STAR-ProBio

Sustainability Transition Assessment and Research of Bio-based Products

Grant Agreement Number 727740

Deliverable D6.5

Actions to promote social acceptance

Version 1.0, [18/12/2019]

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REPORT

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Abstract

The objective of Deliverable 6.5 is to summarise the work performed in Task 6.5 regarding the actions to promote social acceptance. This report describes the work performed by USC and UNITELMA regarding Task 6.5 (actions to promote social acceptance). Given that STAR-ProBio activities should be made publicly available in various way (i.e. websites, patents, archives, etc.) in order to boost social acceptance, this report summarises the actions taken to complete this task. Social acceptance is stimulated through the development of promotional materials for different audiences. A good communicative strategy is crucial to ensuring that the message is properly received by different stakeholders.

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1 Introduction

The objective of Deliverable 6.5 is to summarise the work performed in Task 6.5 regarding the actions to promote social acceptance. This report describes the work performed by USC and UNITELMA regarding Task 6.5 (actions to promote social acceptance). Given that STAR-ProBio activities should be made publicly available in various way (websites, patents, archives, etc.) in order to boost social acceptance, this report is just a brief summary that describes the actions taken to complete this task. Social acceptance is stimulated through the development of promotional materials for different audiences. A good communicative strategy is crucial to ensuring that the message is properly received by different stakeholders. The materials to promote social acceptance contain information about the general context of STAR-ProBio and the relevance of the research conducted under the project.

2.1 Dissemination materials

UNITELMA

With regard to dissemination materials, UNITELMA has produced a brochure explaining the STAR/ProBio project and two of its main results, namely SAT-ProBio and SyD-ProBio. The leaflet (see Annex 1) was disseminated during the International Forum on Industrial Biotechnology and Bioeconomics (IFIB) 2019 in Naples (https://ifibwebsite.com/). This material was more tailored to practitioners and scholars.

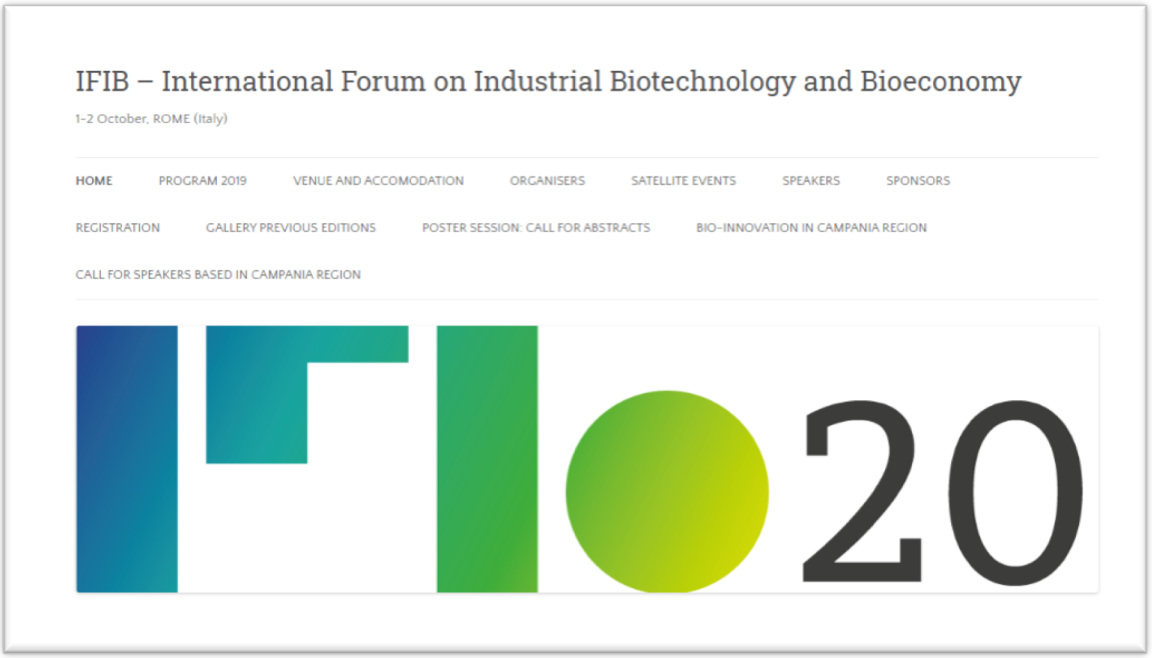


Figure 1 Logo of Forum on Industrial Biotechnology and Bioeconomy (IFIB) 2019

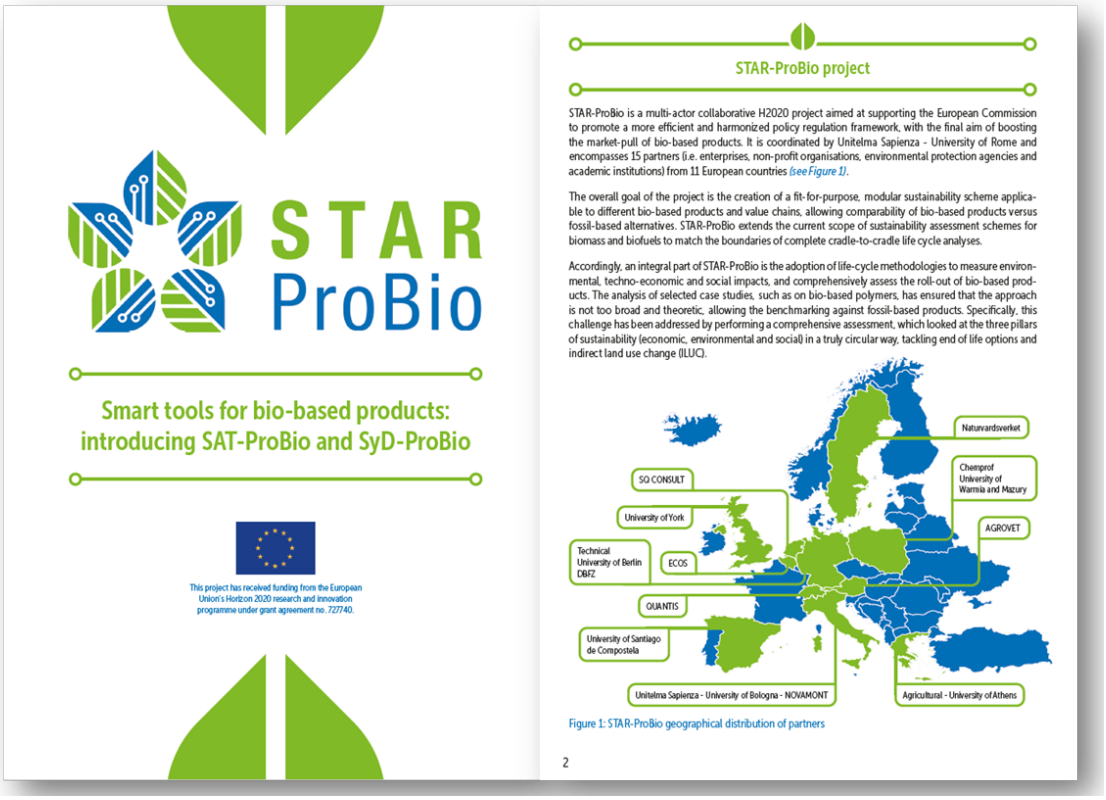


Figure 2 Leaflet developed by UNITELMA (see Annex 1)

Moreover, during the Maker Faire Rome 2019 (https://2019.makerfairerome.eu/), UNITELMA disseminated brochures and explained the goals of the project and some preliminary findings to a broad audience including students, academics, professionals, NGOs and the general public.

