



Proposal of actions to increase/improve the participation of the agricultural sector in BBI JU and ultimately in the bio-based sector

DISCLAIMER

The study on the “**participation of the agricultural sector in the BBI JU: business models, challenges and recommendations to enhance the impact on rural development**” aims at undertaking a detailed assessment of the participation of the agricultural sector in BBI JU portfolio, and to identify business models, challenges and recommendations to enhance the impact of BBI JU initiative for the agricultural sector. The information and views set out in this study are those of the authors and do not necessarily reflect the official opinion of the BBI JU. The BBI JU does not guarantee the accuracy of the data included in this study. Neither the BBI JU nor any person acting on the BBI JU behalf may be held responsible for the use which may be made of the information contained therein.

The study has been successfully implemented and has delivered **a set of 28 recommendations addressed to BBI JU, BIC and EC** to improve the participation of the agricultural primary sector in BBI JU projects (in numbers and in relevance). As highlighted in the study, it is expected that its implementation will also contribute to enhancing and consolidating further the participation of the agricultural primary sector in the bio-based sector and its value chains, in general.

A task force composed by BBI JU, BIC and EC has prepared an action plan that prioritises the recommendations in a coherent and effective way. The prioritisation of the recommendations was carried out taking into consideration that only some of them can be implemented in a short term (via the final BBI JU annual work plan under H2020) whereas others were applicable solely for medium to long-term implementation, possibly even in the context of a future partnership under Horizon Europe. Moreover, some of the recommendations suggested by the contractor were considered as not feasible under the current legal framework of H2020. Finally, as highlighted in the study, some recommendations might address one issue, while potentially having a negative impact on another issue.

Against this background, the task force suggests in the action plan to address only **feasible actions** under the current legal framework (Horizon 2020) and to start with those recommendations with **expected high and medium impact**, to be implemented during the lifetime of the current BBI initiative (2019-2024), provided that **the rest can be addressed under a future partnership** if there will be one under Horizon Europe. The **monitoring** of the implementation of the action plan will take place annually by the task force in order to adjust its implementation if considered necessary, in view of new findings. The action plan has been endorsed by the BBI JU GB on 4 of December 2019.



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PROPOSAL OF ACTIONS TO INCREASE/IMPROVE THE PARTICIPATION OF THE AGRICULTURAL SECTOR IN BBI JU AND ULTIMATELY IN THE BIO-BASED SECTOR AS A WHOLE

1. Background

The study on the *“participation of the agricultural sector in the BBI JU: business models, challenges and recommendations to enhance the impact on rural development”* has its origin in the decision of the BBI JU Governing Board taken in its meeting of 13 June 2018¹.

From April-August 2019, the task force (EC-BIC-BBI JU) created to implement this decision, has worked together first to prepare the tender specification of the study and after that, to supervise the draft of the study. Three meetings (kick-off, interim and final meetings) were organised to discuss its implementation with the contractor (Innovarum). The final report was submitted on 9 August.

The objectives set for the study were: to undertake a detailed assessment of the participation of the agricultural sector in BBI JU portfolio, and to identify business models, challenges and recommendations to enhance the impact of BBI JU initiative on rural development.

The study encompasses different chapters, **including a set of 28 recommendations**, besides the assessment of participation of the agricultural sector in the BBI JU portfolio, the identification of challenges, and the selection of very interesting and promising business models. While all recommendations are formulated so as to improve the participation of the agricultural primary sector in BBI JU projects (in numbers and in relevance), the implementation of the recommendations would also contribute to enhance and consolidate the participation of the agricultural primary sector in the bio-based sector and its value chains, to help the sector enjoy benefits thereof, and to maximise the positive impact of the BBI JU overall, on rural development.

2. Aim of this document

The aim of this document is to present to the BBI JU Governing Board a **proposal prepared by the task force with respect to the implementation of recommendations proposed in the study**. As also mentioned in the study, it is not feasible to implement all recommendations at the same time. In addition, some recommendations might address one issue, while potentially having a negative impact on another issue (e.g. recommendation 2.7 promoting the participation of farmers from different geographical locations might hamper the participation of farmers by making it more complicated both to find partners and to run the project. This recommendation is in contrast to recommendation 2.4 on providing funding to smaller projects).

¹ BBI JU Governing Board Decision 1806-08: BBI JU to lead a Task Force, to undertake a detailed assessment of the participation of the primary sector in the BBI portfolio, and to identify challenges, best practices and actions to enhance the impact of BBI JU actions on rural development. DG AGRI and DG RTD to participate in the task force.



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It is important to note, that the study suggests recommendations that can be addressed by BBI JU and its partners at operational level. However, some of the challenges can only be tackled by promoting structural changes in the agricultural sector and taking measures at a higher political level that are beyond the remit of BBI JU. Recommendations at that level has not been addressed in this study.

3. Methodology

In collaboration and consultation with the task force, the 28 recommendations have been **analysed and prioritised**. More concretely, each recommendation has been characterised as follows:

- Feasibility of its implementation in view of the competences (and remits) of BBI JU, BIC and /or EC and within the current structure of the BBI JU programme and rules: Yes/No. Arguments are provided.
- Impact if implemented in contributing the goals of the study (effectiveness): high; medium; or low.
- Who would be the main responsible and the organisation in charge of performing the tasks: BIC, EC or/and BBI JU.
- Timing (when): short term (possibility to take any action in the draft 2020 AWP and the guide for applicants (2019-2020); medium term (between 2020-2024 and before the end of the current BBI initiative); or long term (for Horizon Europe work programmes in the context of a potential partnership in the area)

The results of this analysis are presented in the table below.

4. Conclusions

After analysing and prioritising the 28 recommendations presented in the study, the task force suggests to start with feasible actions for BBI JU and its partners, with expected high and medium impact, to be implemented during the lifetime of the current BBI initiative (2019-2024). These recommendations are highlighted in green in the table. **If the proposed prioritisation is endorsed by the Governing Board, the following actions would also need to be considered at this stage:**

1. Adjust (slightly)/reinforce the 2020 Annual work plan² in order to implement recommendations 2.3., 2.6., 2.8, 2.9 and 2.12.

² These are the elements already incorporated in the draft 2020 AWP in relevant topic texts. For expected social impacts: “create new job opportunities in the bio-based sector in rural, coastal and/or urban areas”. In the topic description of the topic BBI 2020 D.1 “Proposals have to be suitable for direct acceptance and implementation by farmers (if the supply chain addresses sources on the land) or foresters (if the supply chain addresses sources in the forest area). Proposals therefore need to include these actors in the related primary sector as strategic



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2. Update BBI JU guide for applicants in order to implement recommendations 2.6. and 5.3.
3. Work in dissemination and communication activities (improving visibility of BBI JU for the farmer community) in order to implement recommendations 5.1, 5.2.,5.3 and 5.4
4. Further explore synergies with EIP-AGRI and RDP in order to implement recommendation 6.1.
5. Collect recommendations from BBI JU projects related to regulatory hurdles in order to implement recommendation 6.2

The rest of recommendations, if feasible, should be implemented in the context of a future partnership, if any, under Horizon Europe.

Next steps:

- To implement the short-term recommendations (points 1 and 2 above): adjustment of the draft 2020 AWP and update of the guide for applicants accordingly.
- To present this proposal to the Governing Board for its endorsement.

The task force could meet once per year to analyse the implementation all the recommendations and adjust it according to the needs of BBI JU and its partners, and in view of new developments. The task force should report to the Governing Board the outcomes of this follow-up.

partner(s) and leading the value chain. The involved farmers/foresters participate in the design of the value chain and benefit from its results”.

Cluster of recommendations	Recommendation	Feasibility	Impact	Who	When
1. Related to funding priorities (2 recommendations provided)	1.1. Foster funding lines adapted to, and ring-fenced for, agro-based biomass The idea is to set specific funding lines and budget ring-fenced for agro-based proposals	Not legally feasible. In the current structure of the BBI JU programme, only funding is ring-fenced by type of actions- allowing competence between topic texts within the same type of actions. On top of that, SIRA gives equal importance to the use of other types of feedstock.	Medium (having more budget from agro-based does not ensure the participation of farmers in the proposal)	n.a.	n.a.
	1.2. Promote the use of agro-based biomass The idea is that if several sources of biomass are allowed, the use of agro-based biomass should be prioritised in the selection procedure.	Not legally feasible. With the existing evaluation criteria is not possible to prioritise agro-based proposals in a group of other proposals using other type of biomass.	Medium (having more agro-based proposals does not ensure the participation of farmers in the proposal)	n.a.	n.a.
2. Related to annual calls and topics description (13 recommendations provided)	2.1. Include a significant representation of agricultural producers in the design of the annual calls and topics descriptions. The idea is to	Yes (on going and possibility to improve). During the last years, the number of BIC members working in the agricultural sector, has increased, thus making the topics	Medium	BIC/EC	Long-term. There is not time to improve this involvement farmers in the draft of the (last) 2020 AWP but should be considered in the context

	increase the involvement of farmers and its associations in the annual work plans drafting process. The partners should mobilise them and involve them in this process.	more attractive for this sector. Further promoting and ensuring involvement of farmers in the process is possible. However, there is always a limitation and the results depend on the interest/possibility of farmers to participate in the process and become BIC members.			of a future partnership under Horizon Europe.
	2.2. Focus on projects with higher TRLs (from 6 to 8). The idea is to include more topics with final TRL 8 and not focused only on the biorefinery technology but rather in agricultural practices. (clear application and potential benefits in terms of more incomes, increase the attractiveness for farmers)	Yes, but with limitations. The expected percentage of funding going to Flagship projects has been defined in the SIRA. By definition in the current BBI JU programme, TRL 8 is covered by projects demonstrating the biorefinery technologies at pre-commercial scale and should cover the full value chain (not only on the part of the biomass supply and thus agricultural practices).	High	BIC/EC	Long-term. No time for 2020 AWP but should be considered in the context of a future partnership under Horizon Europe
	2.3. Promote the inclusion of the agricultural producers in the consortia in projects with higher TRLs using agricultural biomass. Recommending the participation of farmers in agro-based	Yes (on-going). Possibility to further encourage the involvement of farmers in the proposal or even in the consortia as beneficiaries via the topic text (mentioned already in topic BBI2020.SO1.D1- to explore if	Medium (might increase the participation but not the relevance of	BIC (programming team) /EC RTD B1/ BBI JU	Short-term: small window of opportunity to adjust relevant topic text in the 2020 AWP in order to reflect this idea

	proposals, will increase the number of farmers in the consortia.	could be added in other relevant topics). This action should be linked with the action proposed in recommendation 2.8, 2.9 and 2.12.	its participation)	(programme unit)	
	2.4. Allow for smaller projects and simplify reporting requirements. Idea behind: Due to the structure and characteristics of the agricultural sector, this sector would fit better in this type of proposals.	Not legally feasible under the current structure of the BBI JU. Reporting requirements in any case will be to a large extent corporate and identical for all Horizon Europe beneficiaries. This action should be explored together with recommendations 2.5 and 4.4.	High	BIC/EC	Long-term. For the future call for proposals under Horizon Europe, would be possible to explore the possibility to include a new type of action (agro-based oriented topics, bottom-up, smaller budget, and simplified reporting requirements) depending on the scope of the future partnership.
	2.5. Allow projects to be proposed via a bottom-up approach	Not legally feasible under the current structure of the BBI JU. This action should be explored together with recommendations 2.4 and 4.4.	High	BIC/EC	Long-term. For the future call for proposals under Horizon Europe, it would be possible to explore the possibility to include a new type of action (agro-based oriented topics, bottom-up, smaller budget, and simplified reporting requirements) depending

					on the scope of the future partnership.
	2.6. Topic descriptions could explicitly request impact on rural areas during the project implementation . The proposal should describe how the impact will be achieved and the method used for evaluate if it has been achieved. The study (page 147) describes examples of activities to be implemented during the project in order to foster future impact on rural areas ³ .	Yes. The 2019 annual work plan and the draft 2020 AWP (in the relevant topics) already requests explicitly the need to contribute to rural areas (create new job opportunities, particularly in rural areas). The expected impacts in the topic texts could be enlarged addressing as well growth of income of farmers or more broadly saying: “support to rural development”. In addition, in the guide for applicants BBI JU could add the examples provided in the study (page 147) on how to contribute to rural development and how to monitor it during the project, as examples/good practices	High	BIC/EC (AWP) and BBI JU (guide for applicants)	Short-term: small window of opportunity to adjust relevant topic text in the 2020 AWP in order to reflect this idea; update the guide of applicants providing examples.

³ Examples of activities to be implemented during the project’s duration in order to foster future impact on rural areas could be: Promote that consortia work on creating synergies with already established networks in the area working on rural development (LEADER groups, EIP-AGRI initiatives); Request that dissemination and communication activities include agricultural stakeholders and rural areas; the project budget allocated to activities/partners established in rural areas should be quantified and ranked; Involve local, rural entrepreneurs active in, for example, logistics, pre-processing and stockage of biomass, disposal/use of by-products and waste, and other services (thus encouraging local sourcing of support services).

