Sustainability Transition Assessment and Research of Bio-based Products

Newsletter Issue 3

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for this newsletter

The third newsletter of our project on the sustainability assessment of bio-based products, STAR-ProBio, in which you can read, among others, how our main outputs are starting to take shape. For any questions or feedback please contact us at communication@STAR-ProBio.eu

Prof. Piergiuseppe Morone (Unitelma Sapienza - University of Rome)

Foreword by the project coordinator

STAR-ProBio reached its turning point in October, entering the second half of its lifetime. This calls for a preliminary assessment of what has been achieved so far and what needs to be achieved over the next 18 months.

The consortium, as a whole, has succeeded in respecting all deadlines (with very minor deviations from the original plans) including key deliverables and milestones. Partners have been very collaborative and, I must say, the rhythm of collaborations across WPs and among partners has grown exponentially over the last six months. This is reflected in the growing number of web-based meetings taking place on a regular basis. Specifically, most Work Package (WP) leaders have established regular monthly meetings useful to sharing views on various aspects of the project as well as to coordinate in the preparation of deliverables and internal documents. To further enhance knowledge flows, both within and across WPs, all partners have successfully adopted Yammer as a web-based collaboration tool to enhance remote networking activities, documents sharing and collective learning activities. Moreover, also the Project Management Committee has established regular web-based monthly meetings to discuss overall progresses of the project.

This need for collaboration is felt by all partners as a key feature of STAR-ProBio, a research and innovation action structured from the very beginning as a truly collaborative project, where knowledge flows from one WP into the other, seamlessly. Specifically, work done in WP1 on gap analysis and case-studies identification has fed into technical WPs (2 to 7), who are developing their analysis through various well-integrated methodologies (LCA, LCC, S-LCA, System dynamic modelling, Delphi surveys, field experiment) and in tight

In this Newsletter:

This project is funded by the European Union's Horizon 2020 Research and innovation action under grant agreement No 727740 with the Research Executive Agency (REA) - European Commission. Duration: 36 months (May 2017 – April 2020).
Work Programme BB-01-2016: Sustainability schemes for the bio-based economy

- We have started developing policy model System Dynamic model for Bio-based Products (**SyD-ProBio**) Read more...
- **Making our research public: l**earn about our reports, articles and events. Read more...
- Mid-June 2019 the project helps organise **Standards for a Bio-Based Economy conference** in Rome, call for papers is now open. **Save the date!** Read more...
- 1.5 years have passed, 1.5 years to go. **Where do we stand?** Read more...

collaboration with each other. Moreover, technical WPs are also actively engaged in the data collection needed to perform the case-studies assessment. An effort which requires close involvement of companies from within and outside the consortium.

Preliminary findings obtained in WPs 2 to 7 are feeding into WP 8, that started developing the preliminary structure of the proposed blueprint/tool (***SAT-ProBio***) – identifying principles and criteria composing its skeleton. Indeed, knowledge flows in a circular way, and principles and criteria feed back into technical WPs, allowing for tuning and alignment of principles, criteria and indicators.

WP9 is also benefitting from extensive and circular knowledge flows. Technical knowledge developed through the project is flowing into the definition of a complex System Dynamic model for Bio-based Products (***SyD-ProBio***), which will serve the purpose of comparing alternative policy scenarios and assess the impact of alternative policy and regulatory measures on the creation of a level playing field and stimulate market uptake for sustainable bio-based products.

All in all, we are getting to the point where the puzzle is taking shape. I'm sure the next 18 months will pass very quickly and I'm confident that STAR-ProBio will successfully achieve its main target – contributing to the transition out of a fossil-based society and towards one based on biomass and truly sustainable.

Rome, 10/12/2018
Piergiuseppe Morone

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STAR-ProBio in brief:

- Aims to **formulate guidelines for a common framework** promoting the development of regulations and standards that support the adoption of business innovation models and market uptake in the bio-based products sector.
- Will develop a **blueprint for a sustainability scheme** and a **sustainability assessment tool** applicable to a large spectrum of bio-products.
- Will make **recommendations** for a more efficient and harmonized policy regulation framework for the market-pull of bio-products.
- Outputs will be **new and revised assessment methodologies, criteria and indicators** developed by integrating scientific and engineering approaches with social sciences and humanities.
- Application to **selected case studies** to illustrate benefits and impacts for bio-based products.
- Case studies cover **extensive value chains** with several intermediate and final bio-based products.

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STAR-ProBio Recent News

Introducing SAT-ProBio & SyD-ProBio: Two future outputs of the STAR-ProBio project

By the end of the project, STAR-ProBio will have developed two tools that will contribute, from a very practical perspective, to the market-pull of bio-based products and to a more efficient and harmonised policy regulation framework. These are:

- **SAT-ProBio**
- **SyD-ProBio**

SAT-ProBio includes a sustainability scheme blueprint and a sustainability assessment tool. The *Blueprint* is an overarching umbrella which encompasses the requirements for conducting the sustainability assessment of bio-based products, and the rules for managing such a scheme. The *Blueprint* can provide information on the most relevant sustainability aspects concerning bio-based products and related value chains, which can be further used by policy makers, regulatory bodies, industries associations, and civil society. It is consistent with the sustainability principles and criteria proposed in the European Standard EN16751:2016 (sustainability criteria for bio-based products). The *Tool* is a tailored instrument for the assessment of specific bio-based products enabling, whenever possible, the comparison of the bio-based products against conventional products or comparison amongst bio-based products.

