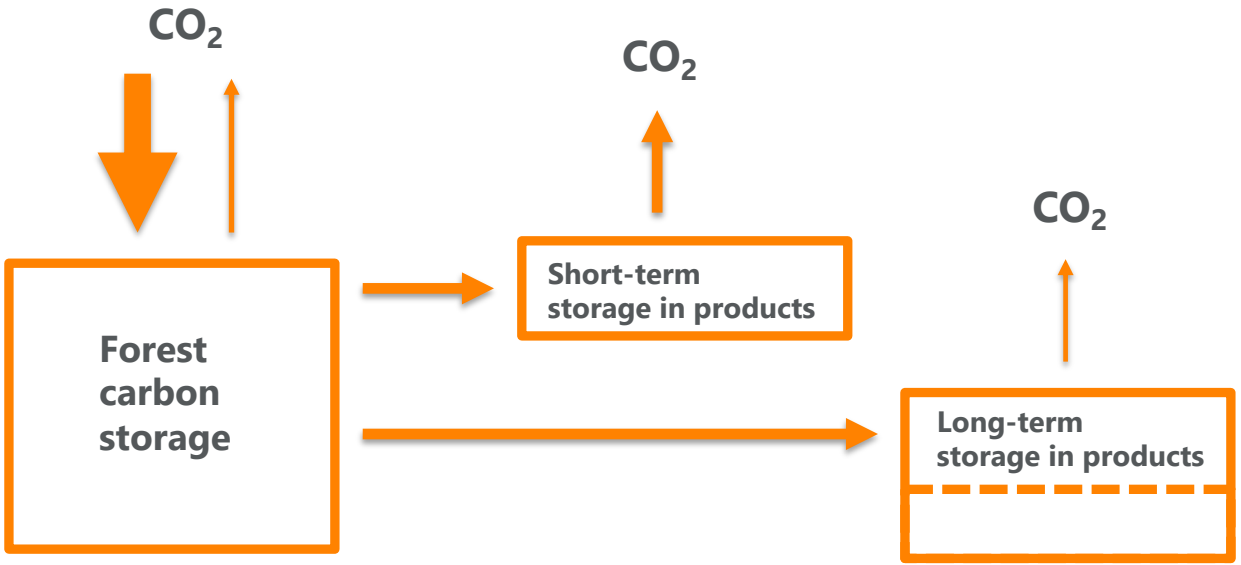
Removing carbon from the global cycle: technological carbon sinks



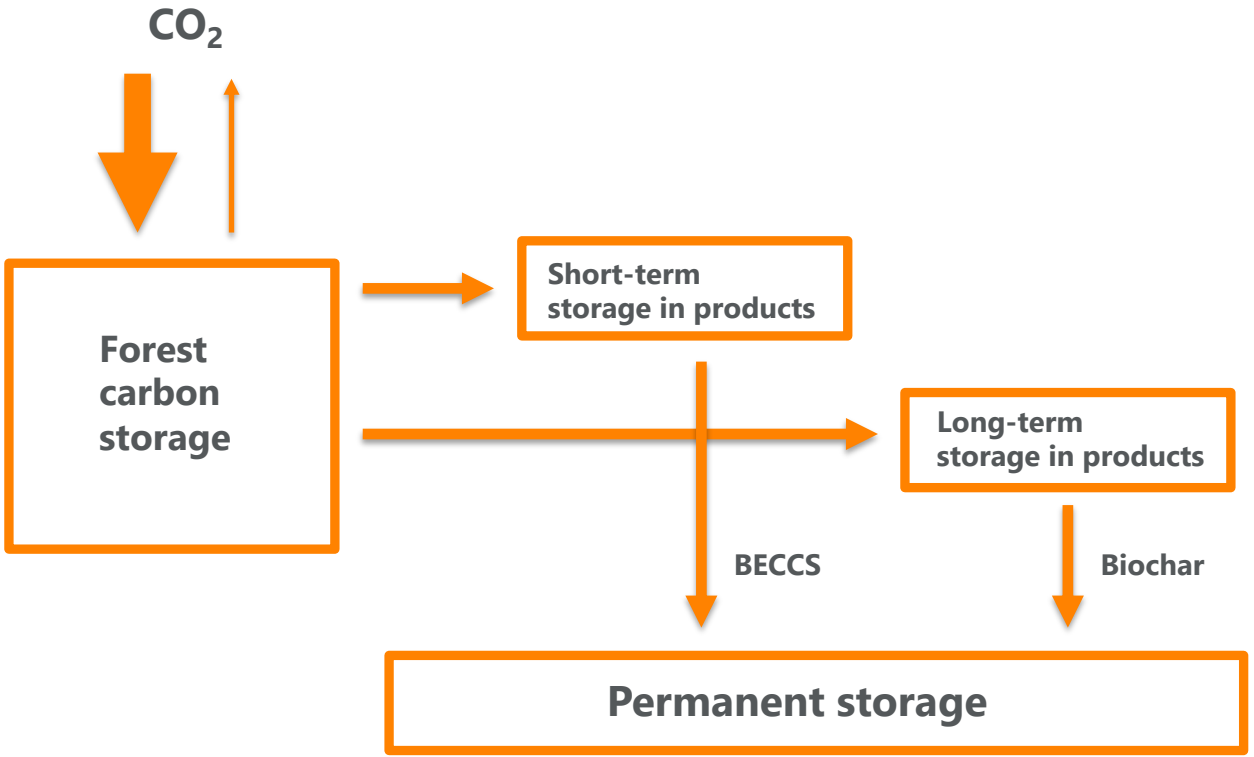
Carbon flows in product chains: carbon neutrality