	2.7. Require participation in projects from agricultural producers from different geographical locations to ensure representability and applicability of the developed solutions.	Yes. Actions in that direction linked to widening actions.	Low	BIC/EC	Short- medium and long – term in the frame of widening actions
	2.8. Project applications have to reflect relevance of project to farming community . It is recommended that the proposals should consider the establishment of an advisory board of farmers which collaborates with the consortia by advising and measuring the impact of the project	Yes. As mentioned in the recommendation 2.3, 2.9 and 2.12, the relevant topic text could further encourage farmers to be involved in the consortia but ALSO could be added that the involvement could take the form of an advisory body to advice and monitoring the impact of the project (during the duration of the project) on the agricultural sector/rural development.	High	BIC (programming team) /EC RTD C1/ BBI JU (programme unit)	Short-term: small window of opportunity to adjust relevant topic text in the 2020 AWP to reflect this idea
	2.9 Foster the inclusion of cooperatives or other forms of agricultural cooperation in the topics. It is recommended to promote the participation of agricultural	Yes. As mentioned in the recommendation 2.3, 2.8 and 2.12 the relevant topic text could further encourage farmers to be involved in the consortia but ALSO could be added that the involvement could take the form of cooperatives or	High	BIC (programming team) /EC RTD C1/ BBI JU (programme unit)	Short-term: small window of opportunity to adjust relevant topic text in the 2020 AWP to reflect this idea

	cooperatives as members of the consortium	other forms of agricultural cooperation.			
	2.10. Strengthen the environmental and climate requirements of the projects . This might increase the relevance of the projects to farmers	Yes, on-going. AWP 2019 and draft 2020 AWP emphasise the importance to contribute to positive environmental and climate impacts	Low	BIC (programming division) /EC RTD C1/ BBI JU should be in the loop	Short, medium and long term in future AWP's under HE
	2.11. Support projects with longer time horizons to record mid-term impacts in agricultural contexts . This might increase the relevance of the projects to farmers and its impacts.	Yes. BBI JU AWP does not set compulsory duration for projects (is only indicative)	Low	BIC (programming division) /EC RTD C1/ BBI JU should be in the loop	Short, medium and long term in future AWP's under HE

	2.12. Foster the role of facilitators to increase the participation of farmers . The idea is to foster the role of advisors/innovation brokers to support (“speak on behalf of”) farmers during the project implementation. The recommendation also suggest to provide funding for facilitators through a flat-rate/lump-sum in smaller projects	Yes, the first part of the recommendation is feasible. The “innovation broker” is a tool already used for example in EIP-AGRI. As mentioned in the recommendation 2.3, 2.8 and 2.9, the relevant topic text could further encourage farmers to be involved in the consortia or proposal but ALSO could be added that other forms might be possible, such as cooperatives, facilitators, etc.	High	BIC (programming team) /EC RTD C1/ BBI JU (programme unit)	Short-term: small window of opportunity to adjust relevant topic text in the 2020 AWP in order to reflect this idea.
		However, under the current structure and rules of BBI JU, is not feasible to provide funding for facilitators through a flat-rate/lump-sum in smaller projects			Long-term: For the future call for proposals under Horizon Europe, would be possible to explore the possibility to provide funding to support the role of the facilitators or innovation brokers with lump-sum or flat-rate
	2.13. Improve possibility to allow compensatory payments to farmers. The idea is to include	Not legally feasible under the current rules of H2020 and BBI JU (are not eligible costs)	High	EC/BIC	Long-term in future AWP's under Horizon Europe, depending on corporate approach for HE

	payment for farmers as an eligible cist for participating in projects				
3. Related to the evaluation process : selection of projects for funding and monitoring of ongoing projects (4 recommendations provided)	3.1. Involve agricultural producers in the evaluation of project proposals . In relevant topics, the panel should include at least one primary producer or related stakeholder	Yes, ongoing. Evaluators have different profiles, including agriculture expertise, to ensure the expertise needed to evaluate the topics is well covered.	Low	BBI JU	Short-term
	3.2. Introduce requirements in the topic text to be evaluated during the selection of proposals	Not legally feasible. On one hand is not possible to modify the evaluation criteria. On the other hand, all the requirements of the topic text are already evaluated. Therefore, there is not clear point to implement this recommendation.	Low	n.a	n.a
	3.3. Ensure that BBI JU activities on monitoring the impacts of projects fully and realistically cover the reality of the agricultural sector. This recommendation is focused on how to improve the collection of data (e.g. collection of data to be done on individual basis	Is not feasible to ask all the beneficiaries to report on the expected impacts (rather than only the COO).	Low It is not clear how this action can help to improve the participation of the agricultural sector in the BBI JU.	n.a	n.a

	and not only via the COO but to all beneficiaries)				
	<p>3.4. Adapt BBI JU monitoring indicators (KPIs and socio-economic impacts) to capture better the reality of the agricultural sector</p> <p>The recommendation suggest to adjust the questions asked to COO via the KPI & impact questionnaire to ensure that they are easier to understand and answer by agro-base participants (details in page 153 of the study)</p>	Yes. Annual updates are taking place in consultation with EC, BIC and the Scientific Committee. Suggestions proposed in the study should be explorer in the next revision.	Low (no clear how can this increase/improve the participation)	BIC/EC RTD C.1 and DG AGRI)/BBI JU	Medium and long term
4. Related to participation rules (3 recommendations provided)	4.1. Modify funding rates in RIAs to foster the participation of large agricultural cooperatives (to avoid that large cooperatives qualified as large industries are not receiving funding)	Not legally feasible under the current rules of H2020 and BBI JU	High	BIC/EC	Long-term: possibility to explore if it is possible depending on the scope of the future partnership.
	4.2 Provide 100% funding for small and medium agricultural producers in IAs (to foster the participation of	Not legally feasible under the current rules of H2020 and BBI JU	High	BIC/EC	Long-term: possibility to explore if is possible depending on the scope of the future partnership.

	small and medium agricultural producers qualified as SMEs in IAs)				
	4.3 Implement an instrument to provide agricultural producers with small grants and reduced reporting requirements	Not legally feasible under the current rules of H2020 and BBI JU. The available instruments under Horizon Europe in any case will be to a large extent corporate. This action should be explored together with recommendations 2.4 and 2.5.	High	BIC/EC	Long-term: possibility to explore if is possible depending on the scope of the future partnership.
5. Related to better visibility of the BBI JU initiative (4 recommendations provided)	5.1. BBI JU joint dissemination actions with local actors. The contractor suggests some example (page 157)	Yes, depending on possibilities of time/resources	High	BBI JU/BIC + farmer org.	Medium-term: possibility to take actions in this direction in the last part of the BBI JU programme between 2020-2024 and also long term
	5.2. Appoint 'farmer champions' who can promote BBI JU among other farmers. The role of this figure, appointed between our project's participants, would be: spread out the work of BBI JU, facilitate the communication with farmers on behalf of BBI JU and increase the	Yes, but under possibilities of our time/resources and depending on external support we could receive from outside BBI. Possibility to use procurement.	High	BBI JU/EC AGRI	Medium-term: possibility to take actions in this direction in the last part of the BBI JU programme between 2020-2024 and also long term

	perception of benefits by farming communities.				
	5.3. Include requirement for agricultural project participants to participate in events related to their project. The recommendation is addressed to foster that the project beneficiaries spread out the word about BBI JU in events and reach the farmer community via.	Yes, but with some reservation. The possibility to implement this recommendation, depends on the dissemination and communication plan of the proposal and if it envisage this type of actions. This action should be implemented together with recommendation 2.6	Medium	Project beneficiaries/B BI JU	Medium term: together with recommendation 2.6 to update the guide for applicants (possibility to take actions in this direction in the last part of the BBI JU programme between 2020-2024) and also long-term
	5.4. Use young farmers' networks and programmes to increase the visibility of BBI JU. This action consists in using established networks and programmes to support young farmers as a dissemination platform to increase the visibility of the BBI JU initiative	Yes, depending on the availability of resources/time	High (young farmers are a powerful target audience)	BBI JU + association of young farmers (CEJA) in cooperation with DG AGRI	Medium-term: possibility to take actions in this direction in the last part of the BBI JU programme between 2020-2024 and also long term
6. Related to links to other EU measures (2 recommendations provided)	6.1. Create synergies and follow-up strategies with RDP and/or EIP-AGRI initiatives. The study suggest some concrete actions on how to improve synergies in page 158	Yes, to complement with on-going activities on synergies. Further explore synergies with Rural Development Programme (RDP) and/or EIP-Agri	Medium	EC/BIC/BBI JU	Medium and long term

	6.2. Collect recommendations from ongoing and finished projects relating to regulatory hurdles, to be assessed by an EU-level task force	Yes, feasible and interesting to feed policy-making (on-going activities in relation to this are carried out)	Medium	EC	Medium and Long-term
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STUDY ON THE PARTICIPATION OF THE AGRICULTURAL SECTOR IN THE BBI JU

BUSINESS MODELS, CHALLENGES AND RECOMMENDATIONS TO
ENHANCE THE IMPACT ON RURAL DEVELOPMENT

Innovarum



 Bio-based Industries
Consortium

STUDY ON THE PARTICIPATION OF THE AGRICULTURAL SECTOR IN THE BBI JU: BUSINESS MODELS, CHALLENGES AND RECOMMENDATIONS TO ENHANCE THE IMPACT ON RURAL DEVELOPMENT.

THE BIOECONOMY STARTS ON THE FIELDS

Study carried out by INNOVARUM (Eurizon S.L.) under BBI JU Tender BBI.2019.SC.01

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It was coordinated by Irene Paredes and Maya Hernando, and counted with the extensive contribution from Carina Folkesson Lillo. Furthermore, significant support was given by Ana Villar and Africa Pardavila, staff of Innovarum

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EXECUTIVE SUMMARY

This report is the result of a study commissioned by the Bio-Based Industries Joint Undertaking (BBI JU) with the aim of **increasing the participation of the agricultural primary sector in the BBI JU initiative, as well as the relevance of their participation**. Its goal is to enhance and consolidate the participation of the European agricultural primary sector in the bio-based sector and its value chains, to help the sector enjoy the benefits thereof, and to maximise the positive impact of the BBI JU on rural development.

The study was carried out between April and August 2019. First-hand opinions from relevant actors were gathered by various methods: surveys, in-depth interviews, a focus group meeting with experts in bioeconomy from across Europe, and interaction with relevant EU networks (e.g. EIP-AGRI, ENRD Thematic Group on Bioeconomy¹, BIOEAST²).

Four objectives were set for the study:

- » to **assess the current participation of agricultural primary producers** in the BBI JU project portfolio;
- » to **identify examples of innovative business models** to allow successful integration of the agricultural sector in bio-based value chains;
- » to **identify key challenges** encountered by the agricultural sector to participating in bio-based value chains in general and in BBI JU in particular; and,
- » to **provide recommendations** to address these challenges.

The main findings are summarised below.

Assessing the participation of agricultural primary producers in BBI JU projects awarded between 2014 and 2017, it was found that 23% (17 projects out of 74) included agricultural primary producers as project

partners³. This accounts for only 3% of beneficiaries in the total BBI JU portfolio. Agricultural producers were rarely in the driving seat in BBI JU projects since they were in general assessed to have limited influence on the work and on decisions taken. In fact, only three projects have an agricultural producer as a coordinator.

On the other hand, an additional 25 projects (34%) made use of agro-based biomass but did not have any agricultural primary producers involved as project beneficiaries. Instead, agricultural stakeholders were involved in other ways, such as through subcontracting; long-term contracts and compensation payments per hectare; or beneficiaries representing the interests of farmers. Examples are described in the study.

BBI JU projects are expected to have an impact on rural development and job creation. However, 57% of the BBI JU beneficiaries surveyed (in 17 projects) believe that no new jobs will directly be created because of their participation in a project, as responsibilities will fall on existing employees. That said, the expectations are that after the project finishes there will be an impact on job creation. 65% of project coordinators (11 of 17) for projects with agricultural partners foresee that their project will generate skilled jobs in rural areas. Furthermore, 53% of them expect their projects to contribute to the growth of income of primary producers and 47% expect to contribute to diversifying the local economy.

The innovative business models (BMs) analysed describe successful initiatives to foster the participation of agricultural producers in meaningful roles in the bio-based sector. Fifteen BMs from European countries and five from non-European countries were studied. The BMs analysed represent different kinds of companies and products and/or services, addressed to several markets, with varied geographic origins and different degrees of technological complexity. For each case, a short

¹ ENRD (2019). *European Network for Rural Development*. https://enrd.ec.europa.eu/enrd-thematic-work/greening-rural-economy/bioeconomy_en.

² BIOEAST. n.d. www.bioeast.eu. Accessed 2019. www.bioeast.eu.

³ Projects from calls between 2014-2017, excluding CSAs.

description of the key points is provided (key partners, benefit for the primary producer, innovation strategy and key factors for success).

The 20 BMs have several common factors for success; important among them were agricultural producers pooling their resources (such as in agricultural cooperatives), and being involved in the processing of their feedstock to increase their level of influence on the value chain.

The main challenges for the agricultural primary sector to engage with the bio-based sector and its value chains were found to be:

- » the unclear and still novel concepts of bioeconomy and the bio-based sector;
- » contradictory policy goals for distinct policy areas;
- » the unclear market demand for final bio-based products and for agro-based biomass as input to the bio-based sector;
- » the difficulties inherent in the initial steps of new bioeconomy activities.

The main reasons why it is difficult for agricultural producers to take on a different role than merely providing biomass to the value chain are the structure of the agricultural sector, together with the nature of agricultural production (a bulk product which is easily substitutable).

A further obstacle to participation in projects is that the agricultural community often has difficulty seeing the benefits of participating in BBI JU projects – the marketability of the end-product was unclear, or projects were perceived as not being directly applicable to their daily activities. Agricultural producers have difficulty gathering the skills and resources required to participate in BBI JU projects. Additionally, stakeholders pointed out that because participating in the bio-based sector is a new activity for agricultural primary producers, there is less knowledge and information available for them; therefore, participating is considered a potential risk. There are also challenges related to the limited awareness among the farming community of the functioning of the BBI JU.