Figure 3 Logo of Maker Faire Rome 2019

USC

USC developed a leaflet (see Annex 2) explaining the STAR-Probio Project (goal, methodologies and partners involved), which has been disseminated during the 3rd International Congress of Chemical Engineering and the 1st Mediterranean Symposium on Life Cycle Assessment -MeSyLCA 2019 (https://anque-icce2019.com/es). This action has been planned for a research and technological audience.

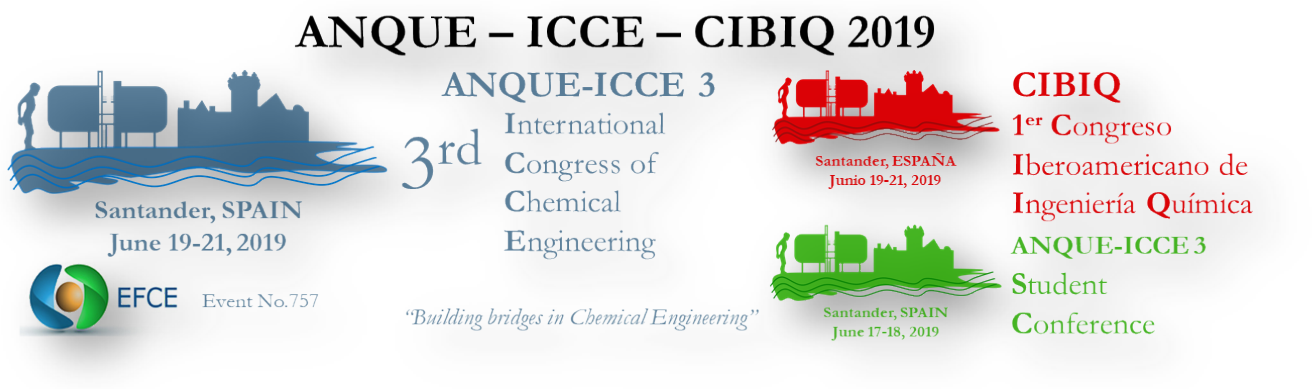


Figure 4 Logo of International Congress of Chemical Engineering

USC developed a brochure explaining the STAR-ProBio Project which was disseminated during the 2nd International Conference "ADAPTtoCLIMATE" held in Heraklion in Crete Island, Greece, on 24-25 June 2019.

Figure 5 Logo of the International Conference "ADAPTtoCLIMATE

Figure 6 Leaflet developed by USC (see Annex 2)

2.2 Video preparation

It was agreed with UNITELMA the preparation of a video with the main findings of the Project (objectives, case studies, outstanding results, etc.) to be disseminated through the website to the external public. This video should last from 3 to 4 min maximum. USC is in charge of editing the video with the contribution of UNIBO and UNITELMA. The video scripts are detailed below. The video will be released in January to the public.

Script from UNITELMA

(Speech of Professor Piergiuseppe Morone)

Hello, my name is Piergiuseppe Morone. I am a professor of economic policy at UNITELMA Sapienza. I am the leader of STAR-ProBio, which is an H2020 project funded by the European Commission. This is a research and innovation action, which aims at assisting the transition out of a fossil-based economy into a biobased economy.

We do so with a twofold objective. On the one hand, STAR-ProBio aims at defining a sustainability assessment tool in order to define the level of sustainability of bio-based products. And then on the other hand, we aim to define a set of policy guidance in order to speed up the transition by means of market uptake of bio-based products.

In order to do so, we have to put together several partners. We have 15 partners, including university, NGO´s, small and medium companies as well as research centers.

Specifically we have the University of York, the Technological University of Berlin, Agricultural University of Athens, DBFZ, which is a project research center from Germany, SQ Consults, the University of Bologna, UWM, which is a university based in Poland, ChemProf, which is a small chemistry company in Poland, Quantis, from Switzerland, NOVAMONT, which is a large enterprise from Italy, the Swedish Environmental Protection Agency, the University of Santiago de Compostela, and ECOS, which is an NGO based in Brussel and then, finally, AGROVET, from Austria.

So basically, we have to put together all this different expertise because the target we are aiming at is a complex one. And we have to use several alternatives methodologies. For example, when we look at the environmental sustainability then we use life cycle assessment (LCA), when we look at the social sustainability we use social life cycle assessment (S-LCA), when we look at the economic sustainability, we use life cycle costing assessment (LCC). Also, the strong focus on indirect land use change (iLUC), which is a core issue when we look at a transition towards the bio-based economy.

In order to investigate the market uptake, we also look at consumers behavior and we do so by means of surveys, field experiments, in order to define willingness to pay of consumers of bio-based products, and specially bio-based products which are labelled as sustainable.

So, we have these multi-fold methodologies, multi-fold approaches which eventually will lead us to develop two major tools which will be the goal of our projects. On the one hand, we have STAT-ProBio, which is the sustainability assessment tool and on the other way, we have the Syd-ProBio, which is a system dynamic tool in order to make policy scenarios comparison.

Script from USC

(Speech of Dr. Sara González García)

The production of bio-based products is a great opportunity to promote the concept of bioeconomy and avoid the use of fossil fuels. However, the production of feedstocks must be carried out in a responsible and sustainable manner, since changes can be inferred in the use of biomass for non-edible purposes and in those affecting land use.