Carbon flows in product chains: carbon negativity with product carbon sink



Carbon flows in product chains: carbon negativity with permanent carbon storage

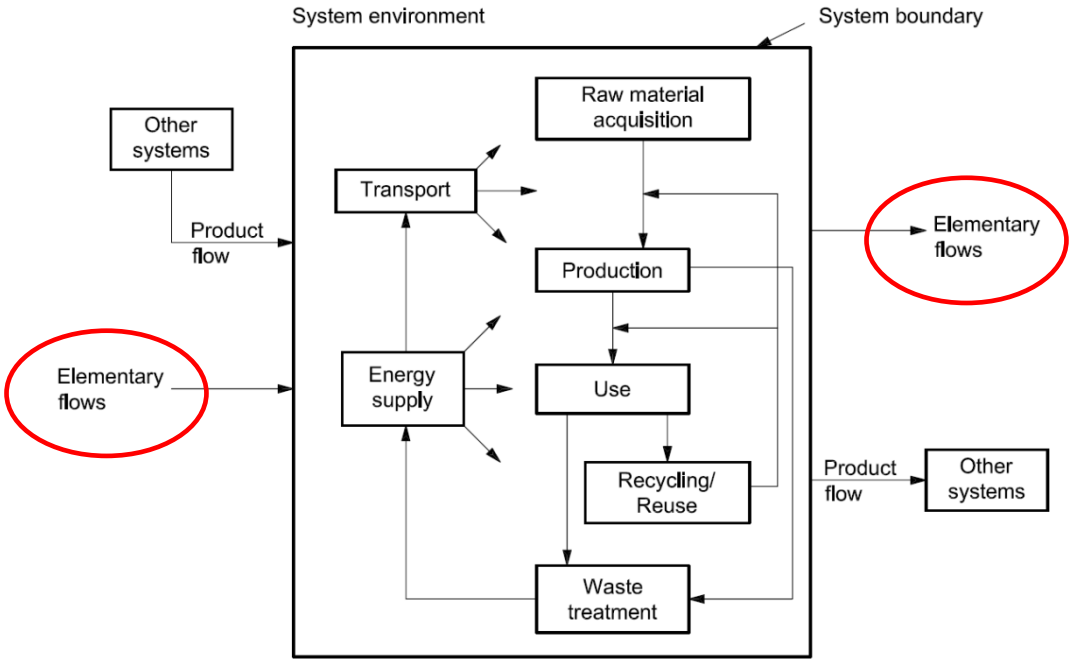


The role of LCA

- Life Cycle Assessment (LCA) is a methodological framework that brings the global environmental impacts and their mitigation to the level of single products, services, or other specified human activities