It should be noted that it is difficult to involve primary producers from the agricultural sector in any EU-level

project; this is not specific to the BBI JU. Hence, the challenges identified are to a great extent applicable also to other European initiatives aiming at including farmers.

Finally, **28 recommendations have been provided aiming at improving the quality and quantity of agricultural participation in BBI JU projects**, which should ultimately contribute to rural development in Europe. The recommendations are **organised into six areas**, and are related to: defining **funding priorities** addressed at promoting the use of agro-biomass; drafting the **annual calls and topics description** to foster the participation of the agricultural primary sector; fine-tuning the **evaluation process** regarding the selection of projects for funding, and monitoring of ongoing projects; adapting the **participation rules** to the particularities of the agricultural primary sector; achieving **better visibility of the BBI JU initiative**; making the most of BBI JU by **linking with other EU measures**.

Several recommendations aim at facilitating the participation of agricultural cooperatives (which have more resources than individual producers, and have a potentially larger multiplier effect), and facilitating the participation of smaller businesses by having smaller projects with fewer requirements (thereby being better adapted to the structure of the agricultural sector).

The findings from the study confirm the initial motivations to carry it out. Participation from the agricultural primary sector in the BBI JU in terms of quantity (23 %) is not bad in view of the breadth of primary sectors that can potentially feed the bio-based industry. However, this participation level can be increased based on the size of the sector and availability of its residual streams.

The sector's participation in terms of quality, measured as agricultural actors being direct beneficiaries and active partners, can certainly be improved. Looking to the future, acting on the findings and conclusions presented in the study will contribute to realising the full potential of the BBI JU initiative's positive impacts for the primary agricultural sector as well as for rural development. The study's results can also assist in designing future initiatives that ensure a high positive impact in these areas.

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1. INTRODUCTION

This study has been conducted on behalf of the Bio-Based Industries Joint Undertaking (BBI JU). A task force with participants from the European Commission (Directorate General for Research and Innovation and Directorate General for Agriculture and Rural Development), the Bio-based Industries Consortium (BIC) and BBI JU was established to prepare the tender specifications and to monitor the draft of the study.

The aim of the present study is to undertake a detailed assessment of the participation of the agricultural sector in BBI JU portfolio, and to identify business models, challenges and recommendations to enhance the impact of BBI JU initiative on rural development.

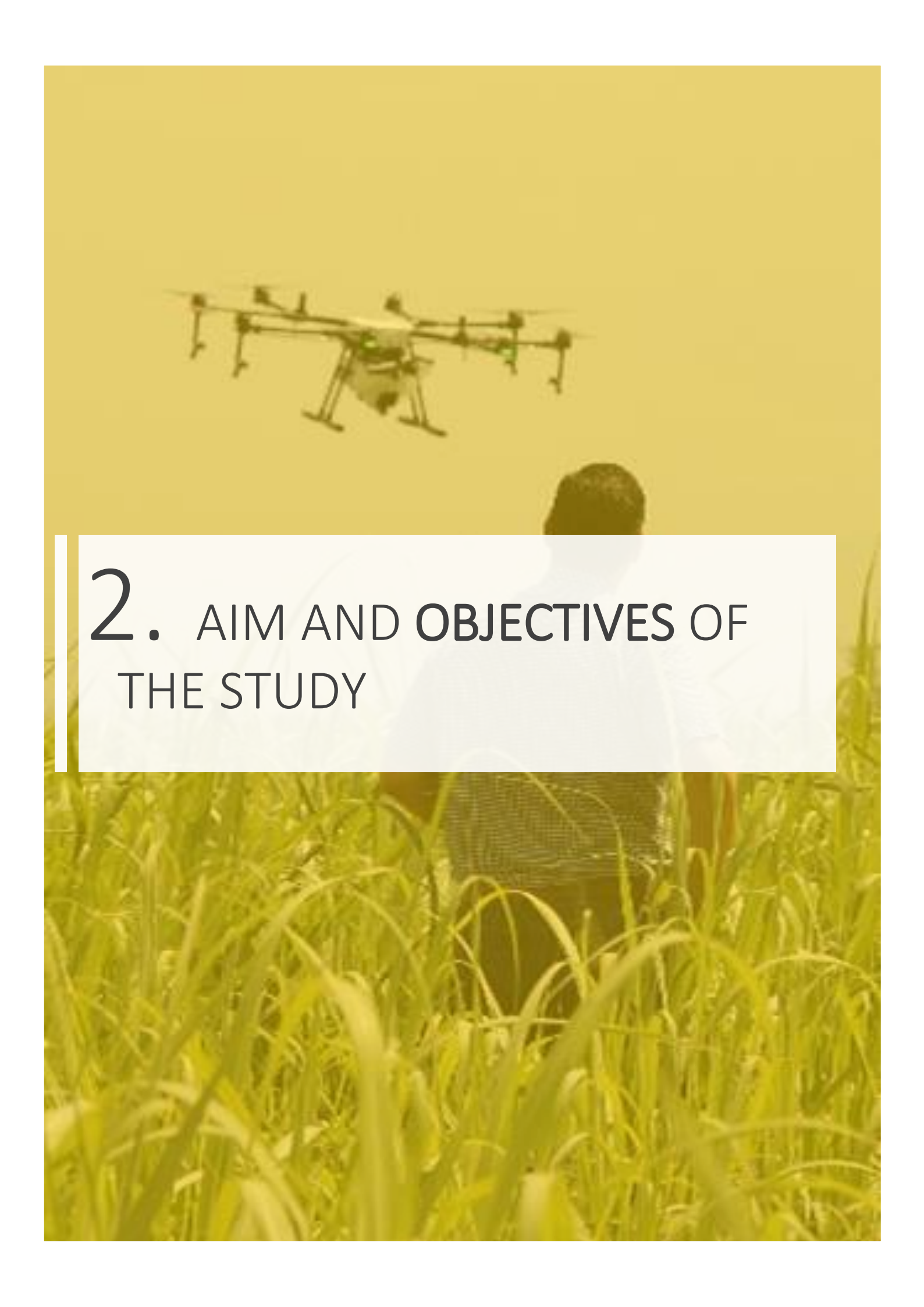
Through its mission to establish a sustainable bio-based industry sector in Europe, the BBI JU initiative has an important potential to support the agricultural sector, one of the pillars of the bioeconomy, and to contribute to rural development in Europe. However, as highlighted in the tender for this study, even though the agricultural sector participates in the BBI JU initiative, according to the 2017 Annual Activity Report of the BBI JU, only 29% of the projects expect to contribute to the growth of income of primary producer after the project ends. Therefore, to increase the potential positive impact on rural development, it is important to further analyse if the current participation of the agricultural sector in the BBI JU initiative could be increased and improved in order to reach its maximum potential, not only with the current structure and approach in place but with sights set on the future.

This study provides a thorough mapping, both in quantitative and qualitative terms, of the current participation of the agricultural sector in BBI JU projects. It also includes an analysis of 20 business models (BMs) in the bioeconomy that are considered relevant. The BMs reflected in the study seek to inspire, and serve as models to, organisations working in the agricultural sector, in order to establish new BMs. The selected BMs provide examples of successful models in which the primary sector plays an active role throughout the value-chain – and profits from it – beyond being mere biomass providers.

Furthermore, the study firstly contains an analysis of the challenges for the agricultural sector of participating in the bio-based sector by playing an active role along the bio-based value chains, not merely providing biomass. Secondly, the study analyses the particular challenges to the agricultural sector of participating in BBI JU projects.

Finally, the study provides recommendations addressed to BBI JU and its partners (European Commission and the Bio-based Industries Consortium) and other policy makers. These recommendations aim at enhancing the impact of BBI JU on rural development and at facilitating and stimulating higher participation in BBI JU projects by the agricultural community, to consolidate the position of the agricultural sector in bio-based value chains so that they are active participants rather than simple suppliers of agro-based biomass.

The analysis has been made using various tools, among them two ad-hoc surveys carried out with BBI JU participants (agricultural partners in on-going projects – “agri-partners” -, as well as coordinators of projects depending on agro-based biomass but where the agricultural producer was not a partner in the consortium). Moreover, 36 in-depth interviews were carried out with relevant stakeholders from 13 EU member states representing various stages of the value chain. Additionally, a substantial literature review and mapping of relevant networks and Horizon 2020 projects has been carried out. Finally, a meeting with a panel of eight experts (focus group) was used to complement and validate the preliminary findings revealed during the assessment phase.


A person is seen from behind, standing in a field of tall, green grass. They are holding a remote control, and a drone is flying in the sky above them. The entire image has a yellowish tint.

2. AIM AND OBJECTIVES OF THE STUDY

The aim of this study is to obtain a detailed picture of the participation of the agricultural sector in BBI JU projects, and to identify business models, challenges and recommendations to increase its participation and enhance the impact of the BBI JU initiative on rural development.

This aim will be achieved through the following objectives:

- 1) Undertake a detailed assessment of the participation of the agricultural sector, meaning primary producers of agricultural products (crops and livestock), in the BBI JU project portfolio. This includes a detailed quantitative and qualitative assessment, taking into account direct participation as well as indirect participation of primary producers in BBI JU projects.
- 2) Identify relevant and successful business models across the bioeconomy that could be used as models to improve the participation of actors in the agricultural sector in value chains, going beyond their role as biomass providers. This includes the identification of relevant and successful business models in all bioeconomy sectors (e.g. forest, marine, food), looking at the BBI JU portfolio and beyond. Examples may be provided from inside or outside the EU.
- 3) Identify key challenges encountered by the agricultural sector to participating in bio-based value chains in general and in BBI JU in particular.
- 4) Provide recommendations to further enhance the participation of the agricultural sector in the BBI JU, thus realising its full impact on rural development.



3. CONTEXT: WHAT IS THE BIOECONOMY, HOW DOES IT RELATE TO AGRICULTURE, AND GENERAL LIMITATIONS TO FARMERS PARTICIPATION IN THE BIO-BASED SECTORS

3.1 Bioeconomy in the EU, its relevance to the agricultural sector, and the Bio-Based Industries Joint Undertaking

3.1.1 What is the Bioeconomy?

In 2012, the Europe's Bioeconomy Strategy and its Action Plan⁴ were adopted, setting out the priorities and needs of the bioeconomy. After a review process that took place in 2017, an updated strategy was adopted by the European Commission in 2018⁵.

The review of the strategy recognised its success in various areas, notably at mobilising research and innovation, boosting private investment, developing new value chains, promoting the uptake of national bioeconomy strategies and involving stakeholders.

The review concluded that the five objectives of the 2012 Bioeconomy Strategy remain valid: ensuring food and nutrition security; managing natural resources sustainably; reducing dependence on non-renewable, unsustainable resources, whether sourced domestically or from abroad; mitigating and adapting to climate change; and strengthening European competitiveness and creating jobs.

To support the five objectives, in the context of the evolved policy priorities, the updated strategy proposed three main action areas:

- 1) Strengthen and scale up the bio-based sectors, unlock investments and markets;
- 2) Deploy local bioeconomies rapidly across Europe;
- 3) Understand the ecological boundaries of the bioeconomy.

Whereas the focus of the first bioeconomy strategy (2012) was very much on research, its update (2018) puts more emphasis on how the bioeconomy can be translated into real and tangible actions, what funding programs are available to do so, and how can they be used.

⁴ European Commission. (2012). Innovating for sustainable growth: A bioeconomy for Europe. Retrieved from <https://publications.europa.eu/en/publication-detail/-/publication/1f0d8515-8dc0-4435-ba53-9570e47dbd51>

⁵ European Commission. (2018). A sustainable bioeconomy for Europe: Strengthening the connection between economy, society and the environment, Updated Bioeconomy Strategy.



Key Concepts

For the purpose of this study, in order to set a common framework to allow all actors involved to understand its key concepts in a similar way, definitions of the bioeconomy, **the bio-based sector** and **other key concepts addressed in this study** are provided hereon.

According to the 2018 updated strategy, **Bioeconomy** covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services.

Bioeconomy incorporates bioenergy production, as well as feed production, which are already established industries. Other bio-based products are produced for the industries of pulp and paper; textiles; leather; fur; wood and wicker products; pharmaceuticals; chemicals; polymers and fibres.⁶ A list of relevant bio-based products, which contains about 70 products, has been compiled in a study promoted by the European Commission's JRC and refined and validated by experts in several areas, including a dedicated workshop organised by the JRC and E4tech in Brussels in 2014.⁷

The updated Bioeconomy Strategy also explains that the **bio-based sector** produces and uses renewable biological resources and/or applies innovative biological processes and principles to deliver bio-based products, processes and services. There are conventional bio-based products made traditionally from biomass (such as wood, cork, natural rubber, paper, textiles, wooden construction materials) and more recently developed products such as bio-based chemicals, bio-based plastics, etc. Biofuels are also bio-based products.

Bio-based products: products wholly or partly derived from biomass, such as plants, trees or animals (the biomass can have undergone physical, chemical or biological treatment). This concept includes bioenergy, i.e. heat and power generation from biomass, as well as bio-based chemicals, organic fertilisers and other bio-based materials (e.g. nanocellulose, carbon nano-fibres, adhesives, normal and intelligent textiles, flexible electronics, 3D printing applications).

⁶ Non-exhaustive list

⁷ European Commission. (2016). The EU Bio-Based Industries: Results from a survey. Retrieved from <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC100357/jrc100357.pdf>

Biomass: plant or animal material used in a wide range of industrial processes as raw material for the production of a range of products. It can be a purposely grown energy crops (e.g. Miscanthus, switchgrass), wood or forest residues, waste from food crops (wheat straw, bagasse), horticulture (yard waste), food processing (corn cobs), animal farming (manure, rich in nitrogen and phosphorus), or human waste from sewage plants.⁸ Aquatic organisms such as algae and fermentation including micro-organisms are also sources of biomass.⁹

Bio-refining: "the sustainable processing of biomass into a spectrum of bio-based products (food, feed, chemicals, materials) and bioenergy (biofuels, power and/or heat)."