SyD-ProBio is a complex system dynamic model designed for comparing alternative policy scenarios, assessing the impact of various policy measures and providing policy recommendations aimed at promoting the market uptake of bio-based products and creating a level playing field among innovative and conventional products. SyD-ProBio builds on a multi-stakeholder perspective and is addressed to EU and MS policy makers working in the improvement of the policy framework guiding the promotion of sustainable bio-based products.

Call for tender - CEN Workshop Agreement

To exploit project results related to the creation of a sustainability blueprint for bio-based products, the STAR-ProBio project will produce a CEN Workshop Agreement (CWA), which is an agreement developed and approved in a CEN Workshop. The workshop will be open to the direct participation of any organisation with an interest in the development of the agreement. As a standardisation activity output, the CEN Workshop agreement will enrich the project's dissemination activities and support a faster and easier access to markets for sustainable bio-based products. TUB is currently sub-contracting a National Standardisation Body to support the establishment of this CWA. A call for tender was sent to pre-selected National Standardization Bodies which were requested to submit an offer by December 7th 2018, based on detailed service specification (Terms of References). The selection process will be finalised at the beginning of January 2019. STAR-ProBio plans to start the CEN workshop series at the beginning of 2019 and aims to complete it in March 2020.

STAR-ProBio Delphi Survey on Market Assessment

STAR-ProBio completed the first round of its WP5 Delphi survey on the market acceptance of sustainability assessment factors for bio-based products with 1088 participants, including 744 consumers and 344 professionals with a specific focus on professional procurers. Key regions were Italy, Germany, Spain and the Netherlands, in addition to input from EU level representatives.

The results show the importance of sustainability certification for bio-based products: 78% of the professional procurers and even 84% of the consumers answered positively to the question "Would you regard sustainability certification for bio-based products as beneficial for your buying decisions?"

Important information influencing consumers' decisions on buying bio-based products, includes:

- Environmental topics: 1. biodegradability, 2. recyclability and 3. type and origin of raw material;
- Social topics: 1. influence of the product on people's health, 2. no child labour and 3. respect of human rights in the production of the material and the product;
- Economic topics: 1. fair land use rights practices in the production of feedstock and 2. fair business practices of the company.

Additional factors that have a significant influence on their buying decisions include: the price; the functionality/performance of the product; and an improved performance over alternative fossil-based products.

Initial findings have been presented and discussed with stakeholders at three events in Turin, Athens and Berlin in Autumn 2018. These and various other results, also including many specific findings for professionals and professional procurers, will be deepened in a second survey round, and the entire results will be published in Spring 2019.

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Read More about STAR-ProBio Research

Recent Public Deliverables

In the last 6 months STAR-ProBio has published several interesting reports:

- Deliverable D2.2: **Selection of environmental indicators and impact categories for the life cycle assessment of bio-based products.** This report describes an environmental life cycle assessment (E-LCA) methodology for bio-based products. Based on the selected life cycle impact assessment (LCIA) and relevant standardised environmental indicators and impact categories. The chosen assessment criteria are 1) ability be used for comparing bio-based materials among them and for comparing bio-based materials against conventional petrochemical products, 2) Scientific relevance, 3) Political and social priority, 4) Reliability and robustness, 5) Representativeness and 6) Stakeholder and market perception. A set of 11 indicators and associated models are recommended to be used for the environmental assessment of bio-based materials and be tested through the STAR-ProBio case studies.
- Deliverable D9.1: **Comprehensive overview of existing regulatory and voluntary frameworks on sustainability assessment.** This report aims to show potential policy gaps with regard to the establishment of a sustainable bio-economy and to develop recommendations to bridge these gaps based on STAR ProBio results. Therefore policies, strategies and legislative documents from EU member states and the European Union, potentially affecting or promoting sustainability assessment and certification were investigated. Furthermore, results of ongoing and finalized projects within the research area were incorporated in this task and a mapping of the SDGs with the results of the analysis of policy documents was conducted in order to assess links between the SDGs and sustainability requirements given in the policy documents of the analysed sample. The investigation showed, that currently, no coherent and comprehensive framework does exist for the EU bio-economy. Instead, many different types of policies with different scope and degree of detail are available. There is a lack of measurable targets within the policies. Certification was found to be an accepted instrument for the assessment of sustainability. The focus of requirements included in the policy framework is on the environmental sustainability, while economic and social aspects are less represented.
- Deliverable D9.2: **Recommendations for standards and criteria for eco-labels for bio-based products**. The European Bioeconomy Strategy aims at achieving an innovative, resilient and low carbon economy that replaces fossil raw materials with biological ones, promoting resource efficiency and contributing to a more sustainable economy. Bio-based industries are aware of the need to create trust in bio-based products by implementing suitable measures to support their market uptake and by providing consumers with appropriate information on their characteristics. Eco-labels offer great opportunities to provide such consumer information, and in this report a lists of key eco-label criteria for selected case studies have been considered and analysed. Based on four case studies, the report provides a number of recommendations, which address broader public policy and existing regulations and mechanisms. They also highlight the need to update other independent mechanisms and labels.

