



WP7: ILUC risk assessment for bio-based products



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Goals and scope

Indirect Land Use Change (ILUC) effects have been recognized to have an impact on the sustainability of bio-based fuels production. However, ILUC estimates are marred by high levels of uncertainty in the data, the assumptions and the model used. Here, to keep consistency with the RED II approach to assess ILUC for bio-fuels, a risk assessment is conducted on ILUC for bio-based products, and possible strategies are evaluated to decrease that risk. More specifically, the objectives are to:

- Define the main factors influencing ILUC for bio-based products
- Develop a model (SydILUC) aimed at decrease the uncertainty related to ILUC estimates, to be used in the framework of risk assessment (Fig. 1)
- Define a set of low ILUC risk practices, with a focus on certification and applicability (Fig. 2)
- Develop a tool to help stakeholders, policy makers and producers to assess their ILUC risk and how to reduce it (Fig. 3)
- Deliver recommendations to policy makers when developing bioeconomy and in particular bio-based products related policies

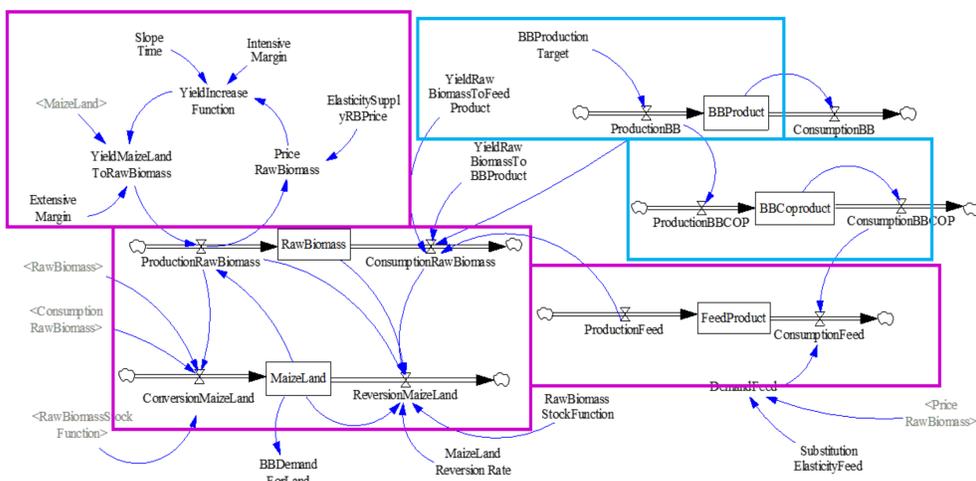


Figure 1. Schematic of the SydILUC model, with different modules enclosed in boxes.

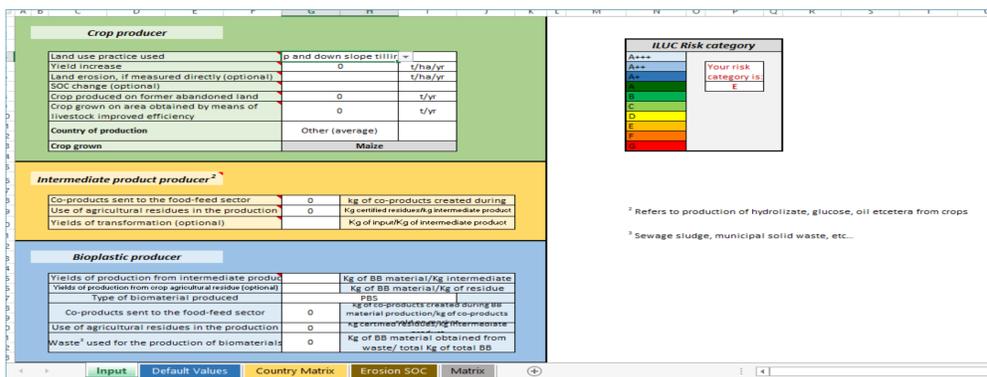


Figure 3. ILUC risk tool for risk assessment by stake-holders and certification.