Energy-driven biorefinery systems: The main product is a secondary energy carrier such as biofuels, power and heat.

- Material-driven biorefinery systems: The main product is a biobased product.
- It can be made from dedicated feedstock (for ex agricultural crops) or from residue.

⁸ European Commission. (2019). European Commission; Biomass. Retrieved 2019, from <https://ec.europa.eu/energy/en/topics/renewable-energy/biomass>

⁹ European Committee for Standardization. (2019). *European Committee for Standardization*. Retrieved from www.cen.eu:

- <https://www.cen.eu/work/areas/chemical/biobased/Pages/default.aspx>
- ftp://ftp.cen.eu/CEN/Sectors/List/bio_basedproducts/DefinitionsEN16575.pdf

3.1.2 Agricultural primary sector and its importance for the bioeconomy and the bio-based sector

Feedstock for the bio-based sector can be provided from three primary sectors: agriculture, forestry and marine. Other important sources of feedstock for the bio-based sector are, for example, household waste, by-products of food processing. When looking at the participation of the agricultural sector, imagination is the only limit to what agricultural products can be used as feedstock for the bio-based sector. The most common feedstocks being provided to the bio-based industry from agriculture consist of vegetable oils (rapeseed and palm oil), animal fats, sugar and/or starch crops (maize, wheat, sugar beet, potatoes), and other cereals. However, straw, specific energy crops, specialty crops such as vines, olives, fruits and vegetables, and intermediary crops are also important inputs for the bio-based industry. Furthermore, the use of residues, by-products and waste from agricultural production or food processing is of increasing importance for bio-based production.

According to the updated Bioeconomy Strategy, food and farming systems account for about three quarters of the overall bioeconomy employment (over 6% of the EU's workforce) and about two thirds of the bioeconomy turnover, amounting to approximately 1.5 trillion euros. The biomass potential in Europe (over 700 million tons oil equivalent) is five times higher than the current consumption, and a lot of this potential stems from agricultural production.¹⁰

In other words, the agriculture (and agri-food) sector has an essential role in the successful development of the bioeconomy and the bio-based sector (bottom-up), and at the same time, the potential benefits for the agricultural sector from the development of the bioeconomy can come to be of great importance (trickle-down). The success of the bioeconomy depends on the participation of a healthy agricultural sector, and the wellbeing of the agricultural sector could be greatly improved if the bioeconomy takes off on a large scale.

3.1.3 Bio-Based Industries Joint Undertaking and its role of fostering the bioeconomy in Europe

The Bio-Based Industries Joint Undertaking¹¹ (BBI JU) is a public-private partnership between the European Union, represented by the European Commission, and the bio-based sector in Europe, represented by the Bio-Based Industries Consortium (BIC). BBI JU was established in 2014. It operates under Horizon 2020 and will finance €3.7 billion of investments in bio-based innovations during the period 2014-2024, funding stemming from both the private and public sectors.

The Strategic Innovation and Research Agenda (SIRA) of the industry, first adopted in 2013 and updated in 2017¹² reflects the industry's vision of a competitive, innovative and sustainable Europe leading the transition towards a bioeconomy, while decoupling economic growth from resource depletion and environmental impact. It translates the ambitions of the BIC into a set of actions designed to deliver tangible and increasingly ambitious results by 2020 and by 2030. It identifies the research, demonstration and deployment activities to be carried out by BBI JU.

¹⁰ Bioenergy Europe. (2018). Statistical Report. Retrieved from <https://bioenergyeurope.org/statistical-report-2018/>

¹¹ Bio-Based Industries Joint Undertaking (BBI JU) . (2019). BBI JU Webpage. Retrieved from <https://www.bbi-europe.eu/about/about-bbi>

¹² Bio-based Industries Consortium. (2017). SIRA, Strategic Innovation and Research Agenda. Retrieved from <https://biconsortium.eu/sites/biconsortium.eu/files/downloads/SIRA-2017-Web.pdf>

At the heart of this agenda are the bio-based value chains and their main pillars:

- foster supply of sustainable biomass feedstock to feed both existing and new value chains;
- optimise efficient processing for integrated biorefineries through research, development and innovation (R&D&I);
- develop innovative bio-based products for identified market applications; and
- create and accelerate the market-uptake of bio-based products and applications;

These pillars form the four strategic orientations of the bio-based industry in Europe.

BBI JU programme is thus driven by the Strategic Innovation and Research Agenda (SIRA) of the industry, published by BIC. The overall objective of BBI JU is to implement a programme of research and innovation activities in Europe to contribute to developing a sustainable European bio-based industrial sector in order to significantly reduce Europe's dependency on fossil-based products, help the EU meet climate change targets, and encourage greener and more environmentally friendly growth.

BBI JU is focused on fostering the development of new biorefining technologies to sustainably transform renewable natural resources into bio-based products, materials and fuels. The particular objectives of the entity are:

- Demonstrate technologies that enable new chemical building blocks, new materials, and new consumer products to be made from European biomass, which replace the need for fossil-based inputs;
- Develop business models that integrate economic actors along the value chain from supply of biomass to biorefinery plants to consumers of bio-based materials, chemicals and fuels, including through creating new cross-sector interconnections and supporting cross-industry clusters; and
- Set-up flagship biorefinery plants that deploy the technologies and business models for bio-based materials, chemicals and fuels and demonstrate cost and performance improvements to levels that are competitive with fossil-based alternatives.

BBI JU launches annual work plans containing a number of topics, which are designed to address the several challenges identified in the Strategic Innovation and Research Agenda (SIRA) of the Bio-based Industries Consortium (BIC).

Among the benefits BBI JU is expected to deliver are: to develop the potential of waste as well as agriculture and forestry residues; to replace at least 25% of oil-based chemicals and materials with bio-based and biodegradable ones by 2030; and to generate higher and more diversified revenues for farmers and cooperatives, creating up to 400 000 new highly skilled jobs by 2020. By 2030 the figure will be 700,000. At least four in five of these jobs will be in rural and currently underdeveloped areas.

The BBI JU initiative has an important potential to support the agricultural sector and contribute to rural development, and this is one of the key priorities for BBI JU. However, there are still some questions in relation to the participation of the agricultural sector in BBI JU initiative, as well as to the actual impacts generated on the agricultural sector and rural development. Therefore, it is important to further analyse whether these aspects (both participation and impact) are achieving maximum potential with the measures and approaches

currently in place. Specifically, the BBI JU 2017 Annual Activity Report¹³ pointed out that only 29% of all projects reported contributing to the growth of primary producers' income, a figure which first needs to be understood and interpreted in more detail, and which could be increased.

3.2 Foundations, basic challenges and driving forces

3.2.1 The foundations for the development of a well-functioning bioeconomy

This study seeks to identify the main challenges the agricultural sector faces, in particular its primary producers, when participating in the bio-based value chains in general, and particularly in the projects funded by BBI JU programme, and to provide recommendations to overcome these challenges.

The intention is to consolidate and to enhance the position of the agricultural primary producers in bio-based value chains so that they are key actors rather than merely suppliers of biomass, in order to enhance their impact on rural development.

Naturally, the participation of agricultural primary producers in the bio-based sector cannot be taken independently from the functioning of the bioeconomy as a whole.

In summary, according to desk research carried out¹⁴, some examples of what constitutes the foundations for a well-functioning bioeconomy, include¹⁵:

- » Solid scientific and technical base to be able to grow sustainable biomass in a profitable manner, and handle the logistics around this, within ecological/environmental limits;
- » Knowledge dissemination, knowledge transfer, connecting actors across the bioeconomy, and at different administrative levels;
- » Entrepreneurship: dynamic and innovative agro-industrial fabric;
- » Market development and market demand;
- » Consistent and coherent government policies, including
 - public-private procurement programs.
 - levelled regulatory playing field.
 - government incentives to farming community;
- » Use of existing infrastructure.

¹³ Bio-Based Industries Joint Undertaking (BBI JU). (2018). Annual Activity Report 2017. Retrieved from <https://www.bbi-europe.eu/sites/default/files/bbi-ju-aar-2017.pdf>

¹⁴ The material reviewed includes: European Commission (2012); *Innovating for Sustainable Growth: A Bioeconomy for Europe*; Langeveld, (2010). *Bioenergy production chain development in the Netherlands: key factors for success*; Biomass Research & Development Board, US government, (2018). *The Bioeconomy Initiative: Implementation Framework*; Milken Institute, (2013). *Financial Innovations Lab Report. Unleashing the power of the Bio-Economy*; Aguilar Romanillos, A, (2018). *Bioeconomía y Sociedad; Mediterráneo Económico* 31; and European Commission (2019). *From idea to market, 15 EU "Success stories"*. Please see Bibliography for a full listing of reference material reviewed.

¹⁵ Please note that this is not an exhaustive list.

3.2.2 Basic challenges for agricultural primary producers to participating in the bioeconomy and driving forces for participation

Without the availability of biomass, there is no bioeconomy, and there is not an unlimited supply of biomass. Since land is a limited resource, the most evident way of increasing production of biomass coming from agriculture is either by intensifying production or by expanding the land on which agricultural production takes place. Both options are difficult tasks that might potentially have negative environmental impacts. Hence, the finite supply of sustainable biomass can be understood as the underlying limitation to how far the sustainable bioeconomy can be developed.

The European Bioeconomy Stakeholders Manifesto¹⁶ puts it in the following terms:

“Sustainable biomass mobilisation in Europe is the basis for a sustainable bioeconomy. The challenges related to biomass mobilisation differ greatly between different regions and from one biomass source to another. The small-scale nature of many biomass producers, cultural and demographic barriers, effects of urbanisation on rural communities as well sparsity of secondary biomass resources are all challenges for the bioeconomy”.

Building on from these basic limitations to the development of the bioeconomy, the challenges to the farming community in participating in the bio-based sector, identified from the background analysis¹⁷, can be summarized as:

- » The small-scale nature of many biomass producers;
- » Poor communication, knowledge transfer and cooperation between different actors along the chain;
- » The bio-based industry is still an emerging sector, implying that it is a risky investment for industry, and thus for farmers. This also limits the availability of funds to invest in production capacity;
- » Deficient market pull, the higher price of biobased products compared to fossil-based alternatives;
- » Generally low/limited incomes for the biomass producer;
- » Feedstock supply: poor logistical infrastructure – transport and storage;
- » Policy and regulatory hurdles;
- » Cultural barriers;
- » Demographic barriers;
- » Limited research and development support for new value chains from the agricultural perspective.

¹⁶ European Bioeconomy Stakeholders. (2017). European Bioeconomy Stakeholders Manifesto. Retrieved from https://ec.europa.eu/research/bioeconomy/pdf/european_bioeconomy_stakeholders_manifesto.pdf

¹⁷ The material reviewed include: Bio-Based Industries Joint Undertaking (BBI JU). (2018). *Annual Activity Report 2017*; European Commission. (2018). *Report from Workshop on “Best practices in integrating primary production (farmers and forest owners) in the Bioeconomy value chains and boosting the development of the Bioeconomy in rural areas.”*; EIP-AGRI. (2015). *Workshop Final Report ‘Building new biomass supply chains for the bio-based economy’*; Bowyer, C., & Allen, B. (2018). *Bioeconomy value chains and rural development – the policy context*. ENRD CP/IEEP; European Commission. (2016). *The EU Bio-Based Industries: Results from a survey*. Please see Bibliography for a complete listing of reference material reviewed.

In order to grasp the relative importance of the challenges that the agricultural primary producers face, it is also important to understand their main driving forces. What motivates agricultural primary producers' to participate in the bioeconomy, and especially in novel sector of bio-based economy?

The drivers, identified through background research, can be categorised into two main types: either market driven (possibility of increasing and/or diversifying revenues for agricultural primary producers), and/or policy driven (at EU, national and regional level), such as requirements linked to environmental goals, or climate and energy targets, or subsidies aimed at incentivising participation.

3.2.3 Specific background for this study

The foundation of the bioeconomy and the natural limitations to its development set the framework for understanding how agricultural primary producers participate in it.

The starting point for our understanding of this study is provided by the more concrete challenges for agricultural primary producers as outlined above, together with the assumed limited benefits for the primary producers from BBI JU projects. Currently – as identified in the Annual Activity Report of the BBI JU for year 2017–, only 29% of projects expect to contribute to increased incomes for primary producers in the near future and the number of participants from the agricultural sector is lower than desirable.

What is understood as limited participation in BBI JU projects should be seen against the background that participation by the primary agriculture sector is difficult in any EU-level project, hence this is not particular to BBI JU.

In addition, it should be noted that BBI JU and its partners have already taken several important steps towards facilitating the participation of the agricultural sector and consolidating its role in the bio-based value chains. Some of the measures taken throughout the last few years are, for example, recruiting actors in the agri-food and food-processing sectors to join BIC and play an active role in the definition of the BBI JU work programme, and, since 2017, including in the BBI JU's annual work programme topics originating from the agricultural sector.

Against this background, in chapter 7 the most relevant challenges faced by agricultural producers when participating in the bioeconomy in general and in BBI JU in particular are identified.



4. METHODOLOGY OF THE STUDY

The overall methodology that has been designed to carry out this study consists in a systematic collection of information through literature review, execution of surveys, interviews and meetings.