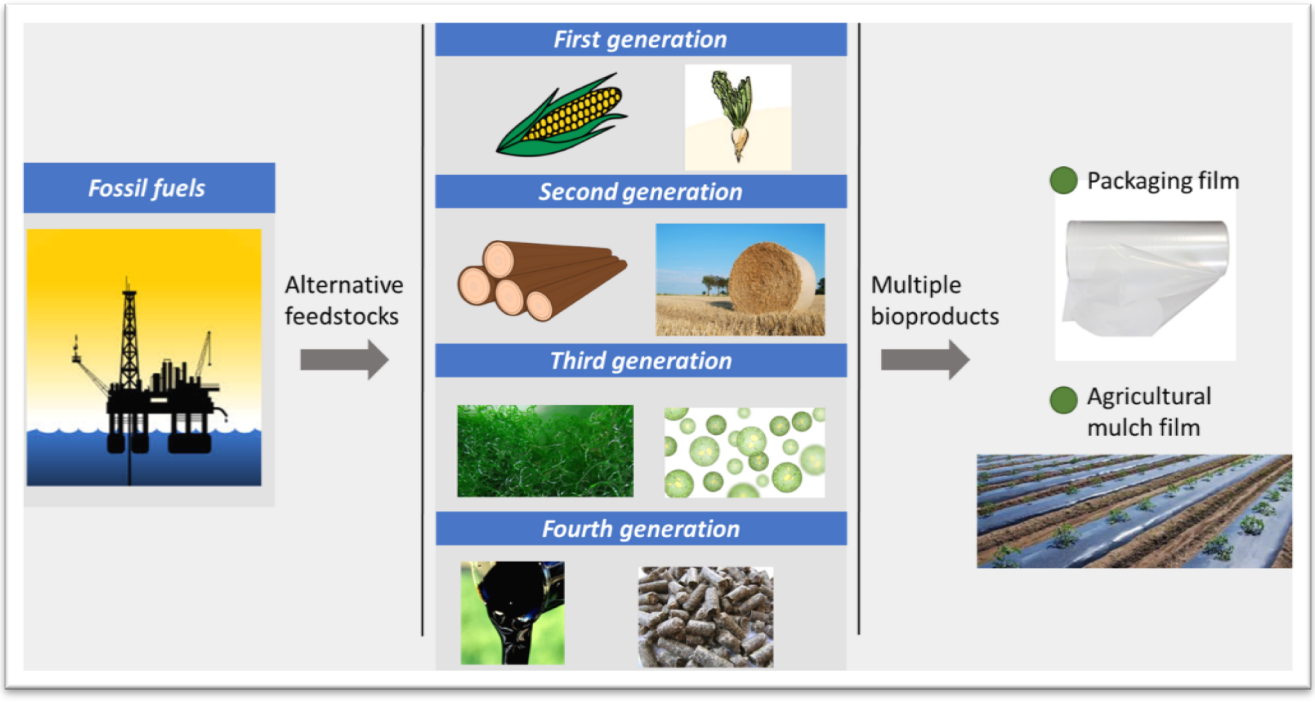
It is therefore crucial to evaluate the sustainability of bio-based products taking into account all stages of their life cycle, from raw materials to end-of-life. This will increase consumer recognition of their environmental, economic and social benefits.

(Speech of Dr. Iana Câmara Salim)

A variety of raw materials can be used as alternative to fossil fuels to produce the target bio-products of the project: Packaging film and Agricultural mulch film. They may comprise first-generation feedstocks, which compete with food/feed markets (e.g. maize grain, wheat grain, sugar beet, sugarcane); residues from agricultural and forestry operations, i.e. second-generation feedstocks (e.g. wheat straw, maize stover); third-generation feedstocks (macro and microalgae) and residues from industrial processes, namely fourth-generation feedstocks (e.g. sugar beet pulp, municipal solid waste).

The framework of this project encompasses three of these alternatives: First, Second and Fourth generation which are maize grain, maize stover and sugar beet pulp.

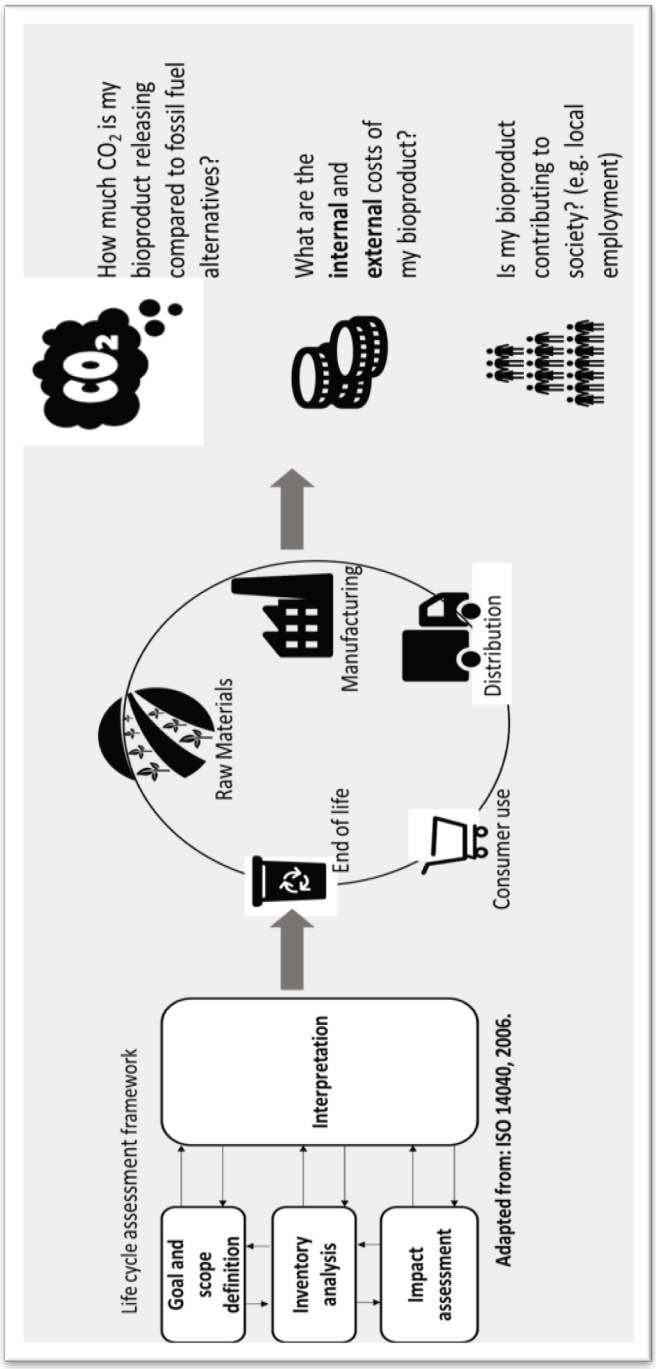
(THIS PREVIOUS TALK IS COMBINED WITH THE FIGURE UNDERNEATH)



(Speech of Dr. Sara González García)

The use of life-cycle-based methodologies from environmental, social and economic perspectives helps stakeholders investigate the sustainability aspects of bio-products and make decisions. It answers questions such as

(THIS PREVIOUS TALK IS COMBINED WITH THE FIGURE UNDERNEATH)



Script from UNIBO

Graphic support:

Graphic representation on the blackboard

(Speech of Dr. Diego Marazza)

Script

An important aspect to be considered for the sustainability assessment of the bio-based product is the Indirect Land Use Change effect. If we need, for example, more maize for animal, people and the bio-based products, we also need more land. If we limit the expansion of maize in our country, the demand for maize will shift to another place in the world. This is an example of ILUC which is a complex topic since it is an effect propagated and controlled by economic forces acting at a planetary scale.

(GRAPHIC REPRESENTATION OF THE ILUC EFFECT - Trades, agricultural technologies and processing steps will be pointed out as elements of the complexity of this issue)

(Speech of Dr. Enrico Balugani)

Until now, many efforts have been made to determine the contribution of bio-based products to quantify the iLUC effects, mainly through economic models. What we did is a bit different and innovative.