Publications

F.S. Ferro, D.A. Lopes Silva, F.H. Icimoto, F.A.R. Lahr & S. González-García, **Environmental Life Cycle Assessment of industrial pine Roundwood production in Brazilian forests**, Sci. Total Environ., 2018, 640-641, 599; https://doi.org/10.1016/j.scitotenv.2018.05.262; written by Universidade de Santiago de Compostela relevant to the work of WP2.

S. Bello, C. Ríos, G. Feijoo, M.T. Moreira, **Comparative evaluation of lignocellulosic biorefinery scenarios under a life-cycle assessment approach**, Biofuel, Bioprod. & Bior., 2018, 12, 1047; https://doi.org/10.1002/bbb.1921; written by Universidade de Santiago de Compostela relevant to the work of WP2.

S. González-García, P. C. Morales & B. Gullón, **Estimating the environmental impacts of a brewery waste–based biorefinery: Bio-ethanol and xylooligosaccharides joint production case study**, Ind. Crops Prod., 2018, 123, 331; https://doi.org/10.1016/j.indcrop.2018.07.003; written by Universidade de Santiago de Compostela relevant to the work of WP2.

S. González-García & J. Bacenetti, **Exploring the production of bio-energy from wood biomass. Italian case study**, Sci. Total Environ., 2019, 647, 158; https://doi.org/10.1016/j.scitotenv.2018.07.295 written by Universidade de Santiago de Compostela relevant to the work of WP2.

STAR-ProBio research also features in the newly released open access book **"Sustainability Transition Towards a Bio-Based Economy: New Technologies, New Products, New Policies"** which brings together all the papers published in the special issue of the Sustainability journal and particularly highlights outputs of Work Packages 1 and 6; https://www.mdpi.com/books/pdfview/book/1025

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STAR-ProBio Dissemination & Communication

Conferences and Events

STAR-ProBio researchers have been out and about in recent months promoting our work at a range of different conferences and events including the following:

Our project coordinator **Piergiuseppe Morone** of Unitelma Sapienza gave a short talk on STAR-ProBio at the **EURAS Conference 2018.** The conference theme was **'Standards for a Smarter Future'** and took place from the 13th to the 15th of June in Dublin, Ireland. The event was attended by 40 scientists, researchers and professionals from across Europe.

Also from Unitelma Sapienza, **Pasquale Marcello Falcone** gave a presentation entitled *'Untangling the different shades of green of the Italian forest-based sector towards a sustainable energy transition'* at the **9th International Sustainability Transitions conference** in Manchester, UK on the 14th June.

At the **SuperBIO project** seminar on the 16th June in Łódź, Poland, **Janusz Gołaszewski** of the University of Warmia and Mazury in Olsztyn represented the STAR-ProBio project and gave a presentation to over 60 scientists, policy makers, researchers and students from Poland. SuperBIO is a Horizon2020 project that aims to develop new, innovative, cross-border and cross-sectorial industrial value chains in the bio-based economy

Also on the 16th June, **Kadambari Lokesh** of the University of York participated in a public engagement event in Newcastle, UK - **Soapbox Science**, where she gave a talk to approximately 30 members of the general public and discussed the lifecycle of everyday products and the link to the STAR-ProBio project.

Krystyna Żuk-Gołaszewska of the University of Warmia and Mazury in Olsztyn gave an oral presentation 'Land use efficiency indicators for bio-based production' at the **Annual Congress on Plant Science and Bio Security**. The event was held from the 12th to the 14th of July in Valencia, Spain and was attended by ca. 80 researchers from around the world.

Diego Marazza of the University of Bologna returned to Erice, Italy for the **51st session of the International Seminars on Planetary Emergencies**, with the theme of **'Science for Peace the World Over'** to deliver a presentation on *'A risk evaluation approach for land use change associated to bio-based products'*. The event had around 100 global participants and was held from the 19th to the 24th of August.

Also in Italy the **6th Social Life Cycle Assessment Conference 'People and Places for Partnership'** took place in Pescara on the 10th to the 12th of September, where **Pasquale Marcello Falcone** of Unitelma Sapienza showcased the work of WP6 People & Places for Partnership in his presentation *'Transitioning towards bioeconomy: assessing the social dimension through the lenses of the stakeholders'.*

Janusz Gołaszewski of the University of Warmia and Mazury in Olsztyn gave a presentation on *'Anaerobic digestion as an option of the end-of-life phase of bio-based products in the light of the EU regulations'* at the **VI Baltic Biogas Forum**, held on 13th & 14th September in Gdańsk,Poland. The event was attended by ca. 70 scientists, researchers and students from Poland, Germany and Norway.