In short, the methodology implemented in this project is the following:

- » **Mapping** of BBI JU project's portfolio (calls from years 2014 -2017) in order to identify projects using agro-based biomass.
- » **Characterisation** of ongoing BBI JU projects through: analysis of the description of the action of the projects and their consortium (annex 1 of the grant agreements); surveys with beneficiaries and coordinators; and analysis of the expected contributions to BBI JU Key Performance Indicators (KPIs) and to other socio-economic impacts reported on annual basis by the project coordinators.
- » **Literature review of hurdles** that the agricultural primary sector needs to overcome to participate in the bio-based sector. Compilation and analysis of the hurdles found.
- » **Literature review of business models** that have been proven successful in business initiatives and innovative projects, and that can serve as examples to newcomers or less consolidated actors in the bio-based sector. Compilation and analysis of the business models' factors of success.
- » Mapping and **analysis** of relevant European networks, projects and initiatives that can provide interesting information, inspiration, or a framework for comparison. Interviewing their representatives to extract valuable information and/or attending events.
- » **Shortlisting and interviewing** 36 key stakeholders, consisting of individuals involved in the bioeconomy at various stages of the value chain, and from various geographical origins (within Europe), and with different levels of involvement and knowledge of BBI JU.
- » Organisation of a **Focus Group**, consisting of eight participants with a key expertise in bioeconomy, in order to contrast and enrich the analysis related to the challenges for participating in BBI JU.

In the following sections further detail is provided about the various steps of the methodology.

4.1 Mapping of BBI JU projects

The study started with the characterisation of the participation of the agricultural sector in the **82 projects** that made up BBI JU's portfolio in April 2019, which includes the projects funded in the annual calls from 2014 to 2017 inclusive.

All relevant details of the current participation of the agricultural sector in BBI JU projects, both ongoing and already finished, were obtained by implementing the following:

4.1.1 Desk study of BBI JU projects database and retrieval of their contact information

The BBI JU project portfolio is classified according to the following categories:

- » **Call**: Lists all the open calls for proposals for research and innovation actions, divided by year.

» **Type of action:** Divided into project types in which BBI JU projects are categorised according to the technology readiness level of the technologies implemented in the project, or the kind of actions they undertake. These are:

- Research and Innovation Actions (RIAs)
- Innovation Actions (IAs), divided itself into Demonstration Actions (IA–DEMO) or Flagship Actions (IA–FLAG)
- Coordination and Support Actions (CSAs)

This primary classification provides a common understanding defining the kind of initiative, which is comprehensible to all applicants and participants.

Below are the **official definitions** for each kind of project¹⁸:



Official definitions

Research and Innovation Actions (RIAs):

They are actions primarily consisting of activities aiming to establish new knowledge and/or to explore the feasibility of a new or improved technology, product, process, service or solution. For this purpose, they may include basic and applied research, technology development and integration, testing and validation on a small-scale prototype in a laboratory or simulated environment. Projects may contain closely connected but limited demonstration or pilot activities aiming to show technical feasibility in a near-to-operational environment.

Innovation Actions (IAs): Innovation actions are industry-driven and consist mainly of activities aiming at producing plans and arrangements or designs for new, altered or improved products, processes or services. They may include prototyping, testing, demonstrating, piloting, large-scale product validation and market replication.

- **Demonstration Actions (IA–DEMO):** "Demonstration" actions aim to validate the technical and economic viability of a new or improved technology, product, process, service or solution in an operational environment. They contain mainly demonstrator activities corresponding to technology readiness levels (TRL) 6 to 7. The purpose of these value chain demonstration projects is to provide the backbone for subsequent flagships. Typical activities include validation of the technical and economic viability of a new or improved technology, product, process, service or solution in an operational environment. The establishment of a demo-scale production facility, be it a new installation, a substantially modified existing facility, or an existing demo facility, is therefore mandatory.

¹⁸ Bio-based Industries Joint Undertaking. (2019). *Guide for Applicants*. Retrieved from <https://www.bbi-europe.eu/sites/default/files/bbiju-gfa-2019.pdf>

- **Flagship Actions (IA-FLAG):** They mainly include activities corresponding to TRL 8. Flagships are the first units of value chains operating at an economically viable scale. ‘First’ means new at least to Europe, or new at least to the application sector in question. Often such projects involve a validation of technical and economic performance at system level in real life operating conditions provided by the market. Building and running such plants entails significantly higher costs and risks than demonstration plants because of the increased scale. Flagship projects support the deployment in the market of an innovation that has already been demonstrated but not yet applied/deployed in the market. As such, for a flagship project clear evidence should be provided that the proposed process has been already validated at demonstration scale. A flagship shall address a complete value chain from procurement, growth, and supply of feedstock material to the final product(s). It shall include the establishment of a large-scale production facility, be it a new installation, a substantial modification of an existing facility, or reconversion of old or abandoned industrial facilities.

Coordination and Support Actions (CSAs): action consisting primarily of accompanying measures such as standardisation, dissemination, awareness-raising and communication, networking, coordination or support services, policy dialogues and mutual learning exercises and studies, including design studies for new infrastructure, and which may also include the complementary activities of networking and coordination between programmes in different countries.

» **Classification of Value Chains (VC):**

In the first SIRA, published by BBI JU in 2013, a classification into value chains was made according to the origin of the bio-based raw materials used in the technology developed in the project. This was extended in the 2017 SIRA to include emerging sectors such as aquatic-based sources, bio-waste and CO₂. In addition, the updated SIRA more actively pursues the crossover between “traditional” value chains. This “multi-value-chain” approach increases opportunities to convert and valorise new feedstocks into a wide array of bio-based products. The following categories are the ones listed in BBI JU website, in the section “projects”:

- VC1 – Lignocellulose biomass
- VC2 – Forest based biomass
- VC3 – Agro-based biomass
- VC4 – Organic waste biomass
- Aquatic Biomass
- Across VCs

» **Classification of Strategic orientations (SO):**

The project portfolio also addresses strategic orientations of the bio-based industry focus on the steps of a value chain:

- SO1: foster supply of sustainable biomass feedstock to feed both existing and new value chains;
- SO2: optimise efficient processing for integrated biorefineries through research, development and innovation (R&D&I);
- SO3: develop innovative bio-based products for identified market applications;
- SO4: create and accelerate the market uptake of bio-based products and applications.

» Information retrieval

BBI JU provides comprehensive information about their funded projects on a publicly available database that is accessible through its website: <https://www.bbi-europe.eu/projects>

The information regarding BBI JU projects website was contrasted with the data found in the European Commission's CORDIS website (<https://cordis.europa.eu>) in which all EU funded projects are listed using the same filters as those found on BBI JU projects website.

Additionally, most of the ongoing BBI JU projects have their own website, in which more detailed information is provided. Where relevant, the project websites were checked as well.

In order to complete the qualitative assessment, additional data was used in the form of a concise description of the activities to be carried out during the lifetime of each BBI JU project. More concretely, the study analysed (after signing a non-disclosure agreement) the information contained in Annex I of the Grant Agreement (Description of the Action). This information was used to gain a deeper understanding of the role of the agricultural partners in the project (work packages and deliverables), as well as the characterization of agri-based projects and how the biomass supply was organised. To access the aforementioned document, BBI JU presented the documents – following strict confidentiality and privacy terms – using the CIRCABC collaborative platform, which provides a secured work area to share information between users and interest groups. This open-source tool is supported by the European Commission.

When more information was needed, Project Coordinators (PCs) of the projects were contacted to discuss the status of the actions, partner collaborations or type of biomass used in a project. Their collaboration in the study is valuable and essential. Contact details were provided by BBI JU.

4.2 Characterisation of BBI JU projects and participants: Survey design

4.2.1 Selection of the targeted projects and beneficiaries to survey

Due to the focus of the study, the projects taken into account have been RIAs, IAs-DEMO and IAs-FLAG. CSAs have not been taken into account, since they are focused in developing “accompanying measures”, such as standardisation, dissemination, awareness-raising and communication, networking, etc., so they were not considered relevant to the ultimate aim of the study.

Only projects belonging to the following value chains were chosen as relevant:

VC1 – Lignocellulose biomass
VC3 – Agri-based biomass
VC4 – Organic waste biomass
and Across VCs.

VC2- forest-based value chains, and aquatic biomass are out of the scope of this assessment, and therefore they have not been surveyed and their related information has not been included. However, they have been taken into account in chapter 6, since they have interesting business models to highlight.

Even though, in the latest SIRA published by BBI JU (2017), these classifications of value chains are no longer used, the projects assessed in this study, which belong to the 2014, 2015, 2016 and 2017 calls, are classified into these categories and the classification was considered useful for project scanning.

All the four strategic orientations are of interest for the study

Then, from this pool of projects, we have pinpointed the ones in which agri-based raw materials are involved. These agri-based raw materials can come from both plant and animal production, and in any form, being main products, by-products or waste streams.

Once it was determined which projects were to be the subject of the study, two target groups were established to be surveyed:

- » **“AGRI PARTNERS”**: Group made up of project beneficiaries, therefore full members of the project consortium, belonging to the agricultural primary sector and involved in the production of biomass.
- » **“PROJECT COORDINATORS”**: When carrying out the revision of BBI JU project participants, it was identified that in many projects, the producers of the agri-based raw materials used in the projects were not involved as partners in the project consortium. It was considered important to understand the “informal collaborations” not included within the framework of the project as well. It was decided to design a specific survey for the project coordinators of the projects in this situation.

This scanning took into account ongoing projects, finished projects and projects that might be under temporary suspension.

» Agricultural partners

To define which entities comply with the requirement of being agricultural primary producers, it was necessary to set criteria. The main criterion was to select those entities in which agricultural production was a key part of the activity and was involved in the daily activities.

For the purpose of this study the concept agricultural partner or “agri-partner” is used, meaning an agricultural primary producer which is involved in a BBI JU project as a project beneficiary (partner).

The following type of entities were considered agricultural partners (agri-partners):

- Individual farmers (such as Miscanthus FARM Johannes Furtlehner., partner in GRACE project);
- Farms (such as Oljarna Krožera Franka Marzi S.P., partner in Pro-Enrich).;
- Large and small companies that produce and market their agri-food produce (such as Monaghan Mushrooms, partner in BIOrescue and Funguschain);
- Companies vertically integrated with full control over the contracted farms (such as Carton Brothers chicken farm, partner in RefuCoat);
- Companies specialised in seed and nursery plants (such as Vandinter Semo B.V B.V., partner in projects GRACE and LIBBIO);
- Farmers’ cooperatives involved in primary products processing (such as Coöperatie Koninklijke Cosun U.A, coordinator of Pulp2Value and GreenProtein);
- Cooperatives of farmers’ cooperatives owned by farmers – also called second degree cooperatives (such as ANECOOP S. COOP, partners in Pro-Enrich project);
- Producers’ organisation with the aim of commercialising the produce (such as Commercial Mushroom Producers Co-Operative Society Ltd, partner in AgriChemWhey).

BBI JU projects also have within the consortium other interesting organisations that play an important role within the agricultural sector such as agricultural input suppliers, farmers’ associations, food processors. However, these types of organisations were **not considered as agricultural participants** since they are not strictly primary producers (not producing agro-based biomass themselves).

Some examples are:

- Federations of agricultural cooperatives which focus on representation, training and advocacy activities (such as Federation de Cooperatives Agraries de Catalunya, Partner in AgriMax);
- Companies involved in processing primary products but without direct action over the cultivation process (such as Maicenas Españolas S.A., partner in RefuCoat; Emmelev S.A., partner in Pro-Enrich).

Only those beneficiaries which are still part of the consortium were considered, excluding those which terminated their participation during the project’s implementation process.

4.2.2 Design of the online surveys

Once the target groups had been established, a specific survey for each of them was designed (one for the “agri partners” and another for the “project coordinators”) with the aim of compiling information that would accurately portray the participation of the agricultural sector in BBI JU project portfolio.

The surveys were carried out through **EUSurvey**, the European Commission's official survey management system, devised for shaping and publishing forms and making them available to the public. It is hosted at the European Commission's Department for Digital Services (DG DIGIT), available free of charge to all EU citizens and entirely created using open-source code.

4.2.3 Survey structure:

The following survey configuration was proposed in order to address all areas:

- Characterisation of the respondent: name, nationality, contact details, age, gender, highest level of studies completed, free comments;
- Characterisation of the agricultural entity they belong to: farm location, farm extension, description of production, pure primary sector / transformation involved, free comments;
- Characterisation of their participation in BBI JU projects: kind of project (RIA / IA-DEMO / IA-FLAG), role (coordinator/participant/third party), budget, previous experience with BBI JU projects or first-time applicant, motivation for participating, assessment of the application procedure, expected outcome of their participation, free comments;
- Degree of involvement in decisions, concrete contributions to the value chains, incentives that enable farmers' participation, business models;
- Quantification of the impact of participation in BBI JU project. Resources invested (time and money), benefits obtained;
- Overall opinion of their participation in BBI JU projects and other comments.

Questions were shaped into multiple choice (single answer), multiple choice (multiple answers) and free text format, in order to provide meaningful input from contributors, and were arranged and edited in a way that could be fully completed in about 15 to 20 minutes. Contributions were submitted through the EUSurvey platform.

The proposed survey structure was divided into five sections:

1. **General Information**: Questions aimed at profiling the respondent and the entity;
2. **Proposal Preparation**: Questions about the entity's initial approach to a BBI JU proposal;
3. **Implementation**: Questions to assess the degree of involvement of the agricultural sector in the decision-making process, its contributions and its overall participation in BBI JU projects;
4. **After-Project Expectations**: Questions about expectations and impact of the participation in a BBI JU project.
5. **Recommendation**: Free text section for agri partners or coordinators to provide recommendation for BBI JU for improving the participation of the agricultural section.

