IDENTIFICATION AND CERTIFICATION OF LOW INDIRECT LAND USE IMPACT BIOMASS FOR THE EU BIOECONOMY

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ABSTRACT: The EU Bioeconomy is considered an ambitious concept aiming at to promote several targets related to environmental, social and economic sustainability. One of the main concerns and risks associated with the development of a growing bioeconomy in the EU is the increasing demand for land to support additional biomass production. This increasing demand might be associated with a number of negative impacts such as for example deforestation, the loss of natural habitats and ecosystem services. The EU H2020 project STAR-ProBio aims at the development of a comprehensive framework for the sustainability assessment of biobased products. As part of this framework development, we are analyzing potential strategies for the production of biomass associated with low indirect impacts and a low demand for land, respectively. This paper highlights the main intermediate findings and describes potential next steps until the end of the STAR-ProBio project.
Keywords: biobased economy, land use, sustainability standards

1 INTRODUCTION

The concept of the EU Bioeconomy (BE) includes a wide range of sectors regarding the production and processing of biomass to food, feed, biobased products and bioenergy. Due to the incoherent nature of the EU BE political framework, the various BE sectors are characterised by different requirements and preconditions such as mandatory or voluntary sustainability criteria as well as the political strategies for the development of the respective sectors (e.g. mandatory targets and/or non-binding declarations). Amongst others, the lack of coherence can foster leakage effects such as the intensively debated problem of indirect land use change (iLUC), potentially resulting from EU biofuel policies.

With a growing BE potential problems resulting from the lack of a coherent policy framework might increase. In addition, depending on the use of political incentives or promoting instruments in the EU BE sectors, the problem of iLUC might become relevant for other EU BE sectors in the future.

As part of the EU H2020 multi-actor research and innovation action project Star-ProBio (1) we are analysing existing approaches for the assessment of iLUC impacts in order to identify practices and strategies for the reduction of iLUC risks when producing and processing biomass. While most of the existing work on iLUC has been focusing on the assessment of future biofuel policies (in most cases for the EU and USA), we found very few publications focusing on:

i) the iLUC effects from non-biofuel sectors and
ii) the development of very specific practices and strategies to reduce iLUC risks which address stakeholder on a process level.

Especially the later seems highly relevant in order to start the development of effective iLUC mitigation strategies.

The main objective of this work is the identification of potential practices to reduce the demand for land for the production of biomass contributing to the supply of biobased products for a growing BE in the EU.

2 METHODS

The identification and analysis of potential practices for the reduction of land demand for biomass production and thus, the production of "low indirect impact biomass" (LIIB) is based on a stepwise approach.

Firstly, a comprehensive assessment of existing approaches for the quantification of direct and indirect land use change effects from EU BE (and mostly biofuel) policies has been conducted (analyzing for example work by: [1, 2 3, 4, 5, 6, 7]). Based on this work, important drivers and risk factors, which determine the potential increase in land demand due to a growing demand for biobased products could be described. This analysis included an in-depth assessment of the most recent modelling activities for the quantification of iLUC effects.

Amongst others, the identified risk factors include:

- Intensive margin (increase in yields)
- Extensive margin (expansion of crop area)
- Price of the Raw Biomass (incentives, taxation)
- Co-products utilization
- Unused land
- Soil erosion
- Waste use

The results of this comprehensive review are available for further analysis [8, 9].

In a second step, the analysis of existing approaches for the quantification of iLUC effects has been complemented by a comprehensive review of available literature and projects on low iLUC risk biomass or LIIB certification approaches. Based on the findings of both steps, STAR-ProBio will develop a comprehensive certification module for the assessment and certification of low iLUC risk biomass to be used in the EU BE.

This blueprint for a product oriented sustainability certification module shall complement the existing

activities aiming at an impact assessment of BE policies (compare Figure 1).

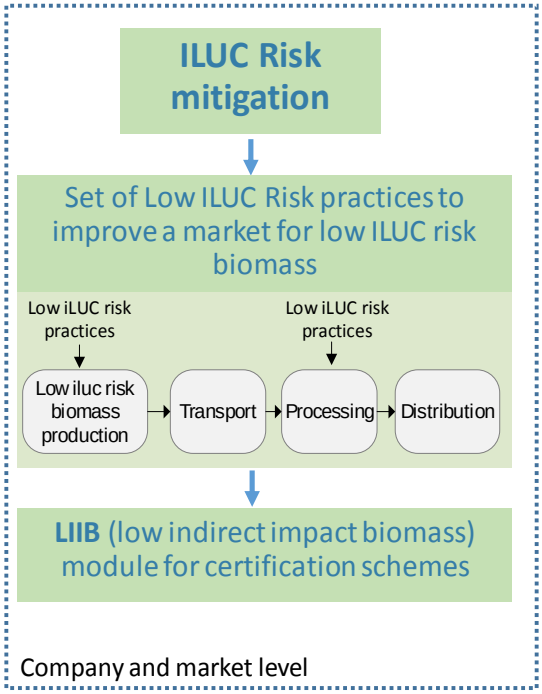

Figure 1: Development of iLUC risk mitigation practices on a company level

3 RESULTS

Based on the analysis of key drivers and existing literature, we have identified a first set of LIIB practices. This includes:

- Increased agricultural crop yield compared to a regional specific baseline development,
- Biomass cultivation on unused land,
- Increased livestock production efficiencies
- Improved chain integration,
- Reduction of biomass losses along the value chain of biobased products,
- Increasing use of waste and residue streams.

A key element in the definition of the identified LIIB practices is the actual implementation based on regional specific information and preconditions. This is an important step in order to avoid or reduce negative trade off effects. Consequently, the LIIB certification module to be developed will provide descriptions of potential trade off areas as well as potential strategies for their avoidance.

For example, potential negative trade off effects regarding the LIIB practice increased agricultural crop yield might include amongst others:

- Increasing GHG emissions due to intensification in agricultural production processes,
- The risk of an increasing share of monocultures in crop rotations,
- Increasing nutrient and pesticide leaching due to increased intensification in agricultural production,
- Increasing risk of water pollution.

4 CONCLUSIONS AND OUTLOOK

Based on a combination of modelling work and literature research, a couple of potential practices supporting the production of LIIB has been identified in the STAR-ProBio project. These practices will be integrated into a blueprint for a sustainability certification module, aiming at the support of biomass producers with the implementation of low iLUC strategies.

The implementation of the low iLUC practices is a crucial aspect, which has to consider potential risks associated with a number of potential trade offs. Thus, the operationalization of the LIIB practices identified will be developed based on case specific examples.

LIIB practices aim at addressing the company/product level. However, in order to be effective, the operationalization of these measures should be supported by policy impact assessment work analyzing the risks and impacts associated with overarching strategies and goals for the EU BE.

During the next steps until the finalisation of the STAR-ProBio project, we will test the applicability of the LIIB practices described based on a number of regional case studies.

5 NOTES

(1) Star-ProBio: Sustainability Transition Assessment and Research of Bio-based Products, please see: http://www.star-probio.eu/

6 REFERENCES

[1] Bauen, A.; Chudziak, C.; Vad, K.; Watson, P.; 2010. A causal descriptive approach to modelling the GHG emissions associated with the indirect land use impacts of biofuels. E4Tech 182.

[2] Bird, D.N.; Zanchi, G.; Pena, N.; 2013. A method for estimating the indirect land use change from bioenergy activities based on the supply and demand of agricultural based energy. Biomass and Bioenergy 59, 3–15. https://doi.org/10.1016/J.BIOMBIOE.2013.03.006

[3] Edwards, R.; Mulligan, D.; Marelli, L.; 2010. Indirect Land Use Change from increased biofuels demand, European Commisson – Joint Research Centre. https://doi.org/10.2788/54137

[4] Fritsche, U.R.; Sims, R.E.H.; Monti, A.; 2010. Direct and indirect land - use competition issues for energy crops and their sustainable production - an overview. Biofuels, Bioprod. Biorefining 4, 692–704. https://doi.org/10.1002/bbb.258

[5] Laborde, D., 2011. Assessing the Land Use Change Consequences of European Biofuel Policies. Ifpri 1–111. https://doi.org/Specific Contract No SI2. 580403

[6] Marelli, L.; Mulligan, D.; Edwards, R.; Institute for Energy (European Commission), 2011. Critical issues in estimating ILUC emissions: outcomes of an expert consultation 9-10 november 2010, Ispra, Italy. Publications Office.

[7] Valin, H.; Peters, D.; van den Berg, M.; Frank, S.; Havlik, P.; Forsell, N.; Hamelinck, C., 2015. The land use change impact of biofuels in the EU: Quantification of area and greenhouse gas impacts. August 261.
[8] Marazza, D.: A risk evaluation approach for indirect land use change associated to biobased products, SETAC EUROPE 28th meeting, Rome, May 2018
[9] Marazza, D.; Merloni, E.; Compagnoni, L.; Balugani, E. 2018. Examination of existing ILUC approaches and their application to bio-based materials. http://www.star-probio.eu/wp-content/uploads/2017/04/STAR ProBio_D7.1_Final_2.pdf

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