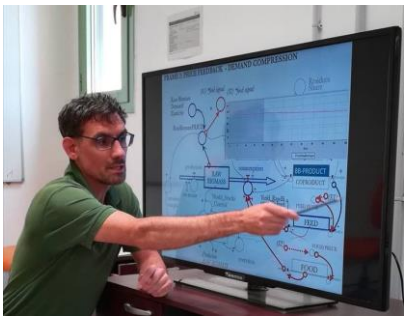
At the **2nd International Conference on Bioresource Technology for Bioenergy, Bioproducts & Environmental Sustainability (BIORESTEC)** held from the 16th to the 19th September in Sitges, Spain, **Ewelina Olba-Zięty** of the University of Warmia and Mazury in Olsztyn gave an oral presentation on the *'Estimation of the externalities in a complex life cycle analysis, with lignocellulose biomass production given as an example'*. The event attracted over 400 global participants.

Piergiuseppe Morone of Unitelma Sapienza gave an invited talk at the **European Bioeconomy Congress Lodz 2018** on the 24th September in Lodz, Poland. Scientists, researchers, policy makers, local government, regulatory bodies, representatives of business, academia and NGOs from across Europe were among the 800 participants at the event.

The STAR-ProBio project was represented by **Piergiuseppe Morone** of Unitelma Sapienza at the **Fourteenth plenary meeting of CEN/TC 411** on the 2nd of October in Stockholm, Sweden, where he gave a presentation to the Technical Committee members on the planned SAT-ProBio Bio-Based Products Sustainability Assessment Blueprint.

At the **XII Edition of the Forum CompraVerde – BuyGreen** held on 18th and 19th October in Rome, Italy, **Piergiuseppe Morone** and **Valentina Tartiu** of Unitelma Sapienza contributed to the **Mobilization and Mutual Learning (MML) Workshop "The role of Green Public procurement in boosting Bioeconomy: challenges, opportunities and barriers to overcome"** organised by the BIOVOICES project.

From 24th - 26th October several members of the STAR-ProBio project at the University of Santiago de Compostela, **Maria Teresa Moreira, Lucía Lijó, Isabel Noya** participated in the **4th Iberoamerican Congress On Biorefineries (4-CIAB)** in Jaen, Spain with two oral presentations, two poster presentations as well as delivering a course on the **Biorefinery as a multi-platform for Energy and Bioproducts**



STAR-ProBio Workshops

STAR-ProBio researchers have been involved in organising a number of internal and external workshops in recent months to promote the work of the STAR-ProBio project and to influence the direction of the project.

Sustainability Metrics: Tracking, Measuring and Reporting Responsible Innovation workshop

This WP3 workshop was held in York in September and was organised to promote the STAR-ProBio project amongst sustainability experts from academia and industry who were interested to share the significance of using green and efficiency indicators in addition to LCA to ensure a holistic coverage of product sustainability assessment, in the context of bioeconomy and circular economy. Speakers from UK-based industries and universities and also from Utrecht University shared their expertise and application of sustainability assessment methods via dedicated presentations.

Policy Analysis workshop series

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, incoherent policy framework of action. Within *Task 9.5 - Policy analysis for the creation of a level playing field*- STAR-ProBio's team is developing SyD-ProBio: a system dynamics model for the assessment of the effectiveness of policy actions, and the creation of a level playing field for bio-based products against fossil-based products and bioenergy. Given the complex and cross-cutting nature of the policy arena for bio-based products, a series of small workshops (up to 10 participants) has been set up for eliciting knowledge from relevant stakeholders for the development of the system dynamics model. These workshops are correlated with the main phases of the System Dynamics building process – e.g. system boundary selection, formulation of dynamic hypotheses, etc. To date, two workshops have been held in Rome (October) and in Stockholm (November), fuelling the development of a system dynamics conceptual model on bioplastics. The sketch of this conceptual model will represent the input for discussions for the third workshop to be held in Berlin next January.

Indirect Land Use Change workshop

In July WP7 partners participated in a 3 day technical workshop in Ravenna with the aim of working together to improve the system dynamic model applied to ILUC and to identify the most relevant factors affecting the risk of ILUC related to bio-based products, as well as planning synergies and interaction with other WPs..

The Bioeconomy Explained to Young Students

In September 2018, Unitelma (on behalf of the STAR-ProBio consortium) attended the **European Researchers Night 2018**, an "*open science event that makes science and the work of scientists familiar to audiences all over Europe*". A mini version of the Bioeconomy Village was organized in Frascati, together with the BIOWAYS and BIOVOICES projects. This was a great opportunity to present STAR-ProBio to the general public and explain the bioeconomy to young people. In the pictures to the right, Piergiuseppe Morone is introducing key bioeconomy concepts to young students from a secondary school near Rome. During the event, several bio-based products were showcased in a practical and engaging way. Students were also involved in entertaining and informative games.

European Researchers Night 2018

The main purposes of the initiative were: (1) to increase young people's awareness of the bioeconomy; and (2) to explain to them how more sustainable choices for the environment and our health can be made. At the end of the day, STAR-ProBio flyers and gadgets were distributed to all students and their teachers. This was very much appreciated!