During the collection of the surveys, in some cases the person answering the survey had started his/her involvement with the project when the project was already ongoing, and they had not been involved in the

project concept definition or proposal writing stage. The data contained in the survey acknowledges this, and this can be represented as blank answers.

4.3 Analysis of the socio-economic impacts from BBI JU annual KPI & impact questionnaires

The expected contribution of the projects to the KPIs and socio-economic impacts were analysed in order to characterise the ongoing BBI projects. The information used consisted of the analysis done by BBI JU in the 2018 Annual Activity Report¹⁹. In addition, a total of 72 reports were individually analysed in order to further understand the expected socio-economic impacts reported by the project coordinators related to the scope of this study.

4.4 Analysis of business models

A thorough exploration has been carried out of business models (BMs) across the bioeconomy that involve primary producers with a role going beyond that of being mere biomass providers. Concrete examples and real approaches have been reviewed in which the primary sector is engaged in bioeconomy value chains with a meaningful and active role.

A thorough desk and literature research has been carried out to select the 20 models to describe. The compilation includes 15 cases from eight different EU countries (the Netherlands, Spain, France, Ireland, Sweden, Italy, Germany, and Finland) and five cases from three non-EU countries (The US, Canada and Australia). The BBI JU portfolio was studied and a couple of successful business models from BBI JU projects have been depicted.

An individual analysis was done for each of the BMs, including a short description of the company involved, as well as a description of the innovation of interest. This has been done with two key tools: Ansoff's matrix, which classifies the innovation strategy of the company, and the Business Model Canvas, which helps schematise the business model used. This has allowed understanding of their value proposition, what the benefit is for the primary producer, which key partners are required, what revenue streams the model renders, to which market(s) it is addressed, and their innovation strategy. As well as this, factors that can be considered to have positively influenced their success in impacting primary producers have been extracted and analysed.

Finally, an assessment of the common factors of success for innovative BMs in the bio-based sector has been carried out.

¹⁹ Bio-Based Industries Joint Undertaking (BBI JU). (2018). Annual Activity Report 2017. Retrieved from <https://www.bbi-europe.eu/sites/default/files/bbi-ju-aar-2017.pdf>

BM's operating in other primary sectors (forest, marine) are highlighted as good examples but are not analysed in detail, since a key factor for shortlisting the ones present in this report has been their potential partial replicability, which is higher when they belong to the same primary sector.

The main sources of information have been the companies' websites and public documents in which their innovations were depicted, such as presentations given in workshops, and reports published by the European Commission (EC).

4.5 Interviews to key stakeholders

Through 36 thorough interviews with key stakeholders from the whole value-chain and from 13 EU member states (as well as with umbrella organisations active at EU level), the challenges to the functioning of the bioeconomy have been considered from the point of view of what they mean for agricultural producers' participation in the bio-based sector, in particular, for agricultural producers' participation higher up in the bio-based industry value chains, and, at the final stage, what implications this has for agricultural producers' participation in BBI JU projects.

The aim of the interviews was to establish whether the interviewee considered there to be general challenges for agricultural producers to participating in the bio-based sector, and specific challenges to participating in BBI JU projects. If so, the interviewees were asked to describe which were the most important challenges. Concrete examples of obstacles to participation were requested, both in general terms in the bio-based sector, and more specifically for participating in BBI JU projects. Furthermore, suggestions were requested for solutions to address the problems raised.

The original goal was to carry out a total of 20 interviews, but due to the high interest generated, and the substantial information that was provided with high relevance for the study, a total of 36 interviews was carried out.

The information collected from the interviews is used to complement the survey of BBI JU participants, the desk research carried out, and the contact with other networks and projects, in order to perform an analysis of the challenges the agricultural sector faces in participating in BBI JU projects, and in the bio-based sector in general, and also to provide insights as to potential solutions to the challenges.

The stakeholders interviewed have a strong knowledge of the agricultural sector and/or of the functioning of the bio-based industry. The categories of key stakeholders that have been interviewed include:

- » Individual agricultural producers, both participants and non-participants²⁰ in BBI JU projects;
- » Farmers' Union representatives;
- » Cooperatives (large and small, with various degrees of participation in the bio-based sector);

²⁰ A non-participant is considered to be an agricultural producer with the characteristics of a producer that could potentially be involved in a BBI JU project, but that is not currently involved in any project consortia, for example, agricultural producers participating in other EU projects, or in national projects with a similar profile, or agricultural producers who applied for a project, but were not awarded the project.

- » Bio-based industrial sectors' representatives (chemistry sector, bioenergy sector, fibre, paper);
- » Public administrations (national, regional, and local level);
- » Innovation agents (facilitators connecting the farming community with EU projects);
- » Researchers and academics;
- » EU-level networks (representatives of ENRD, EIP-AGRI, Bio-East Initiative etc);
- » NGOs;
- » BBI JU advisory bodies: States Representatives Group and Scientific Committee.

The interviews aimed at identifying both general challenges for the agricultural producers to actively participating in the bio-based sector and its value chains, and particularly challenges to participating in BBI JU projects. The interviews have delivered in-depth insights based on the interviewees' practical experience related to the bio-based sector. The objective has also been to identify challenges with regard to geographical differences throughout the EU. The results are included in chapters 7 and 8, where the challenges and recommendations will be presented.

4.6 Literature review and mapping of relevant networks and projects

Extensive desk research and a literature review were carried out in order to establish the overall foundation for the functioning of the bioeconomy, and the challenges to its development. This was then used as the basis for understanding the challenges to European farmers' participation in the bioeconomy, and – by extension – their participation in BBI JU projects.

Furthermore, we have been in contact with several of the relevant networks and ongoing projects related to bioeconomy at EU level, which has enabled us to contrast and verify our understanding of the challenges faced by farmers with those identified by others.

The networks include EIP-AGRI (contrasting our results with the outcomes from various workshops organised on the bioeconomy, and direct contact with several operational groups); ENRD's Thematic Group on Bioeconomy²¹, who have undertaken analytical work in parallel with the study commissioned by BBI JU on the theme "How are the Rural Development Programs being used to support Bioeconomy projects?", including interviews with stakeholders on the challenges they face in participating in the bioeconomy; and the ENRD bioeconomy project portal. The [BIOEAST](https://enrd.ec.europa.eu/enrd-thematic-work/greening-rural-economy/bioeconomy_en) Initiative, a network of 11 Central-Eastern European EU member

²¹ ENRD. (2019). *European Network for Rural Development*. Retrieved from [enrd.ec.europa.eu: https://enrd.ec.europa.eu/enrd-thematic-work/greening-rural-economy/bioeconomy_en](https://enrd.ec.europa.eu/enrd-thematic-work/greening-rural-economy/bioeconomy_en)

states, has also been contacted. Examples of relevant H2020 projects are [Rubizmo](#)²², [AGROinLOG](#)²³, [BioSTEP](#)²⁴, and [BioRescue](#)²⁵.

The contact with relevant networks and projects has contributed to the profound understanding of the ongoing work in the EU related to mapping the challenges for the agricultural sector to participating in the bioeconomy, as well as the work ongoing to provide solutions to the challenges.

Furthermore, the report on the outcome of the workshop organised by DG Agriculture in 2018²⁶ has provided solid input to the understanding of the mapping of challenges and opportunities for farmers to participate in the bioeconomy that has already been done by the EU institutions.

4.7 Focus Group

A focus group (FG) made up of eight experts in bioeconomy from eight different EU countries with complementary profiles has been organised in order to contrast and verify the key results of the analysis carried out. The table below describes the profile of the different experts:

Position	Country
Senior project manager of a large agro-industrial cooperative	The Netherlands
EIP-AGRI project coordinator and principal investigator in bioeconomy	Ireland
Chief adviser at national farmers union	UK
Project coordinator of a Horizon 2020 project relevant to this study	Spain
Assistant associated professor and vice-rector of agricultural university	Bulgaria
Leader of the rural development public benefit association	Hungary
Project adviser and enterprise expert	Finland
Senior researcher in a university centre dedicated to bioeconomy	Denmark

Table 1: Focus Group Experts

²² Rubizmo. (2019). www.rubizmo.eu. Retrieved from Rubizmo: <https://rubizmo.eu/>

²³ AgroInLog. (2019). www.agroinlog-h2020.eu. Retrieved from <http://agroinlog-h2020.eu/en/home/>

²⁴ BioStep. (2019). BioStep. Retrieved from www.bio-step.eu/: <http://www.bio-step.eu/>

²⁵ BioRescue. (n.d.). BioRescue. Retrieved from www.biorescue.eu: <https://biorescue.eu/>

²⁶ European Commission. (2018). Report from Workshop on “Best practices in integrating primary production (farmers and forest owners) in the Bioeconomy value chains and boosting the development of the Bioeconomy in rural areas. Retrieved from https://ec.europa.eu/agriculture/sites/agriculture/files/bioeconomy/pdf/2018-09-20-workshop-report_en.pdf

Ahead of the meeting, a document containing the key pre-findings of the study was circulated to the participants, as a background for the meeting discussion.

FG participants were presented with the key pre-findings of the analysis carried out on the challenges that agricultural producers face in participating in the bio-based sector, and particularly in participating higher up in the value-chain, and the challenges agricultural producers face in participating in BBI JU projects, and they were then invited to openly discuss the relevance of the findings. Participants were also asked to identify whether there are challenges that are missing from the analysis. Furthermore, the discussion in the FG helped to identify potential solutions to increase the number of agricultural producers participating in BBI JU projects.

The focus group was organised on 4th June 2019, in Madrid. This was well in advance of the deadline of the pre-final report, to allow sufficient time to take on board the suggestions from the meeting. At the same time, it was organised once all interviews with the selected key stakeholders had taken place and the survey results had been analysed, allowing us to digest the input from the interviews and surveys before organising the meeting.

Participants of the focus groups consisted of a representative group of the key stakeholders who had been interviewed. The focus group ensured representativity across various actors along the value chain, and across various countries, but at the same time the aim of the meeting was not to be too big, in order to allow for open and interactive discussions.



5. ASSESSMENT OF THE PARTICIPATION OF THE AGRICULTURAL SECTOR IN THE BBI JU PROJECT PORTFOLIO

This chapter analyses the qualitative and quantitative participation of agricultural primary producers currently taking part in BBI JU projects. This participation is considered both through formal collaborations – where the agricultural participants are involved as beneficiaries, referred to as “**agricultural partner**” or “**agri-partners**” – and through other forms of collaboration – where the farmers are subcontracted, where the industry representative participating in a consortium has a supply contract with farmers, or where farmers’ representatives have been included in the consortium as an indirect way to include agricultural primary producers -.

In sub-chapter 5.1, a detailed description of the participation is carried out, looking at the portfolio of projects using agro-based biomass from calls between 2014 and 2017, including aspects related to type of organisation, budget and involvement (role and tasks) in the project.

The sub-chapter 5.2 provides first-hand information on the views and concerns of participants taking part in the BBI JU project. To this end, results are analysed from the surveys carried out to agricultural partners currently taking part in BBI JU projects and with coordinators of ongoing BBI JU projects that use agro-based biomass, but where the biomass provider is not part of the consortium.

The sub-chapter 5.3 analyses the expected socio-economic impacts, and impacts on primary producers and rural development reported by project coordinators in 2018 through the BBI JU annual KPI and impact questionnaire. The assessment done by BBI JU in the 2018 Annual Activity Report is complemented with an analysis of the individual responses, related to their contribution to the indicators most relevant to this study.

Finally, in sub-chapter 5.4, a SWOT analysis is included to provide an overview of the strengths, weaknesses, opportunities and threats of the participation of the agricultural sector in the BBI JU initiative.

5.1 Description of current BBI JU participants from the agricultural sector

5.1.1 General overview

The total portfolio of BBI JU projects is composed of all projects resulting from the four annual calls for proposals launched by BBI JU during the years 2014, 2015, 2016 and 2017. In this portfolio, there are a total of 82 projects, divided as follows:

Table 2 Distribution per type of all funded projects in the BBI JU initiative between 2014 to 2017

	Number of projects	Share of total projects %
RIAs	43	52%
IA-DEMOS	24	29%
IA-FLAG	7	9%
CSAs	8	10%
Total	82	100%

As explained in chapter 4 – Methodology, the 8 CSAs were not further analysed since they are not contributing to the objective of this study, therefore the basis for analysis is **74 projects**.

Among 74 projects funded by BBI JU which are the subject of this study, RIAs represent 58%, followed by IA-DEMOs which represent 32%, and finally 10% are IA-FLAGs (Table 3).

Table 3 Distribution per type of all projects relevant to this study in the BBI JU initiative between 2014 to 2017

	Number of projects relevant to the	Share of total projects relevant to the study
RIAs	43	58%
IA-DEMOs	24	32%
IA-FLAG	7	10%
Total	74	100%

When looking in detail at the portfolio of RIAs, IA-DEMOs and IA-FLAGs, the average consortium size is 12 partners. Usually RIAs have a larger consortium than IA-DEMOs, and IA-DEMOs larger than IA-FLAGs. RIAs have 13 project partners on average, IA-DEMOs 11, and IA-FLAGs 9.

Table 4 Total number of partners per type of project 2014-2017

Type of project	Number of partners	Average number of partners per project
RIAs	547	13
IA-DEMOs	274	11
IA-FLAGs	64	9
Total	885	12

5.1.1.1 Agricultural partners involved in the BBI JU portfolio 2014-2017

For the purpose of this study the concept **agricultural partner** or **“agri-partner”** is used, meaning an agricultural primary producer which is involved in a BBI JU project as a project beneficiary (partner).