We developed a risk-based approach for the assessment the iLUC risk of the biobased products using a causal-descriptive model and we called it SyDILUC model (this means that we described transparently the interactions, researched dynamics in the real world and modelled them)

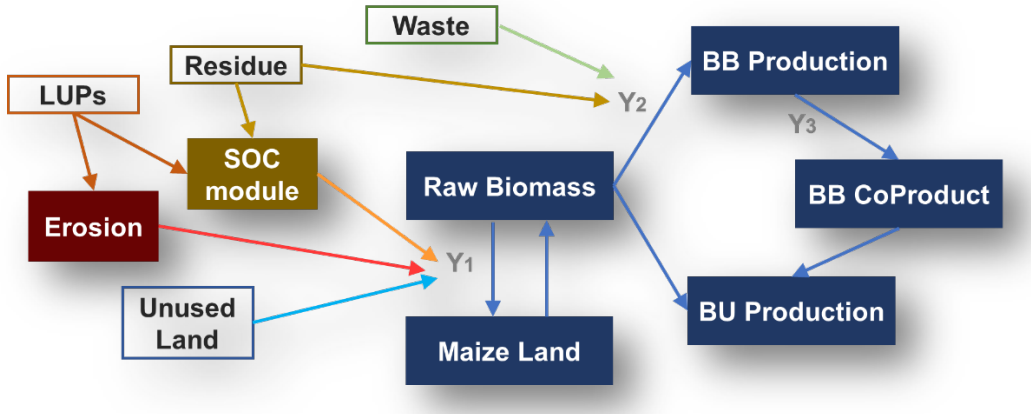
We were then able to isolate the economic effects and the risk factors linking the production of bio-based products with land consumption, at a global scale. This is the nature of the SydILUC.

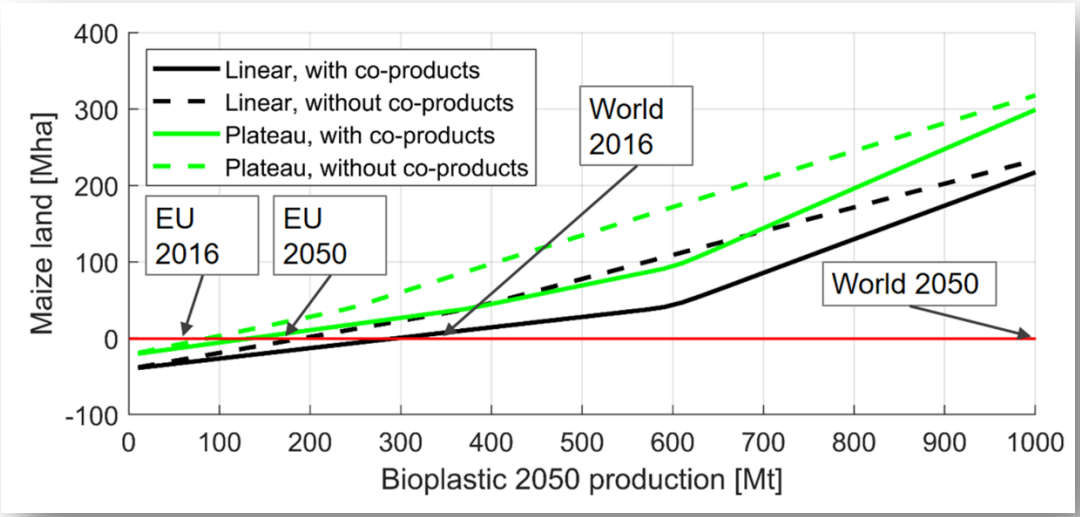
(GRAPHIC REPRESENTATION OF THE SYDILUC MODEL)

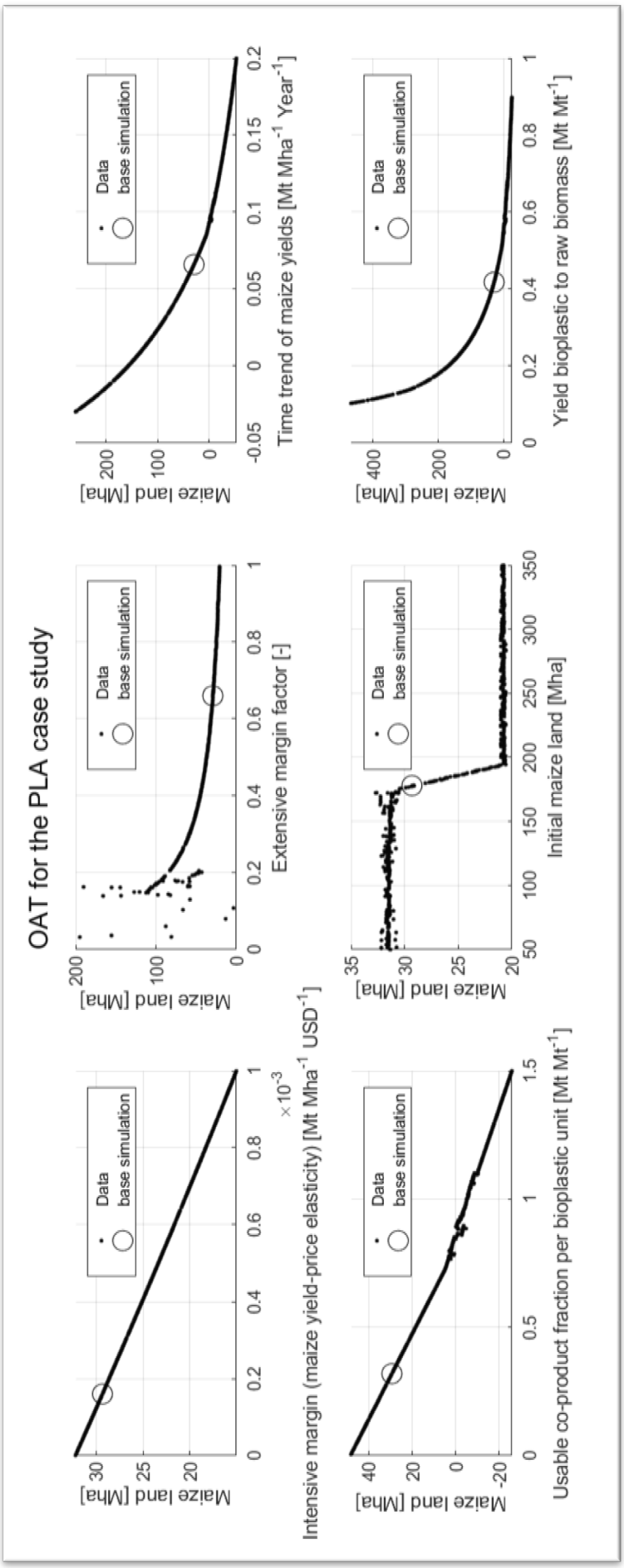
The SydILUC model has three main beneficiaries:

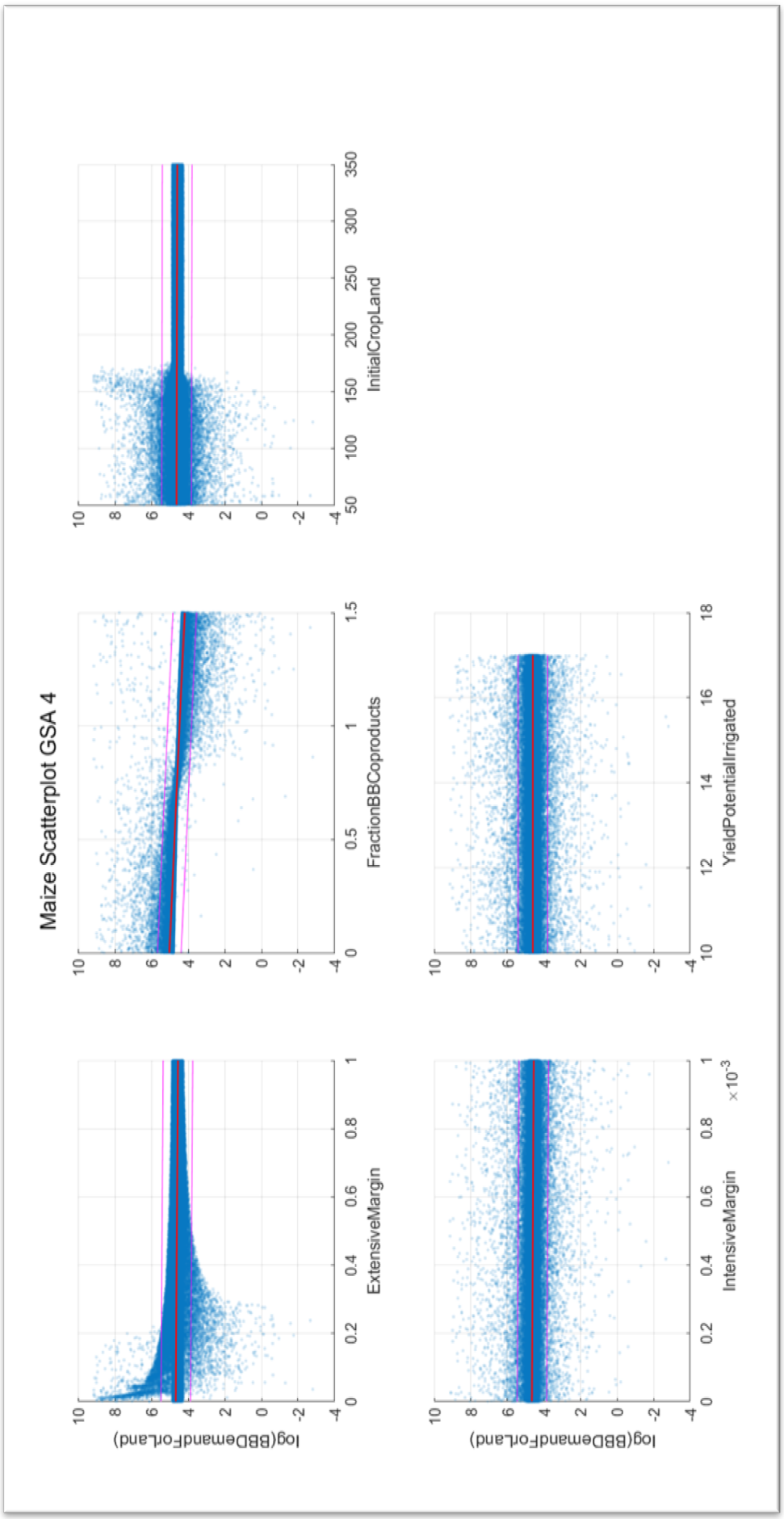
- The economic operators that can assess the ILUC risk level of its own bio-based products, through our ILUC Risk Tool (GRAPHIC REPRESENTATION OF THE ILUC RISK TOOL)
- The certification bodies that can certify the Low ILUC risk biomass
- The policy makers that can elaborate *ad hoc* policy resolutions for mitigating the iLUC risks

(The talk of Enrico Balugani is combined with the figures underneath)






OAT for the PLA case study
Maize land [Mha]
Data
base simulation
Intensive margin (maize yield-price elasticity) [Mt Mha-1 USD-1]
×10-3
Extensive margin factor [-]
Initial maize land [Mha]
Usable co-product fraction per bioplastic unit [Mt Mt-1]
Time trend of maize yields [Mt Mha-1 Year-1]
Yield bioplastic to raw biomass [Mt Mt-1]


Maize Scatterplot GSA 4
log(BBDemandForLand)
InitialCropLand
FractionBBCoproducts
YieldPotentialIrrigated
ExtensiveMargin
IntensiveMargin
×10-3

Crop producer

Land use practice used	Up and down slope tilling	
Yield increase	0	t/ha/yr
Land erosion, if measured directly (optional)		t/ha/yr
SOC change (optional)		
Crop produced on former abandoned land	0	t/yr
Crop grown on area obtained by means of livestock improved efficiency	0	t/yr
Country of production	Other (average)	
Crop grown	**Maize**	

Intermediate product producer [2]

Co-products sent to the food-feed sector	0	kg of co-products created during BB
Use of agricultural residues in the production	0	Kg certified residues/kg intermediate product
Yields of transformation (optional)		Kg of input/Kg of intermediate product

Bioplastic producer

Yields of production from intermediate product (op		Kg of BB material/Kg intermediate
Yields of production from crop agricultural residue (optional)		Kg of BB material/Kg of residue
Type of biomaterial produced	PBS	
Co-products sent to the food-feed sector	0	kg of co-products created during BB material production/kg of co-products sold on market
Use of agricultural residues in the production	0	Kg certified residues/kg intermediate product
Waste [3] used for the production of biomaterials	0	Kg of BB material obtained from waste/ total Kg of total BB material

ILUC Risk category

A+++
A++
A+
A
B
C
D
E
F
G

Your risk category is: **E**

[2] Refers to production of hydrolizate, glucose, oil etcetera from crops

[3] Sewage sludge, municipal solid waste, etc...

Script from UNITELMA

(After the talk of WP2 and WP7, prof. Piergiuseppe Morone concludes the presentation with some closing remarks and take-home messages).

Although we are very well aware that still a lot needs to be done in order to finalize the transition to a bio-based economy, we are also aware that we, as a European funded project, that with STAR-ProBio , we are doing our share to make this change happen and this is the big and best rewards we can possibly get.

Leaflet developed by UNITELMA

STAR-ProBio project

STAR-ProBio is a multi-actor collaborative H2020 project aimed at supporting the European Commission to promote a more efficient and harmonized policy regulation framework, with the final aim of boosting the market-pull of bio-based products. It is coordinated by Unitelma Sapienza - University of Rome and encompasses 15 partners (i.e. enterprises, non-profit organisations, environmental protection agencies and academic institutions) from 11 European countries *(see Figure 1)*.

The overall goal of the project is the creation of a fit-for-purpose, modular sustainability scheme applicable to different bio-based products and value chains, allowing comparability of bio-based products versus fossil-based alternatives. STAR-ProBio extends the current scope of sustainability assessment schemes for biomass and biofuels to match the boundaries of complete cradle-to-cradle life cycle analyses.

Accordingly, an integral part of STAR-ProBio is the adoption of life-cycle methodologies to measure environmental, techno-economic and social impacts, and comprehensively assess the roll-out of bio-based products. The analysis of selected case studies, such as on bio-based polymers, has ensured that the approach is not too broad and theoretic, allowing the benchmarking against fossil-based products. Specifically, this challenge has been addressed by performing a comprehensive assessment, which looked at the three pillars of sustainability (economic, environmental and social) in a truly circular way, tackling end of life options and indirect land use change (ILUC).