Analysis and validation

All the coefficients of the model were defined with their statistical distribution, in order to obtain explicit uncertainty estimates. The model was calibrated in 2018 in a step-wise procedure for the different modules, using data from 1961 to 2006. The model was validated on the period 2006-2017, and yielded reliable results. Data from 2018 and 2019 do not show any decrease in reliability.

Methodology

- Extensive literature review to define the ILUC factors (task 7.1)
- Extensive literature review and schematization to define the low ILUC risk additionality practices (task 7.2)
- System dynamics modelling framework to develop the SydILUC model (task 7.1)
- Statistical and econometrical analysis on data coming from FAOSTAT, global markets and other Star-PROBIO WPs (task 7.2)
- Monte Carlo, Sobol sampling, K-clustering and other model analysis techniques to implement the tool (task 7.2)
- Global sensitivity analysis (variance analysis) of the model to elaborate policy recommendations regarding land use governance mechanisms in the context of the uptake of bio-based products (task 7.3, Fig.4)

Identification of additionality practices

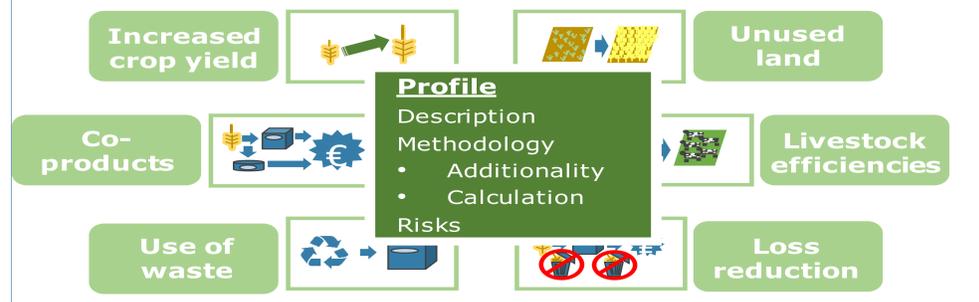


Figure 2. Additionality practices for low ILUC risk certification.

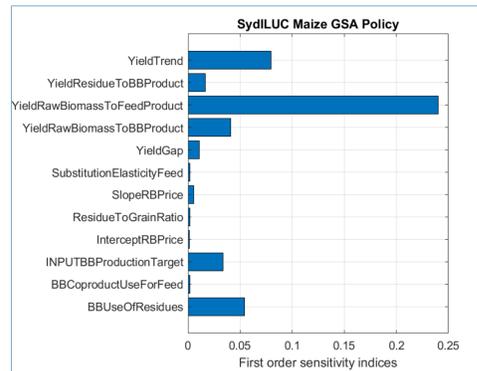


Figure 4. SydILUC global sensitivity analysis aimed at supporting policy recommendations.



Figure 5. SydILUC projections for three different biomasses, with error bands for agricultural yields.

Main findings

- Maize showed lower ILUC risk with respect to soybeans and sugar beet pulp (Fig. 5)
- The increase in agricultural yields is the most effective way to reduce ILUC risk, and this can be achieved in areas far from their potential agricultural yield values
- The use of co-products, agricultural residues and waste to either produce bio-based materials or to substitute for feed have great potential to reduce ILUC risk as well
- Policy instruments only function when effectively combined. Transboundary and cross-sectoral approaches to sustainable land use should be promoted.

WP Partner logos



Publications

1. Deliverable 7.1. Examination of existing ILUC approaches and application to bio-based materials. February 26, 2018.
2. Deliverable 7.2. Land Use Changes applied to the case studies. January 31, 2020.
3. Deliverable 7.3. Set of recommendations for land use policies. March 31, 2020.
4. Marazza D., Merloni E., Balugani E. (2020). Indirect Land Use Change and Bio-based Products. Book chapter in Transition Towards a Sustainable Biobased Economy. Royal Society of Chemistry.



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