According to the established criteria mentioned in Chapter 4 (Methodology) from the 74 projects resulting from calls for proposals 2014 -2017 (without taking into account CSAs), there are a total of **17 projects** involving at least one agricultural primary producer as a partner in the consortium. This means that **23% of projects funded by BBI JU include agricultural primary producers among the beneficiaries** – not including CSAs.

The distribution of these 17 projects is as follows: 8 RIAs, 6 IA-DEMOs and 3 IA-FLAGs. More concretely:

- 8 out of 43 of all funded RIAs (19%) count at least one agricultural primary producer among the beneficiaries.
- 6 out of 24 of all IA-DEMOs (25%) count at least one agricultural primary producer among the beneficiaries.
- 3 out of 7 of all IA-FLAGs (43%) count at least one agricultural primary producer among the beneficiaries.

There is total of 24 different entities from the agricultural sector (primary producers) participating as beneficiaries in BBI JU consortia, and 28 participations, as four entities participate in more than one project. These 28 participations represent 3.16% (28 out of 885) of the total number of participations in the BBI JU portfolio. 35% of the projects (6 out of 17) have more than one agricultural partner in their consortium.

Table 5 Agricultural primary producers taking part in the BBI JU portfolio as beneficiaries, listed in alphabetic order

	Name of the project partner	Main Activity	Type of biomass provided in the project	Country	Type of organisation	Project(s) they are involved in
1	ANECOOP S. COOP	Fresh fruit and vegetables commercialisation	Side streams from citrus and tomato production	ES	Cooperative	Pro-Enrich
2	Azienda Agricola Chiesa Virginio	Cereal production, energy production.	Agricultural waste	IT	SME	AgriMax
3	Commercial Mushroom Producers Co-Operative Society Ltd	Mushroom commercialisation	Validation of sub products as substrate for mushroom growing	IE	Cooperative	AgriChemWhey
4	Conserves France	Canned vegetable products	Agro-industrial side streams	FR	Cooperative	Prolific
5	Coöperatieve Vereniging Miscanthusgroep U.A.	Production of miscanthus	Miscanthus biomass	NL	Cooperative	GRACE
6	Farma Oborin Sro	Animal farming, cereal production, fresh vegetables, agritourism	Cereal biomass	SK	SME	BIOSKOH
7	Miscanthus FARM Johannes Furtlehner	Production of miscanthus	Miscanthus biomass	AT	Self-Employed	GRACE
8	Glanbia Ireland	Dairy products, ingredients	Dairy side streams	IE	Cooperative	AgriChemWhey
9	Indulleida, S.A.	Valorisation of fruit surpluses and by products	Fruit by-products, surpluses	ES	Cooperative	AgriMax
10	Coöperatie Koninklijke Cosun U.A	Sugar production	By-products of sugar production, sugar beet leaves	NL	Cooperative	Pulp 2 VALUE, GreenProtein
11	Lusosem, S.A.	Plant breeding, seed production	Lupin varieties	PT	SME	LIBBIO

	Name of the project partner	Main Activity	Type of biomass provided in the project	Country	Type of organisation	Project(s) they are involved in
12	Carton Bros - Manor Farm Irish Chicken	Chicken meat production and commercialisation	Validation of new packaging solutions	IE	Large Company	RefuCoat
13	Millibeter (Circular Organics)	Insect farming	Insect biomass	BE	SME	InDIRECT
14	Monaghan Mushrooms	Mushroom production	Mushroom surpluses and by-products	IE	Large Company	BIOrescue, FUNGUSCHAIN
15	Novabiom	Production of miscanthus	Miscanthus biomass	FR	SME	GRACE
16	Olivar de Segura S.C.A.	Olive oil production	Olive oil press-cake	ES	Cooperative	Pro-Enrich
17	Oljarna Krožera Franka Marzi S.P.	Olive oil production	Olive oil press-cake	SI	SME	Pro-Enrich
18	Pleurette	Mushroom production	Mushroom surpluses and by-products	FR	SME	Prolific
19	Protifarm Holding NV	Insect farming	Insect biomass	NL	SME	InDIRECT
20	Sudzucker AG	Sugar production	Renewable feedstock	DE	Cooperative	PROMINENT, EFFECTIVE
21	Tereos Participations S.A.S	Sugar production	Renewable feedstock	FR	Cooperative	PEference
22	Terravesta Assured Energy Crop Ltd	Production of energy crops, consulting on energy crops	Miscanthus biomass	UK	SME	GRACE
23	Vandinter Semo B.V	Plant breeding, seed production	Lupin varieties	NL	SME	LIBBIO, GRACE
24	SAS Ynsect	Insect farming	Insect biomass	FR	SME	Zelcor

5.1.1.2 Distribution of agricultural partners per project

When analysing in detail the portfolio of projects that have agricultural partners among the consortium in most cases (10 out of 17, 59%) there is only one agricultural producer in the consortium. However, on average there are 1.6 agricultural partners per project within the 17 projects, mainly due to the two projects with high representation of agricultural producers, which are GRACE with five agricultural producers as partners and Pro-Enrich, with three.

Table 6 Involvement of the agricultural producers in BBI JU consortia

Project	Number	Name of the agricultural primary producers involved in the consortia
AgriChemWhey	2	Commercial Mushroom Producers Co-Operative Society Ltd
		Glanbia Ireland
AgriMax	2	Azienda Agricola Chiesa Virginio
		Indulleida, S.A
BIOrescue	1	Monaghan Mushrooms
BIOSKOH	1	Farma Oborin Sro
EFFECTIVE	1	Sudzucker Ag
FUNGUSCHAIN	1	Monaghan Mushrooms
GRACE	5	Terravesta Assured Energy Crop Ltd
		Novabiom
		Vandinter Semo B.V
		Coöperatieve Vereniging Miscanthusgroep U.A.
		Miscanthus FARM Johannes Furtlehner
GreenProtein	1	Coöperatie Koninklijke Cosun U.A
InDIRECT	2	Millibeter (Circular Organics)
		Protifarm
LIBBIO	2	Lusosem, S.A.
		Vandinter Semo B.V
PEference	1	Tereos Participations
Pro-Enrich	3	Olivar de Segura S.C.A.
		Oljarna Krožera Franka Marzi S.P.
		Anecoop S. COOP
Prolific	2	Conserves France
		Pleurette

Project	Number	Name of the agricultural primary producers involved in the consortia
PROMINENT	1	Sudzucker Ag
PULP2VALUE	1	Coöperatie Koninklijke Cosun U.A
RefuCoat	1	Carton Bros - Manor Farm Irish Chicken
Zelcor	1	SAS Ynsect

Within the subgroup of the 17 selected projects, the average number of agricultural partners within the total number of partners is constant (12%) in all the three types of projects.

Table 7 Representativity of the agricultural producers in the selection of projects with agricultural partners

Type of project	Partners total	Number of Agri Partners	%
RIA	105	13	12%
IA-DEMO	95	11	12%
IA-FLAG	34	4	12%

5.1.1.3 Participants involved in more than one project

It is interesting to highlight that four out of the 24 agricultural partners (17%) have repeated participation.

Table 8 List of the agricultural partners which are active in more than one project

Beneficiary	Project 1	Project 2
Monaghan Mushrooms	BIORescue	Funguschain
Sudzucker AG	Effective	Prominent
Vandinter Semo B.V	Grace	Libbio
Cosun	Pulp2Value	GreenProtein

5.1.1.4 Type of agricultural partners

Almost half of the current agricultural partners are SMEs (46%). This group includes small and medium size farms, and also innovative companies involved in production and processing. The second biggest group of participants are cooperatives (42%). Additionally, two large companies are currently involved in BBI JU consortia (8%), and only one individual farmer (4%).

Table 9 Distribution of participants in the project per type of entity

Type of entity	Number	%
SMEs	11	46%
Cooperatives	10	42%
Large Companies	2	8%
Self-Employed	1	4%
Total	24	100%

5.1.1.5 Geographical distribution of agricultural partners

France is the country with the highest number of representatives from the agricultural sector involved as partners in BBI JU projects, with five different representatives, followed by the Netherlands with four. There are only representatives from 12 member states present in the projects at the time of writing. Worth highlighting is the low representation from Eastern European countries. Furthermore, there is no agricultural representative from the Scandinavian countries.

Table 10: Distribution of agricultural partners per EU country and graphic representation

Country	AT	BE	DE	ES	FR	IE	IT	NL	PT	SI	SK	UK	TOTAL
Number	1	1	1	3	5	4	1	4	1	1	1	1	24

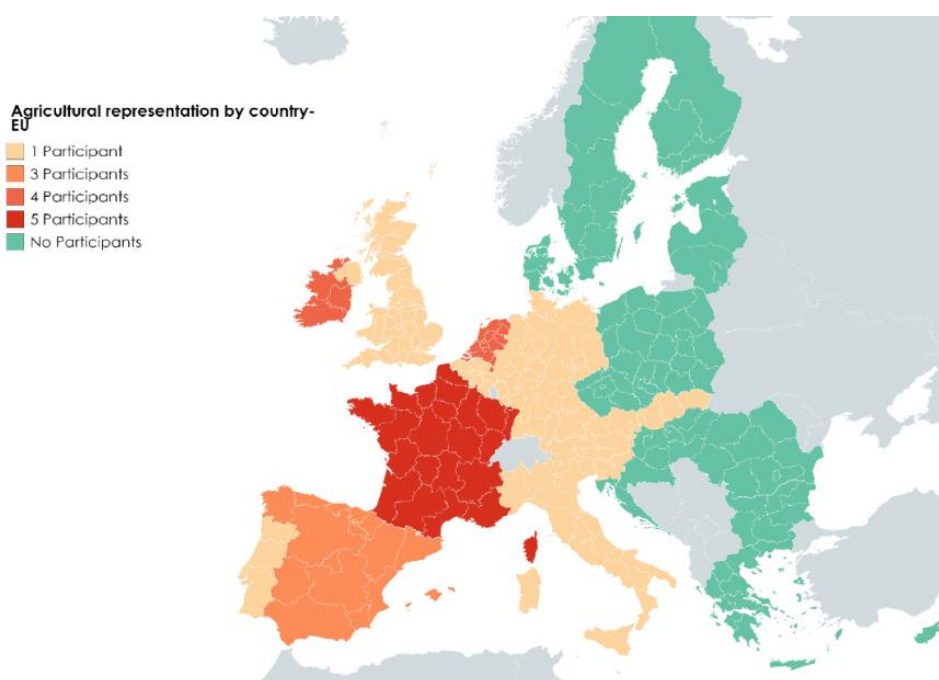


Figure 1: Agricultural representation by country-Map EU

5.1.2 Involvement of agricultural primary producers in project implementation

It was considered very interesting and relevant to the study not only to look at the number of participants, but also at the type of involvement these participants have in their consortia.

From this analysis, two very different types of involvements were identified:

- agricultural producers involved as **“regular” partners** in the consortium, and
- agricultural producers that are involved as the **coordinators** of their project.

From the 17 projects involving agricultural partners, 14 projects have primary producers involved as “regular” partners (82%) and in the other three projects the agricultural partners are the project coordinators (18%).

We describe their involvement in further detail below:

5.1.2.1 *Agricultural partners involved as “regular” partner:*

From a quantitative point of view, if we look at the sub-group of 14 projects where agri-partners act as “regular” partners and not as coordinators, in all cases the participation of these agri-partners in terms of responsibilities within the project is minor. Agri-partners that act as “regular” partners represent on average 12% of the consortium participants, but were responsible only for 6% of the work packages and 8% of the deliverables.

In fact, regarding leadership in work packages, in eight out of the 14 projects (57%) where agri-partners are involved as regular partners, and not as coordinators, agri-partners do not lead any work package. Regarding deliverables, in four out of the 14 projects (29%) they are not responsible for any of the generated deliverables.

As already highlighted above, the project with highest number of agri-partners involved as regular partners is GRACE, with five partners from the primary sector (Terravesta Assured Energy Crop Ltd, Novabiom, Vandinter Semo B.V., Coöperatieve Vereniging Miscanthusgroep U.A., Miscanthus FARM Johannes Furtlehner), representing 23% of the consortium participants. However, these partners do not lead any work packages and are responsible for only 8% of the deliverables.

From a qualitative point of view, they are mainly in charge of providing their biomass to other project partners. This main role is sometimes complemented by other roles such as providing information on the biomass they supply; analysing and characterising it by providing a qualitative assessment; or participating in designing parts of the industrial value chain envisaged, for example, optimising the storage and supply strategy.

Therefore, as a preliminary conclusion it could be noted that a higher number of agri-partners in the consortium does not directly imply a higher involvement in the implementation of the action. A possible explanation is that in the end it comes down to the kind of coordination carried out in the project; some coordinators consider agri-partners as mere biomass providers, and some others take advantage of their presence to increase the know-how of the consortium about the biomass us.

Table 11 Overview of the involvement of agricultural partners in project implementation

Project	Type of project	Partners total	Agri Partners	% of agri partners	Total nº of WP	WP led by agri-partner	% of WP led by agri-partner	Total nº of Db	Db by agri-partner	% Db by agri-partner
AgriMax	IAsDEMO	29	2	7%	9	1	11%	51	3	6%
BIOrescue	RIAs	10	1	10%	7	1	14%	66	13	20%
BIOSKOH	IAsFLAG	11	1	9%	8	0	0%	75	3	4%
EFFECTIVE	IAsDEMO	12	1	8%	9	0	0%	55	2	4%
FUNGUSCHAIN	IAsDEMO	17	1	6%	7	1	14%	67	13	19%
GRACE	IAsDEMO	23	5	22%	7	0	0%	61	5	8%
InDIRECT	RIAs	9	2	22%	8	0	0%	27	2	7%
LIBBIO	RIAs	14	2	14%	7	0	0%	38	0	0%
PEference	IAsFLAG	11	1	9%	11	1	9%	51	3	6%
Pro-Enrich	RIAs	16	4	25%	7	0	0%	55	0	0%
Prolific	RIAs	17	2	12%	9	0	0%	37	0	0%
PROMINENT	RIAs	9	1	11%	8	2	25%	32	6	19%
RefuCoat	RIAs	13	1	8%	9	0	0%	42	0	0%
Zelcor	RIAs	17	1	6%	10	1	10%	43	3	7%
Total		208	25	12% avg	116	7	6% avg	700	53	8% avg

Notes: Deliberable= Db.

