Addressing bioeconomy policy challenges: the need for more systemic integrated assessment tools

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Abstract

In the European Commission, bioeconomy policy intersects with a range of policy areas and relates to many different sustainability objectives. Significant trade-offs, related to significant challenges and opportunities, exist. Conventional models and tools often fail to span the option space considered by decision-makers, or to allow capturing of the full spectrum of relevant concerns. This presentation explores from a policymaking perspective the limitations of typical scientific inputs and discusses the need for novel tools better suited to handling the complexity and interconnectedness inherent to the bioeconomy. The presentation sets the stage for the introduction of new approaches and relates to the European Commission's Integrated Bioeconomy Land Use Assessment project(1).
Current practices managing or using biomass are often criticized for perpetuating unsustainable land and biomass use, a reality which highlights the urgent need for new approaches. Alternative practices for supplying, processing, and using biomass have been developed, and more will need to be developed, however they haven't yet been able to reconcile conflicting objectives and deliver the societal and environmental outcomes desired by many. There is a growing need to explore increasingly divergent, alternative pathways, and to understand how to respond to multiple interconnected challenges for the benefit of all. In this context, bioeconomy is seen as both a means and an end for systemic transformation.

Scientific tools are required to support policy making and provide insights on 'better' and 'worse' pathways in relation to agreed (e.g., in the European Green Deal) or individual preferences. However, such support will be exceedingly difficult to realize under a simple continuation of siloed inputs from conventional scientific efforts. A few of the reasons **conventional efforts fall short** include (1) they **tend to have a limited scope**, focusing on limited set of environmental, economic or social outcomes, and-more importantly-a limited set of (policy) drivers, making it difficult to explore the full range of possible bioeconomy futures and neglecting other relevant dimensions of sustainability, (2) they **tend to not adequately assess the impacts of system reconfigurations** on the range of stakeholders, failing further to integrate consideration of diverse values and knowledges, and (3) they **often rely on unrealistic or vague technicalities**, such as equilibrium assumptions or the choice to express model parameters all in monetary terms, the latter point leading to

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biophysical ambiguities.

To overcome these limitations, a **new class of 'whole-of-bioeconomy' tools** are essential. These tools must be capable of (1) **identifying and quantifying trade-offs** between different sustainability objectives, considering not only quantities of resources but also their functional requirements and end-uses, acknowledging that different resources serve different purposes, typically multiple purposes simultaneously, (2) **relating trade-offs to diverse preference profiles**, enabling through social multi-criteria evaluation (or similar) an understanding of how different stakeholders are affected by various policy choices and opening the possibility of adding some automatization to an important aspect of the decision-making process, or alternatively to elicit and integrate different preference profiles as emerging from bottom-up participatory activities, and (3) **illustrating possible future system configurations that can claim to minimize in certain ways deviations from the set of objectives**, a point which does require a systemic perspective and robust consideration of the many interdependencies exhibited by the bioeconomy.

(1) https://knowledge4policy.ec.europa.eu/projects-activities/integrated-bioeconomy-land-use-assessment_en

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