Executive Summary

Transformative Bioeconomies: The Building Sector

Introduction

Wageningen University and Research (WUR) invests in the theme of Transformative Bioeconomies to support technological and institutional development advancing the phase-in of sustainable renewable materials and the phase-out of fossil feedstock. The first step for the investment theme "Transformative Bioeconomies" is to make a baseline system analysis of the building sector, including an inventory of existing innovation initiatives that require (and are open to) further study and support. This baseline analysis aims to map out the transition of achieving large-scale usage of building materials made of renewable carbon and the phasing out of unsustainable building materials (e.g. concrete) in the Netherlands. This baseline analysis will be used to select cases and initiatives WUR can further study and support in the project's next phase.

There are four technological pathways towards renewable carbon-based materials available: (1) dematerialisation, (2) biobased building materials starting from biomass, (3) applying CO2 capture and utilisation technologies, and (4) recycling discarded carbon-based materials. The second pathway, starting from biomass, is the most relevant for WUR to strengthen its position. Furthermore, the project team focused on Civil and commercial construction ('burgerlijke- en utiliteitsbouw' or B&U). Within the construction sector, we exclude the interior of buildings to focus on several more persistent parts of buildings, namely structures, panels and insulation. Otherwise, the number of topics to be covered would make it way too wide-ranging, apart from the shortage of time.

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Status quo: position WUR

The recognition of WUR in the building business is low, except for the research on processing (WFBR). In contrast, the wood and agricultural sector is well known with the expertise of WUR regarding biomass production, forest management and economics. In the landscape of knowledge institutes working on circular building economy, WUR has a strong position in expertise on technical, sustainability, socio-economic and spatial aspects of biomass production and processing.

"Building in a way that is economically responsible and contributes to the well-being of people and animals. Everywhere, anytime." (Transitie agenda circulaire bouweconomie, 2018, p. 10)

1 Alignment

Roadmap development - It is essential to align further steps with the most significant objectives and activities of the Transition Team Circular Building Economy.

Interesting initiatives – Most of the initiatives in the building materials made of renewable carbon are well developed and (nearly) ready for market uptake. The challenge we face is the uptake, further development and upscaling in the market. Eye-catching initiatives are: (I) several initiatives to realise (prefab) wooden buildings and neighbourhoods, (ii) the project of ZLTO and Miscantell, (iii) initiatives on fibres-based insulation materials; and (iv) the initiative Building Balance.

Environmental Performance Indicators - LCA data are lacking and the LCA methodology is not standardised enough to make comparisons. We must align with MPG and include carbon capture to stimulate the use of biomass for the building industry.

2 Implementation

Acceptance – Technically, much is possible in producing and processing biomass/crops, but even though public policies are ambitious, acceptance in society and markets is often low.

Collaboration - Collaborations are needed to overcome ignorance concerning needs, supply chains, competencies and interests. The high demand for new houses and renovation and the challenging ambitions of lowering nitrogen and CO2 emissions create momentum. Still, solid traditions and split networks hinder the realization of aspirations.

Procurements - Public procurements must be advanced to include more daring trials involving new and recycled materials, forcing incumbents to renew at a strategic level.

Nature inclusivity - Building materials based on biomass may be considered in a broader perspective of circularity and nature-inclusive building (materials, planning, and development).

3 WUR Contribution

Production methods - Further development of biomass production in different settings of farmers, including product choice, processing and application.

Business models - Further development of (new) business models for farmers, and processors, including the valuation of Carbon, Nitrogen, and landscape services.

Material production - Further development of plants and biobased materials for high-value products and recycling of biobased products

Sector transition - Support developing biomass valorisation, spatial planning, advancing feasible value chains and promoting acceptance and attractiveness in industries and society.

Broader perspective – Biobased building materials must be considered from the wide perspective of circularity and nature-inclusive building (material and development).

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