In October 2018, a bigger version of the Bioeconomy Village was organized in the framework of the **Maker Faire Rome 2018**. This is the "*most important event in the world of innovation, a showcase of invention, creativity, and resourcefulness*". This three-day event gathers together students, teachers, researchers and the general public. The opening morning of the fair was exclusively dedicated to students from schools. In the pictures on the right, Piergiuseppe Morone and Francesca Govoni are introducing STAR-ProBio and the bioeconomy to young students attending the event, showing concrete examples of bio-based products and explaining their environmental, economic and social benefits compared to fossil-based products.

Maker Faire Rome 2018

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STAR-ProBio Work Package Updates: Reflections at halfway through the project

At just over half way through the project, STAR-ProBio Work Package leaders reflect on what has been achieved so far since the project launch back in May 2017 and what remains to be done in the second half of the project.

WP1: Screening and analysis of existing sustainability schemes for the bio-economy was completed back in January this year, with key outputs including the identification of sustainability assessment gaps and recommendations to overcome them based on analyses of current standards and sustainability assessment schemes; and the identification and selection of feasible value chains and case studies for evaluating the sustainability assessment scheme to be developed within the STAR-ProBio project.

WP2: Upstream environmental assessment and **WP3: Downstream environmental assessment** have been working closely together to assure the harmonised environmental assessment of the case studies, in terms of functional unit, system

boundaries, allocation methods, environmental indicators, etc. As a result of the review of the literature on LCA studies for the production of feedstocks, environmental indicators and impact assessment methods, and the definition of the objective and scope (system boundaries, function and functional units), the environmental indicators to perform the LCA studies have been selected. Thereafter, corn glucose, corn stover and sugar beet pulp were selected as feedstock for further investigation of the defined case studies. To date, the life cycle inventory phase of the selected feedstocks is being developed in order to have an appropriate inventory table to carry out the life cycle impact assessment. More in detail, data regarding the cultivation of corn and sugar beet in different European and non-European countries has been collected. Therefore, in the next months the report "*Life cycle inventory of feedstock production and upstream processing*" will be published, which will serve as the basis for the calculation of the environmental impact assessment of feedstock production and upstream processing.

Resource efficiency is of significance to the both environmental (and economic) performance of a value chains, promoting alternative utilisation of any and every product/ residues retaining the market value of the invested materials in the product and reducing disposal of solid waste to a landfill. Therefore, in addition to the work on LCA, **WP3: Downstream environmental assessment** has also developed/ employed some hybridised indicators by combining resource efficiency principles with that of green chemistry, highlighting the circularity characteristics embedded by the economic operators within product and process designs. Some examples of these hybridised indicators include waste-factor, renewability, hazardous chemical use, energy efficiency and circularity. These indicators are transferable to the sustainability evaluation of the fossil-based equivalents in a comparative LCA study. Future work involves testing the effectiveness of the proposed methodology via comparative LCA based evaluation of selected bio-based case studies, against that of conventional commercial equivalents which will set the baseline for the above-mentioned environmental evaluation.

Within **WP4: Techno-economic assessment** work has focussed on the development of the techno-economic sustainability assessment methodology for the production of bio-based products including relevant principles, criteria and indicators. This approach is being integrated with **WP3: Downstream environmental assessment** in order to assess the commercial potential of products, processes and services towards the minimisation of the environmental impact and maximisation of economic impact. The selected case studies are currently developed in order to be used for the evaluation and refinement of developed methodology in the next stage of the project. Emphasis will be given to the development of a systems engineering approach in order to provide the potential of each feedstock and/or process to achieve sustainable production of bio-based products, considering both techno-economic and environmental aspects. WP4 has also developed a detailed inventory of alternative end-of-life options for bio-based and conventional products and defined the scope of the techno-economic sustainability analysis of the end-of-life routes for the production of bio-based chemicals, added-value products and polymers.

WP5: Market assessment has been working on facilitating the further market uptake of sustainable bio-based products by providing in-depth information on the sustainability preferences and expectations of all relevant value chain players. The market assessment builds upon foresight methods, which include in particular focus group activities and a three-round Delphi study to identify the demand for new sustainability criteria that are easily understood and relevant to the various target groups' needs. An important output of WP5 is the completion of the first Delphi survey round, addressing two groups of European stakeholders: professionals and end-consumers. The group of professionals included public procurers, businesses, certification bodies, and other institutions such as NGOs and researchers in the relevant field. Specific considerations were given to professionals entrusted with buying decisions. The survey comprised questions on the awareness and the willingness to buy bio-based products, on the importance of certification in buying decisions and on relevant product characteristics, in particular regarding the three (environmental, social and economic) sustainability pillars. Detailed characteristics of sustainability assessment schemes were also discussed. More detailed information on the survey and its results can be found here. The survey results will be deepened in a second round, which will be presented in the next newsletter.

Despite being an emerging methodology, Social Life Cycle Assessment (S-LCA) offers the way for complementing more established Environmental Life Cycle Assessment (E-LCA) and Life Cycle Costing (LCC). Hence **WP6: Social assessment** has performed an extensive review of social sustainability with a specific focus on bio-based economy, to propose a preliminary list of value items representing the main indicators along the whole social life cycle assessment of the impacts of bio-based products. This was then used to identify a social impact framework tailored to bio-based products by means of a two-step methodological framework encompassing, (i) the identification and mapping or relevant stakeholders (i.e. workers, consumers, society, local community and value chain actors) and (ii) the validation, according a participatory involvement of stakeholders. Future work within WP6 will focus on the development of social and socio-economic criteria and indicators for end-of life analysis and actions to promote social acceptance.