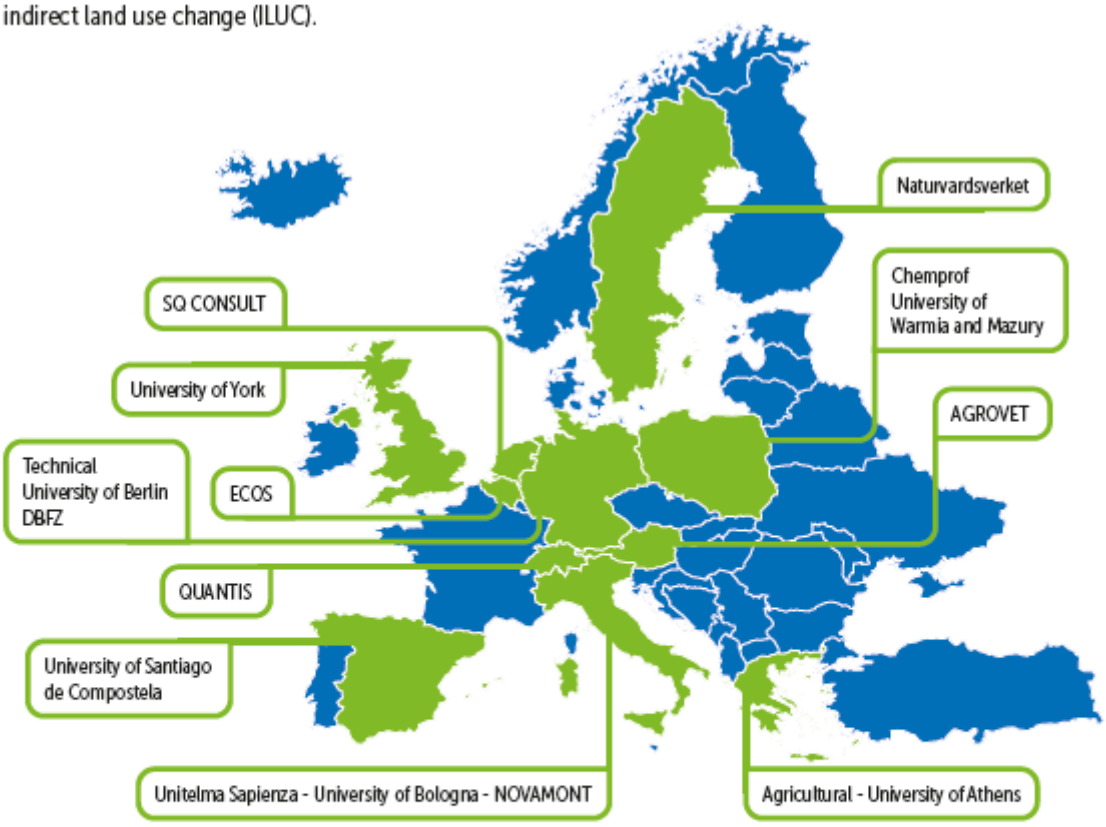


Figure 1: STAR-ProBio geographical distribution of partners

2

STAR-ProBio networking activities have been successful over last years. Some key achievements in this regard include: the establishment of tight collaboration with the Climate and Environment Division at FAO, which has led to a fruitful ongoing discussion on indicators and methodologies to measure the sustainability of the bioeconomy; the participation in the BBI-JU stakeholder forum held in Brussels in 2017; the participation, as a founding member, in several activities of the European Bioeconomy Network. Moreover, STAR-ProBio established an official liaison with CEN TC-411 and was mentioned in the Italian Bioeconomy Strategy 2019.

Public deliverables of our project are freely available on: www.star-probio.eu

Introducing SAT-ProBio: a sustainability framework tailored to bio-based products

Sustainability assessments are key components both for consumer's acceptance and for developing an efficient and meaningful policy framework for bio-based products. STAR-ProBio project has put a great deal of effort into the analysis of the existing certification and standardisation landscape and the development of coherent criteria and indicator sets aiming at improving and complementing existing sustainability certification and assessment approaches. In particular, STAR-ProBio concluded that existing standards and related certification schemes lack focus on end of life and circularity aspects and that ILUC as well as social and economic impacts are often addressed inadequately *(see Figure 2)*. Against this background, the SAT-ProBio framework will support stakeholders with the sustainability assessment of bio-based products, that will be based on a meaningful combination of the existing results of all STAR-ProBio work packages, adding a set of guidelines and rules regarding the actual implementation of all sustainability principles, criteria and indicators developed SAT-ProBio will also show options to integrate criteria and indicators discussed in the project, as well as the respective methodologies, into existing sustainability certification and sustainability assessment schemes.

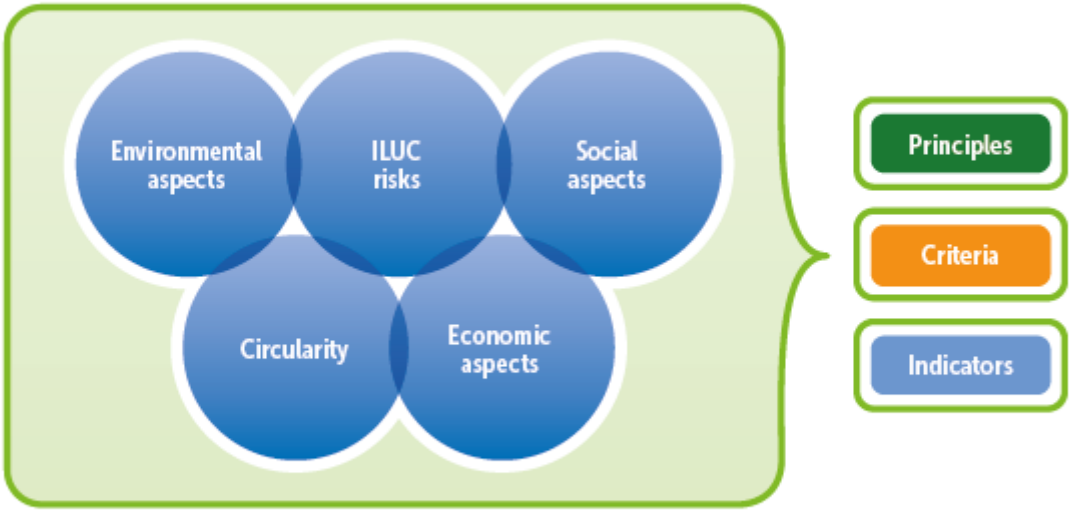


Figure 2: Sustainability pillars addressed in SAT-ProBio

3

SAT-ProBio features in a nutshell

SAT-ProBio is composed of four elements *(see Figure 3)*:

Element I. Building Blocks (BB), covering a set of overarching criteria and indicators;

Element II. A Benchmarking Platform (BP), comparing the standards of existing certification schemes, identifying a common denominator between them, and linking it with SAT-ProBio's Building Blocks;

Element III. An Integrated sustainability Assessment Tool (IAT), providing a methodological framework for assessing the sustainability aspects related to bio-based products (case studies) from a life cycle thinking perspec- tive;

Element IV. Rules for Framework management (FR), defining a set of rules that connects the three above-mentioned components.