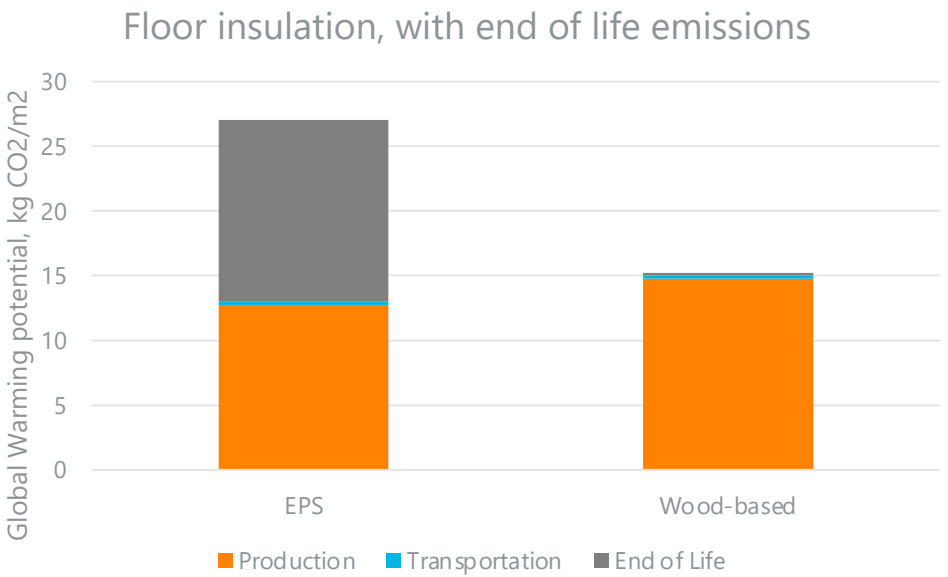
- The “Life Cycle Thinking” is necessary also in assessing the opportunities for mitigation at global, national, regional, organizational etc. levels and in policy actions
    - Aiming to holistic sustainability
    - Avoiding partial optimization

The principles of the Life Cycle Assessment (LCA) framework



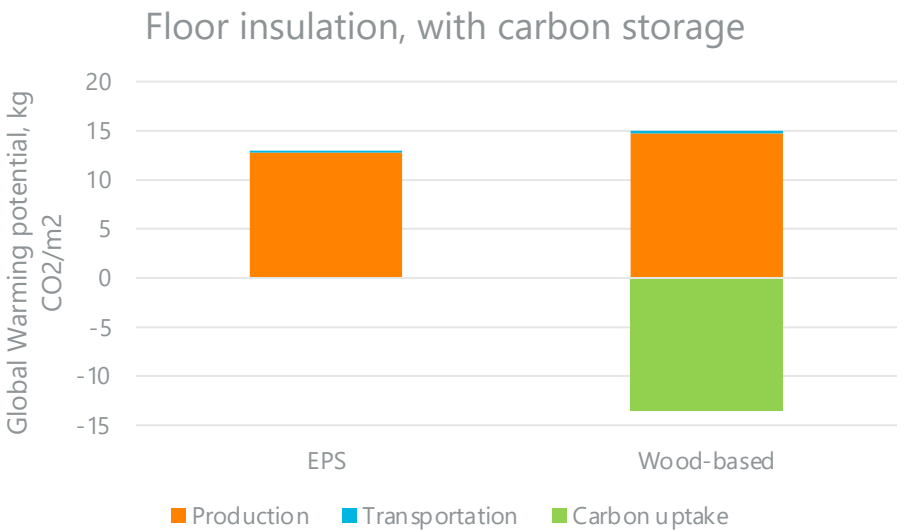
ISO 14040: Environmental management — Life cycle assessment — Principles and framework

Climate effect of insulation materials



Source: Perinteistä muovia korvaavat materiaalit ja ratkaisut, Final report, Luke+VTT

Climate effect of insulation materials



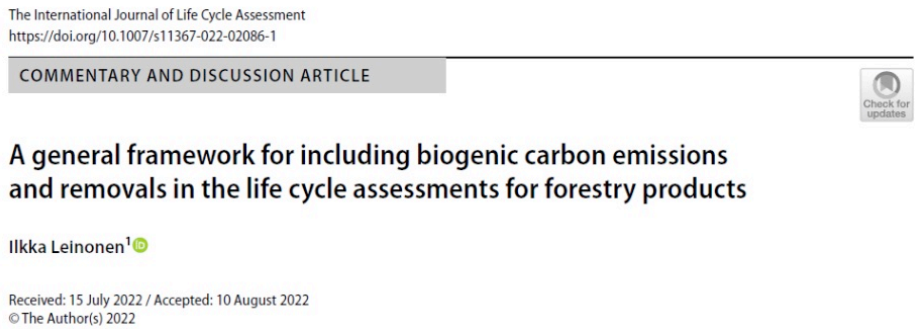
Source: Perinteistä muovia korvaavat materiaalit ja ratkaisut, Final report, Luke+VTT

Further information

Ilkka Leinonen
ilkka.leinonen@luke.fi

"Developing LCA methods for assessing the environmental benefits of biobased products, raw materials and side streams" (Bio-LCA)

https://www.luke.fi/en/projects/biolca


The International Journal of Life Cycle Assessment
https://doi.org/10.1007/s11367-022-02086-1

COMMENTARY AND DISCUSSION ARTICLE

Check for updates

A general framework for including biogenic carbon emissions and removals in the life cycle assessments for forestry products

Ilkka Leinonen[1]

Received: 15 July 2022 / Accepted: 10 August 2022