WP7: ILUC risk assessment for bio-based products aims at assessing the indirect land use change (ILUC) of bio-based products, supporting the development of a horizontally applicable blueprint for a sustainability scheme. In WP7 STAR-ProBio researchers have been working on the development of a causal-descriptive model based on a system dynamics methodology (SyDILUC) which represents one of the STAR-ProBio sustainability assessment tools for bio-based products. This has involved identification of: relevant and essentially required independent variables (input); key drivers and indicators for measures and strategies to reduce ILUC risks during feedstock production, processing and product end-of-life; and the most relevant aspects

for policy recommendation and indicators. The SyDILUC output will be the "ILUC risk quantification" for the bio-based value chains. In the next few months efforts will be directed towards assessing the effectiveness of the proposed tool for selected case studies that represent real examples of bio-based products and considering end-of-life options.

Results from all other WPs are combined in **WP8: Sustainability scheme blueprint for bio-based products** to provide improvement of current regulations related to sustainability of bio-based products in the form of recommendations, blueprint of sustainability scheme and fast-track documentation related to certification schemes on. WP8 has built on the work of WP1 through performing SWOT (strength-weakness-opportunities-threats) and PESTEL (policy-economy-social-technological-environmental-legal) analysis of the gaps identified in existing sustainability schemes. Moreover: (i) concepts for communication of LCIA results were analysed; (ii) an approach to benchmarking was elaborated; and (iii) potentiality of thresholds was assessed. This work leads to: an intense discussion around the issue "sustainable products vs. sustainable behaviours" with regard to threshold identification; the preparation of a matrix for description of sustainable principles, criteria and indicators associated with the life-cycle of bio-based products in the framework of environmental, social and economic domains. One of the key outputs to date has been the conceptualisation of the Sustainability Assessment Tool for Bio-based Products (SAT-ProBio) – to be developed into a blueprint and a tool for sustainability assessment of bio-based products. Preliminary work for the establishment of a CEN Workshop Agreement, around SAT-ProBio, was conducted, including the preparation of the Terms of References for selecting a National Standardization Body (NSB). The main research activities planned for the second half of the project will focus on successive collection of results from other WPs and their integration into draft deliverables on recommendations, blueprint and fast-track documentation for sustainability schemes of bio-based products. The documents will be further discussed, corrected and improved by the virtual technical committee, meetings of stakeholders and experts from EAB and ERC. The crucial task for the next period is to elaborate a general framework for SAT-ProBio that will be the basis for the blueprint and activities related to CEN Workshop Agreement (CWA) in cooperation with NSBs and CEN/TC411.

Within **WP9: Analysis of regulations, (eco)labelling and policy initiatives**, the analysis of regulations, (eco) labelling and policy initiatives has shown a huge number of promising links between the STAR-ProBio products and the existing framework of the Bioeconomy. The analysis of these links has provided guidance for the development of the STAR-ProBio blueprint and the SAT-ProBio tool. Furthermore, this activity has revealed a number of gaps in the existing policy framework of the Bioeconomy which will be addressed by future activities in WP9. In addition to the analysis of the EU policy framework, WP9 has focused on the development of recommendations for standards and criteria for eco-labels for bio-based products. For this purpose, a set of existing EU (Eco) labels has been applied and tested with the STAR-ProBio case studies. Additionally, respective industry stakeholders have been approached to identify potentials for the further development of EU (eco) labels based on STAR-ProBio results. Upcoming activities in STAR-ProBio WP9 will focus on three key areas:

- Using the existing structure of the draft STAR-ProBio blueprint to develop a co-regulation framework which is compatible with existing EU regulations and which will support the market uptake of STAR-ProBio results;
- Analysis of the extent to which sustainability certification activities are suitable to support national and EU BE monitoring activities;
- Testing the effectiveness and impacts of different policy recommendations which shall support the market uptake of sustainable bio-based materials by supporting the creation of a level playing field.

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STAR-ProBio Researcher Interviews

Enrico Balugani

What is your role in the project and how does your work help to reach STAR-ProBio's desired impact?

I'm part of the Bologna University (UNIBO) task force and I'm mainly concerned with the implementation, improvement, calibration and validation of the model for indirect land use change (ILUC) risk analysis. Very briefly, ILUC is the negative, indirect impact on land use change that could potentially occur due to increase in biomass production to fulfil the increase in manufacture of bio-based products. Since ILUC is a very complex process, we at UNIBO are trying to simplify the model through the use of a descriptive model, which will eventually

"The bottom line is that we will be able to take into account the risk of ILUC effects in the certification of bio-based products."

Enrico Balugani, Università di Bologna

More information on the STAR-ProBio ILUC model will feature in a forthcoming issue of our newsletter.

inform the certification scheme for bio-based products. The bottom line is that we will be able to take into account the risk of ILUC effects in the certification of bio-based products.