Introducing SyD-ProBio: A system dynamics model as a tool for policy analysis of bio-based products

STAR-ProBio is a challenging journey towards sustainability, and one key component of this journey is unquestionably the policy arena for the bio-based products. To date, the policy arena for bio-based products encompasses a wide range of policy areas at global, EU and national level, which yet result in a complex, fragmented, uncoherent policy framework of action.

Within Task 9.5 - *Policy analysis for the creation of a level playing field* - STAR-ProBio's team aims at developing a system dynamics model for the assessment of the effectiveness of policy actions, and the creation of a level playing field for the bio-based products against fossil-based products – **SyD-ProBio**.

Given the complex and cross-cutting nature of the policy arena for bio-based products, **SyD-ProBio** builds on a multi-stakeholder perspective and is addressed to EU and Member States policy makers working in the improvement of the policy framework guiding the promotion of sustainable bio-based products, more specifically biopolymers as a case study.

4

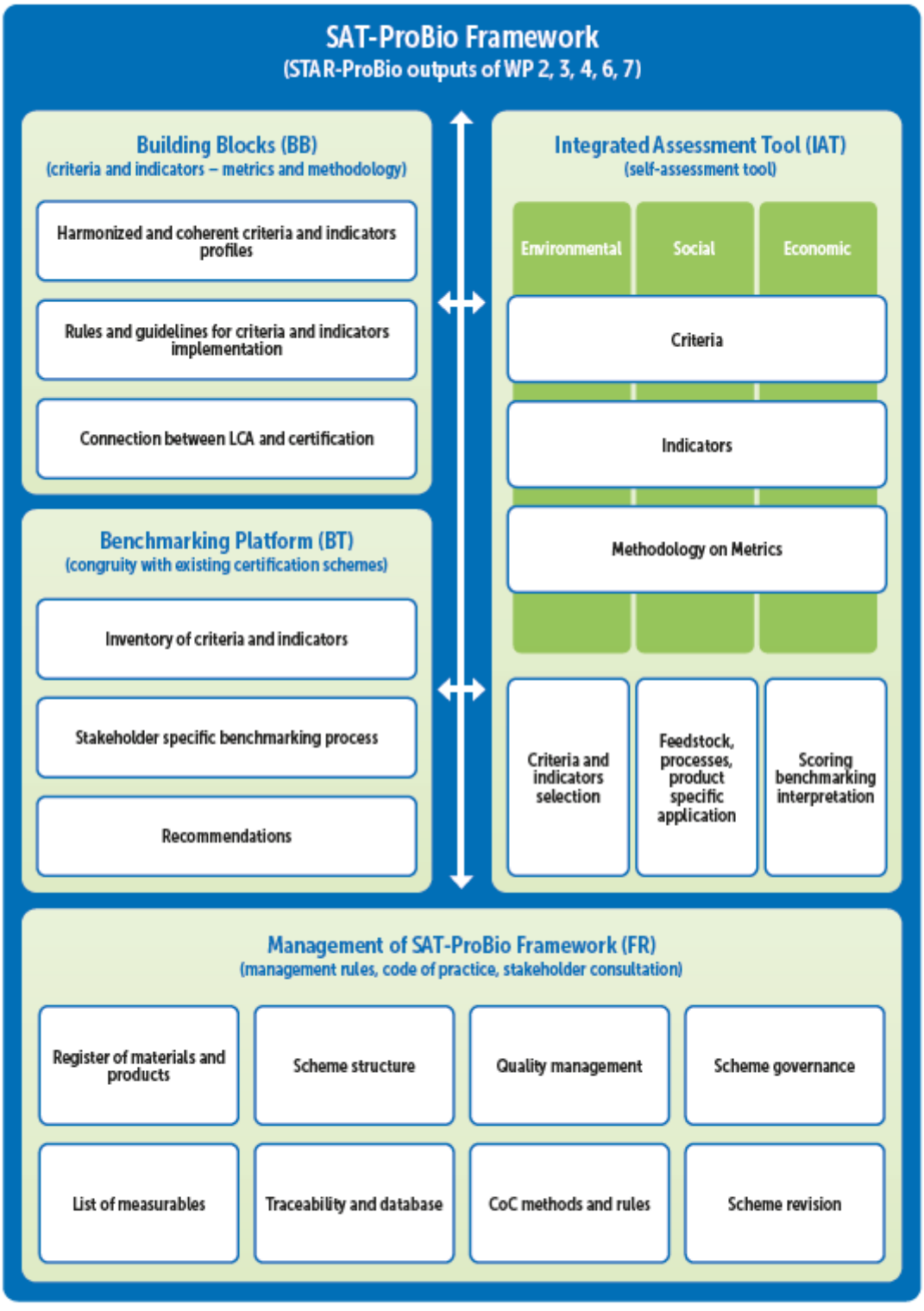


Figure 3: SAT-ProBio sustainability framework

5

SyD-ProBio features in a nutshell

The SyD-ProBio model puts forward an user friendly interface *(see Figure 4)*. Thus, any user interested in SyD-ProBio technicalities, can learn more about the model design (e.g. system boundaries, hypotheses, internal feedback loops and time delays, policy instruments tested) by accessing "About the model" section. Furthermore, the users interested in creating their own scenarios and comparing simulations results, have the possibility to do so by the means of the "Simulation lab" section of the model.

The SyD-ProBio allows users to customize the existing scenarios. The users have the possibility to change the values for any parameter of the model according to their own needs – e.g. the share of feedstock in the total PLA demand; the PLA waste end of life (EoL) rates in different sectors *(see Figure 2)*; they can modify the hypotheses of the default scenarios and run the simulations under the new conditions. Furthermore, they can create and test their own policy mix by using the "Policy options" button *(see Figure 5)*. To this end, SyD-ProBio enables policy-makers to assess the impact of any policy option from the chosen policy mix on the market uptake of bio-based products – e.g. the effect of carbon tax on the demand for PLA production for the next 30 years.

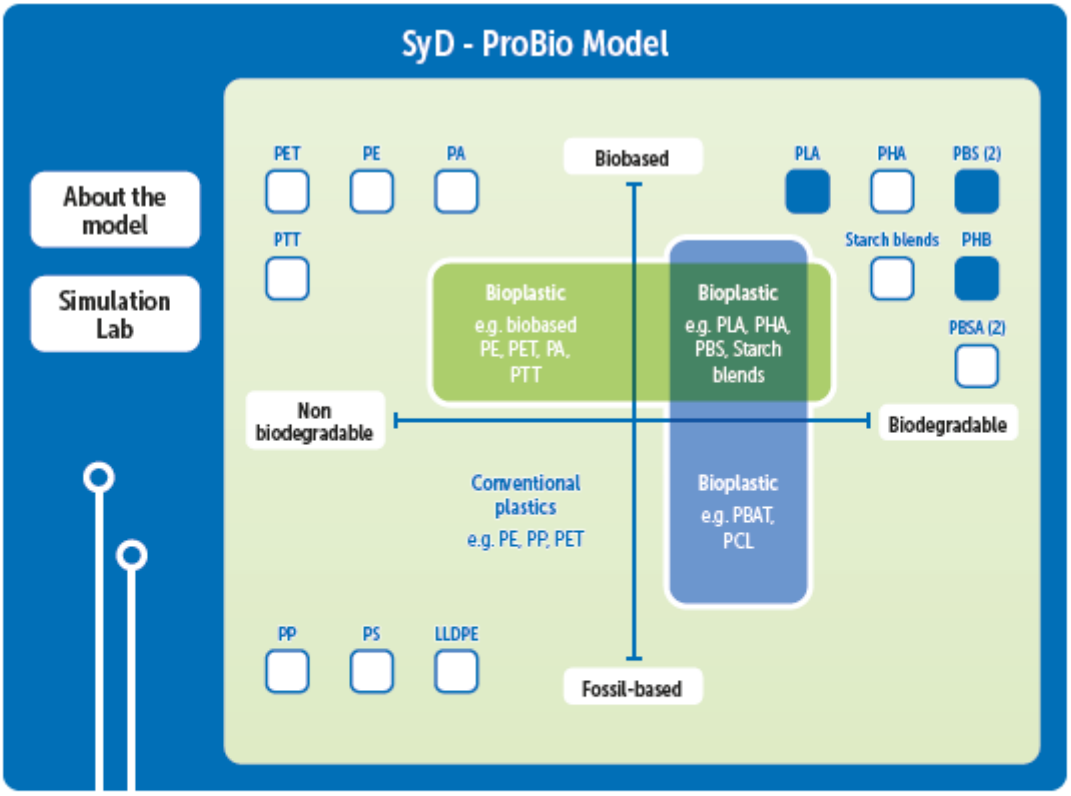


Figure 4: SyD-ProBio Interface

6

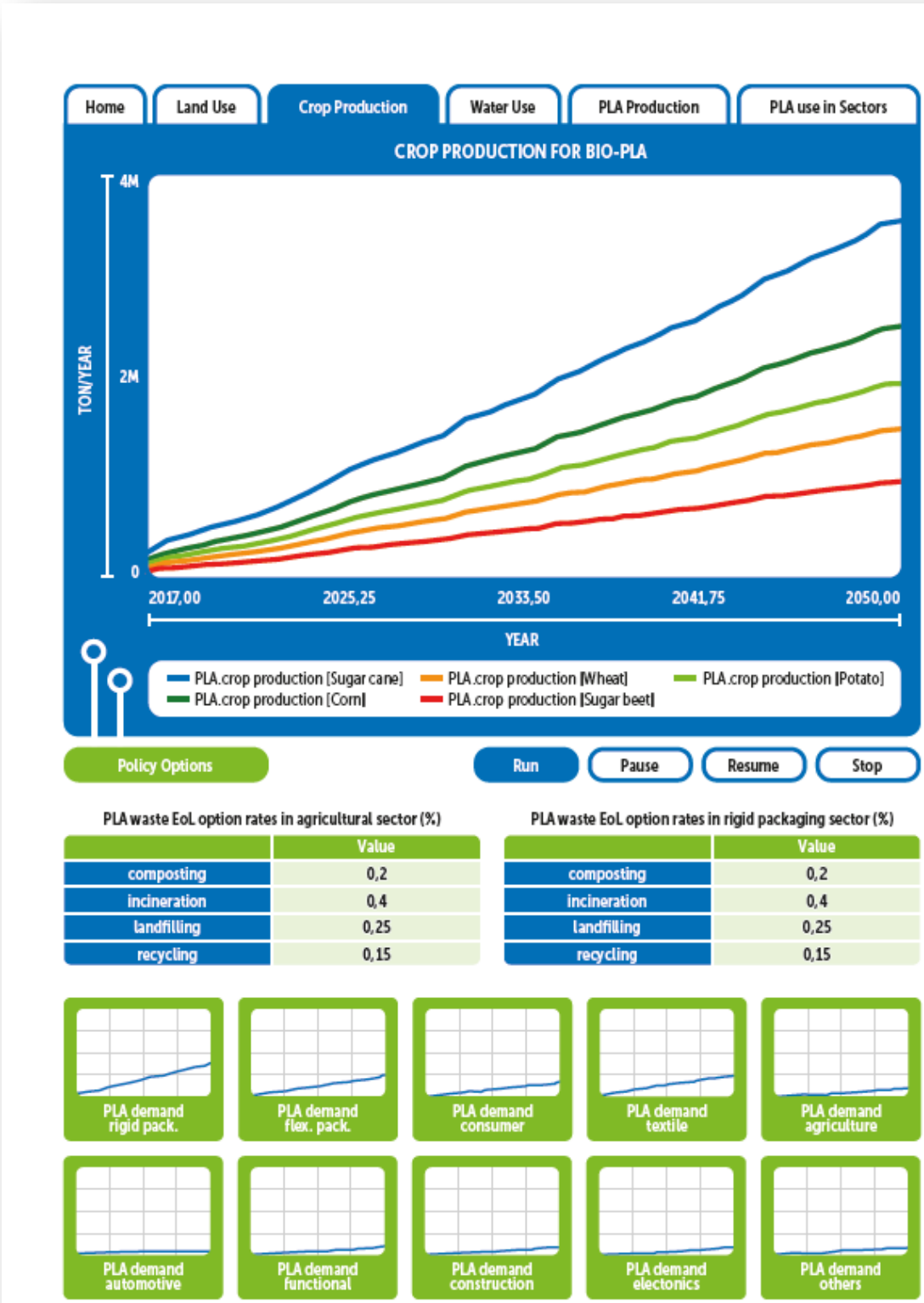


Figure 5: PLA scenario - Example

7


STAR
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Following

Leaflet developed by USC

Why is STAR-ProBio important?

- To meet environmental, social and economic challenges, paving the way for a much-needed sustainability transition towards a bio-based economy
- To promote an efficient and harmonized policy regulation framework
- To boost the market-pool of bio-based products

How is this achieved?

STAR-ProBio is developing two "Smart Tools", which will be the legacy of the project:

- **SAT-ProBio**

  A Sustainability Assessment Tool developed as an overarching umbrella covering the assessment of bio-based products, and the rules for standardization. It should provide information on the most relevant sustainability aspects of bio-based products and the related value chain for use by policy-makers and civil society. It is consistent with the sustainability principles and criteria proposed in the European Standard EN16751:2016

- **SyD-ProBio**

  A System Dynamic Model for bio-based products, which serve to compare alternative policy scenarios and assess the impact of alternative policy and regulatory measures in creating a level playing field and stimulating market uptake of sustainable bio-based products.

Which methodologies are used in STAR-ProBio?

- The environmental assessment is being carried out, through the LCA, in a particular economy framework (with a focus on end-of-life analysis) in which issues arising at the upstream and dowstream stages of the value chain will be examined.

- Techno-economic and social impact assessment are being conducted through stakeholder analysis (SLCA)

- Indirect land use change issues (ILUC) are also being addressed from an environmental, economic and social perspective