What is the most interesting part of your job?
First of all, the fact that I'm helping reducing the potential impact on soil quality and the environmental in general, especially in countries outside the EU. Those countries' policies are too often driven as a response to the global market trends, which is set by the most powerful nations. Secondly, the study of the global market interactions is very interesting, helps in the understanding of the dynamics related to global crop yields, and gives clear directions for producers for better practices. Finally, modelling is always a stimulating challenge, and I personally love it!

Tell us a bit about your background/career path
I completed both my BSc and MSc in Environmental Sciences at Bologna University in Italy, with an MSc thesis on the monitoring and modelling of groundwater dynamics and quality in the coastal zone of the Po valley. After that, I got a PhD position in the Netherlands with Twente University (in collaboration with Wageningen University) and specialized in soil physics, hydrogeology, and environmental modelling. I later moved to Bogotá, Colombia, were I worked for some time as a hydrogeologist with Cenigaa research centre to characterize and model the groundwater reservoirs in the Huila department, Colombia. During this period working as a hydrogeologist, I got deeply interested in modelling in general, and I applied many modelling and data analysis techniques (geospatial, dynamic, statistical modelling, machine learning, econometrics).

What is your view of the bio-based products sector/market?
There is an enormous potential for the bio-based products, since plastic products are both pervasive and essential to the modern economy. The first step in reaching a circular economy is to produce plastic from renewable sources, possibly with renewable energy. The second step is to focus on biodegradable bio-plastics, and, possibly, to use waste as a biomass feedstock for the bio-plastics. However, we should take into account possible, dynamic and related effects on other sectors of the economy and other regions of the world, to avoid shifting the problem somewhere else.

In your opinion, what would success look like for the project?
The success of the project means that we delivered a certification scheme simple to use, transparent and flexible enough, which can also be used to evaluate possible future direction for improvements of the bio-plastics (and bio-based products in general) by the policy makers. The flexibility of the scheme is paramount, in my opinion, since the market is dynamic and still developing. We should be able to include new possible findings from R&D on bio-plastic, and show how important it is to invest in it. This can be done, for example, by showing the pros and cons of third generation feedstocks (still under research) against first generation ones (currently used).

Mathilde Crêpy

What is your role in the project and how does your work help to reach STAR-ProBio's desired impact?
I work for ECOS, the European Environmental Citizens' Organisation for Standardisation. ECOS is a pan-European non-profit organisation which promotes and defends the environmental voice in the development of standards at the European and international level. With nearly 50 member organisations from across Europe and North America, ECOS is the only environmental NGO specialised in standardisation worldwide.

Within STAR-ProBio, ECOS is contributing to the market assessment, the work on land use change and the blueprint, and the drawing of policy recommendations.

Our ambition is for the project to lead to the development of a comprehensive and ambitious set of sustainability criteria for bio-based products, and transparent communication to consumers and end users about the performance of bio-based products.

What is the most interesting part of your job?
Advocacy work often comes with being passionate and convinced about one's arguments. I really like developing ECOS strategy on the files I cover, confront it with the reality of the field thanks to our members, and publicly defend it. It is both challenging and rewarding.

Tell us a bit about your background/career path
Nothing in my background indicated that I would end up working on standards. I have two master's degrees in Political Science and one in Environmental Law. As a student, I specialised early in environmental matters, which I found so interesting I never thought of focusing on anything else. After graduating, I worked for the European Commission on climate policies; notably on the famous EU Emission Trading System: the biggest carbon market worldwide to date – quite a technical file! After 3 years, I wanted to do more environmental advocacy, while still working on technical issues. ECOS was the perfect match. I've worked there since 2017 focusing on the bioeconomy, sustainable finance and environmental management.

What is your view of the bio-based products sector/market?
No long-lasting economy will ever rely on fossil resources. In this sense, the use of renewable resources such as biomass is undeniably the future. Having said that, biological resources, no matter how renewable, are always limited – something we tend to forget. For the economy to be sustainable, materials and resources have to be used within the limit of their regenerative capacity and within planetary boundaries. Therefore, to me, bio-based products are only part of the solution rather than the solution itself.

In your opinion, what would success look like for the project?
The project will be a success if it inspires policy-makers to design more ambitious product policies, and for standard-setters and certification schemes to pick up on our blueprint. It will also play an instrumental role in incentivising industry to design more sustainable products and provide reliable information to consumers to make more sustainable purchasing decisions.

"For the economy to be sustainable, materials and resources have to be used within the limit of their regenerative capacity and within planetary boundaries"

Mathilde Crêpy, ECOS

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STAR-ProBio M18 meeting, Athens

The STAR-ProBio M18 Meeting (8th to 10th October 2018) was hosted by project partner AUA in Athens, Greece and attended by representatives from all the other partner organisations. After a first day of sharing recent developments internally among partners, in depth feedback on the project work to date was provided from the External Advisory Board and External Review Committee Members on day two. The meeting concluded with a dedicated session for Project Management, where discussions surrounding the SAT-ProBio tool featured heavily. A special thanks to all External Advisory Board and External Review Committee members for their active participation and constructive feedback!

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Related European Projects

STAR-ProBio has cultivated synergistic co-operations with many related European projects. In June next year we will be partnering with the LIFECAB project to deliver a joint workshop and here we provide some background information on this project. We also report on the progress made in recent months by the European Bioeconomy Network, a collaboration between several bioeconomy related EU projects including STAR-ProBio.

LIFECAB, funded in 2017 under the 2016 Life Programme, aims to maximise recycling and reuse of municipal bio-waste (MBW) through the implementation of two new processes: (i) production of soluble bio-based substances (SBO) from MBW compost, and (ii) anaerobic digestion of MBW in the presence of SBO to obtain a digestate with reduced ammonia and biogas with improved methane content compared to current technology. In the first project year the preparatory tasks of monitoring the seasonal and geographical variability of compost and design and construction of a prototype facility to produce SBO have been completed.

Planned activities for the second and third project year are (i) operation of the prototype to produce 10-50 t/year SBO and (ii) validation the SBO assisted anaerobic fermentation process, both carried out within the Acea MBW treatment plant located in Pinerolo, Italy. LIFECAB has wider ambitions beyond validating the two processes. According to previous research, SBO are efficient chemical specialities for multiple uses in the chemical industry, agriculture and animal husbandry. This offers the perspective to turn a MBW treatment plant into a biorefinery producing bio-based fuel and chemicals. By funding the fabrication of the prototype, LIFECAB represents a milestone to reach the biorefinery objective after project life.

Read more in the project web site www.lifecab.eu. Contact persons: enzo.montoneri@gmail.com; simone.solaro@hysytech.com.

As reported in our last newsletter, Star-ProBio is a member of the **European Bioeconomy Network (EuBioNet)**, officially launched in May this year. EuBioNet facilitates collaboration among EU funded projects that are communicating, promoting and supporting the Bioeconomy in order to maximise impact and has recently expanded to 30 partners. The network has been active in promoting events and activities organised by its members and dissemination of their project's results, as well enhancing networking (including joint participation to new funding calls). Since May, EuBioNet has made significant progress and has a number of successes to date, including gaining recognition from the European Commission as being a key player for promoting and communicating bioeconomy in the recent update of the Bioeconomy Strategy. The network has also supported the organisation of a number of joint activities such as the Maker Faire, Bioeconomy Village and Mobilisation and Mutual Learning workshops, as well as exhibiting at events including Researcher's Night and the Bioeconomy corner at 'Sustainable and Circular Bioeconomy, the European way', part of the European Commission's high level conference on European Bioeconomy Strategy held in Brussels in October and visited by Commissioner Moedas (photo on the right).

For a full list of the network's achievements and how to join please visit http://eubionet.eu/.

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Save the date: STAR-ProBio EURAS side-event

STAR-ProBio co-organises the 'Standards for a Bio-Based Economy' EURAS conference @ 13-15 June, Rome

The 2nd STAR-ProBio workshop will take place as a side-event of the 2019 EURAS conference (European Academy for Standardisation e.V.) held at LUISS Guido Carli University of Rome, Italy from 13-15 June 2019. Our workshop will be organised jointly with the LIFECAB project. More details to follow shortly!

The organisation committee have published the Preliminary Call for Papers. The conference theme is 'Standards for a Bio-Based Economy'. Please submit papers by 15 February 2019. Notification will be sent out by 22 March. The deadline for the final paper is 5 April 2019. You'll find the call for papers here.

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STAR-ProBio in brief:

- Aims to **formulate guidelines for a common framework** promoting the development of regulations and standards that support the

STAR-ProBio Partners:

- Unitelma Sapienza University of Rome
- University of York
- Technische Universitaet Berlin

adoption of business innovation models and market uptake in the bio-based products sector.

- Will develop a **blueprint for a sustainability scheme** and a **sustainability assessment tool** applicable to a large spectrum of bio-products.
- Will make **recommendations** for a more efficient and harmonized policy regulation framework for the market-pull of bio-products.
- Outputs will be **new and revised assessment methodologies, criteria and indicators** developed by integrating scientific and engineering approaches with social sciences and humanities.
- Application to **selected case studies** to illustrate benefits and impacts for bio-based products.
- Case studies cover **extensive value chains** with several intermediate and final bio-based products.

- Agricultural University of Athens
- Deutsches Biomasseforschungszentrum
- SQ Consult
- University of Bologna – Alma Mater Studiorum
- Uniwersytet Warminsko Mazurski W Olsztynie
- ChemProf
- Quantis
- NOVAMONT
- Swedish Environmental Protection Agency – Naturvardsverket
- Universidade de Santiago de Compostela
- agroVet GmbH
- European Environmental Citizens Organisation For Standardisation

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STAR-ProBio geographical distribution of partners

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www.star-probio.eu/news/

STAR ProBio

Sustainability Transition Assessment and Research of Bio-based Products

STAR-ProBio Newsletter Issue 3 **December 2018**

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This project is funded by the European Union's Horizon 2020 Research and innovation action under grant agreement No 727740 with the Research Executive Agency (REA) - European Commission. Duration: 36 months (May 2017 – April 2020).
Work Programme BB-01-2016: Sustainability schemes for the bio-based economy

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