5.1.2.2 Agricultural partners involved as project coordinator:

From a quantitative point of view, there are three projects out of 17 (18%) where agricultural partners have a leading position in the consortium, being involved as the project coordinator. This is the case of Pulp2Value and GreenProtein, both projects coordinated by the same partner, Coöperatie Koninklijke Cosun U.A, and in AgriChemWhey, coordinated by Glanbia.

It is important to highlight that the involvement of the agricultural partners in the project changes radically when they are coordinators. In the three projects where this is the case – Pulp2Value, GreenProtein and AgriChemWhey – the coordinator leads on average 50% of the work packages and is responsible for 59% of the deliverables produced.

Table 12 Overview of the involvement of agricultural coordinators in project implementation

Project	AgriChemWhey	GreenProtein	PULP2VALUE	Total
Type of project	IA-FLAG	IA-DEMO	IA-DEMO	
Partners total	12	7	7	14
Agri Partners	2	1	1	2
%	17%	14%	14%	14%
Total n° of WP	7	9	7	16
Total n° of WP with a lead agri-partner	4	4	4	8
%	57%	44%	57%	50%
Total n° of Deliv.	38	28	16	44
Total n° of Deliv. with a lead agri-partner	19	13	13	26
%	50%	46%	81%	59%

From a qualitative point of view, they not only supply biomass, but are in charge of coordinating most technical work packages, as well as of the overall coordination of the project, and other non-technical tasks.

5.1.2.3 Analysis of BBI JU contribution

The average BBI JU contribution allocated per agri-partners is 1,160,828€ Values range from no contribution at all, which is the case for large companies in RIAs, to € 15 million, which is the contribution received by Glanbia for IA-FLAG project AgriChemWhey (see table 11). It is worth noting that the information on the project BBI JU contribution was retrieved by BBI JU from the CORDA database at the time of the preparation of the study.

As it can be seen from the analysis, some cooperatives are eligible for funding under RIAs and some are not. This is due to the fact that cooperatives are evaluated according to their turnover and staff force and classified as SMEs (eligible for funding in RIAs) or as large companies (not eligible for funding under RIAs). For the purpose of the study, and given their common factors, it was decided to group them under the category of cooperatives.

Table 13 BBI JU contribution requested per agricultural partners

Name of the project partner	Type of organisation	Project	Type of project	Funding received by the agri -partner (euros)	Total BBI JU contribution to the project (euros)	%
ANECOOP S. COOP	Cooperative	Pro-Enrich	RIA	Not eligible for funding	€ 3,312,890.86	0.00%
Azienda Agricola Chiesa Virginio	SME	AgriMax	IA-DEMO	€ 1.284.216,04	€ 12,488,230.37	10.28%
Commercial Mushroom Producers Co-Operative Society Ltd Producers Co-	Cooperative	AgriChemWhey	IA-FLAG	€ 340.004,00	€ 22,007,931.38	1.54%
Conserves France	Cooperative	Prolific	RIA	Not eligible for funding	€ 4,672,382.75	0.00%
Coöperatieve Vereniging Miscanthusgroep U.A.	Cooperative	GRACE	IA-DEMO	€ 327.250,00	€ 12,324,632.86	2.66%
FARMA OBORIN SRO SRO	SME	BIOSKOH	IA-FLAG	€ 3.069.500,00	€ 21,568,194.13	14.23%
Miscanthus FARM Johannes Furtlehner	Self-Employed	GRACE	IA-DEMO	€ 88.375,00	€ 12,324,632.86	0.72%
Glanbia Ireland	Cooperative	AgriChemWhey	IA-FLAG	€ 14.995.179,88	€ 22,007,931.38	68.14%
INDULLEIDA, S.A	Cooperative	AgriMax	IA-DEMO	€ 1.841.783,13	€ 12,488,230.37	14.75%
Coöperatie Koninklijke Cosun U.A	Cooperative	PULP2VALUE	IA-DEMO	€ 3.500.759,50	€ 6,589,180.00	53.13%
		GreenProtein	IA-DEMO	€ 1.924.068,58	€ 4,227,361.37	45.51%
Lusosem, S.A.	SME	LIBBIO	RIA	€ 202.100,00	€ 4,923,750.00	4.10%

Carton Bros - Manor Farm Irish Chicken	Large Company	RefuCoat	RIA	Not eligible for funding	€ 2,300,735.30	0.00%
Millibeter (Circular Organics)	SME	InDIRECT	RIA	€ 175.000,00	€ 1,347,947.75	12.98%
Monaghan Mushrooms	Large Company	BIOrescue	RIA	Not eligible for funding	€ 2,635,140.63	0.00%
		FUNGUSCHAIN	IA-DEMO	€ 844.350,00	€ 5,700,547.00	14.81%
Novabiom	SME	GRACE	IA-DEMO	€ 531.642,13	€ 12,324,632.86	4.31%
Olivar de Segura S.C.A.	Cooperative	Pro-Enrich	RIA	€ 41.000,00	€ 3,312,890.86	1.24%
Oljarna Krožera Franka Marzi S.P.	SME	Pro-Enrich	RIA	€ 45.000,00	€ 3,312,890.86	1.36%
Pleurette	SME	Prolific	RIA	€ 150.237,50	€ 4,672,382.75	3.22%
Protifarm	SME	InDIRECT	RIA	€ 10.000,00	€ 1,347,947.75	0.74%
Sudzucker AG	Cooperative	EFFECTIVE	IA-DEMO	€ 253.276,63	€ 7,171,906.64	15.03%
		PROMINENT	RIA	Not eligible for funding	€ 1,685,006.00	0.00%
Tereos participations	Cooperative	PEference	IA-FLAG	€ 793.187,50	€ 24,999,610.00	3.17%
Terravesta assured energy crop ltd	SME	GRACE	IA-DEMO	€ 1.165.399,73	€ 12,324,632.86	9.46%
Vandinter Semo B.V	SME	GRACE	IA-DEMO	€ 195.500,00	€ 4,923,750.00	3.97%
		LIBBIO	RIA	€ 178.500,00	€ 12,324,632.86	1.45%
SAS Ynsect	SME	Zelcor	RIA	€ 546.875,00	€ 5,256,993.00	10.40%

5.1.2.4 BBI JU contribution of agricultural partners in RIAs, IAs-DEMO and IAs-FLAG in projects with agro-based biomass.

It can be affirmed that the average BBI JU contribution received by agri-partners increases as the TRL of the project does, being € 168,589.06 for RIAs (Table 14), € 1,086,965.52 for IAs-DEMO (Table 15) and € 4,799,467.85 for IAs-FLAG (Table 16).

In the calculation of the average funding obtained by agri-partners in RIAs, it was not taken into account the four entities that qualified as large companies and were not eligible for funding. These fore entities were: ANECOOP S. COOP, Conserves France, Carton Bros - Manor Farm Irish Chicken and Monaghan Mushrooms.

Table 14 BBI JU contribution for agricultural partners involved in RIAs

Name of the project partner	Project	Kind of project	Funding received
Lusosem, S.A.	LIBBIO	RIA	€ 202,100.00
Millibeter (Circular Organics)	InDIRECT	RIA	€ 175,000.00
Olivar de Segura S.C.A.	Pro-Enrich	RIA	€ 41,000.00
Oljarna Krožera Franka Marzi S.P.	Pro-Enrich	RIA	€ 45,000.00
Pleurette	Prolific	RIA	€ 150,237.50
Protifarm	InDIRECT	RIA	€ 10,000.00
Vandinter Semo B.V	LIBBIO	RIA	€ 178,500.00
SAS Ynsect	Zelcor	RIA	€ 546,875.00
		AVERAGE	€ 168,589.06

Table 15 BBI JU contribution for agricultural partners involved in IAs-DEMO

Name of the project partner	Project	Kind of project	Funding received
Azienda Agricola Chiesa Virginio	AgriMax	IA-DEMO	€ 1,284,216.04
Coöperatieve Vereniging Miscanthusgroep U.A.	GRACE	IA-DEMO	€ 327,250.00
Miscanthus FARM Johannes Furtlehner	GRACE	IA-DEMO	€ 88,375.00
Indulleida, S.A	AgriMax	IA-DEMO	€ 1,841,783.13
Coöperatie Koninklijke Cosun U.A	PULP2VALUE	IA-DEMO	€ 3,500,759.50
Coöperatie Koninklijke Cosun U.A	GreenProtein	IA-DEMO	€ 1,924,068.58
Monaghan Mushrooms	FUNGUSCHAIN	IA-DEMO	€ 844,350.00
Novabiom	GRACE	IA-DEMO	€ 531,642.13
Sudzucker AG	EFFECTIVE	IA-DEMO	€ 253,276.63
Terravesta Assured Energy Crop Ltd	GRACE	IA-DEMO	€ 1,165,399.73
Vandinter Semo B.V	GRACE	IA-DEMO	€ 195,500.00
		AVERAGE	€ 1,086,965.52

Table 16 BBI JU contribution for agricultural partners involved in IAs-FLAG

Name of the project partner	Project	Kind of	Funding received
Commercial Mushroom Producers Co-Operative Society	AgriChemWhe	IA-FLAG	€ 340,004.00
FARMA OBORIN SRO SRO	BIOSKOH	IA-FLAG	€ 3,069,500.00
Glanbia Ireland	AgriChemWhe	IA-FLAG	€ 14,995,179.88
TEREOS PARTICIPATIONS	PEference	IA-FLAG	€ 793,187.50
		AVERAGE	€ 4,799,467.85

However, this information should be taken cautiously, since there is a great dispersion in the BBI JU contribution received.

The total averages of all projects in the BBI JU portfolio (74) have also been calculated, and they are expressed in the following table:

Table 17: Total averages of all projects in the BBI JU portfolio

	Number of projects funded	Accumulated BBI JU Contribution	Accumulated number of partners	Average BBI JU contribution per project	Average BBI JU contribution per partner
RIAs	43	€ 144,338,810.64	547	€ 3,356,716.53	€ 263,873.51
IA-DEMO	24	€ 187,898,035.14	274	€ 7,829,084.80	€ 685,759.25
IA-FLAG	7	€ 158,703,813.13	64	€22,671,973.30	€ 2,479,747.08

Comparing the BBI JU contribution of agricultural partners in RIAs, IAs-DEMO and IAs-FLAG projects with agro-based biomass:

Table 18: Comparison of the budget of agricultural partners in projects with agro-based biomass

Average BBI JU contribution per partner	Average BBI JU contribution for complete project portfolio	Average BBI JU contribution Agri-partners	Difference
RIAs	€ 263,873.51	€ 168,589.06	€ - 95,284.45 (-57%)
IA-DEMO	€ 685,759.25	€ 1,086,965.52	€ 401,206.27 (+37%)
IA-FLAG	€ 2,479,747.08	€ 4,799,467.85	€ 2,319,720.77 (+48%)

5.1.2.5 BBI JU contribution analysis comparing regular partners to coordinators.

Another interesting analysis is to compare the average BBI JU contribution of the agricultural partners when they are involved as regular partners and when they are the project coordinators. As seen in Table 19, the average BBI JU contribution of agricultural partners when involved as regular partners is 604,159.83 €.

Table 19 Average budget of agricultural partners when involved as “regular” partners

Name of the project partner	Project	Average BBI JU contribution received by agri partner	Average Project BBI JU contribution
Azienda Agricola Chiesa Virginio	AgriMax	€ 1,284,216.04	€ 12,488,230.37
Commercial Mushroom Producers Co-operative	AgriChemWhey	€ 340,004.00	€ 22,007,931.38
Coöperatieve Vereniging Miscanthusgroep U.A.	GRACE	€ 327,250.00	€ 12,324,632.86
Farma Oborin SRO	BIOSKOH	€ 3,069,500.00	€ 21,568,194.13
Miscanthus FARM Johannes Furtlehner	GRACE	€ 88,375.00	€ 12,324,632.86
INDULLEIDA, S.A	AgriMax	€ 1,841,783.13	€ 12,488,230.37
Lusosem, S.A.	LIBBIO	€ 202,100.00	€ 4,923,750.00
Millibeter (Circular Organics)	InDIRECT	€ 175,000.00	€ 1,347,947.75
Monaghan Mushrooms	FUNGUSCHAIN	€ 844,350.00	€ 5,700,547.00
Novabiom	GRACE	€ 531,642.13	€ 12,324,632.86
Olivar de Segura S.C.A.	Pro-Enrich	€ 41,000.00	€ 3,312,890.86
Oljarna Krožera Franka Marzi S.P.	Pro-Enrich	€ 45,000.00	€ 3,312,890.86
Pleurette	Prolific	€ 150,237.50	€ 4,672,382.75
Protifarm	InDIRECT	€ 10,000.00	€ 1,347,947.75
Sudzucker AG	PROMINENT	€ 253,276.63	€ 1,685,006.00
Tereos Participations	PEference	€ 793,187.50	€ 24,999,610.00
Terravesta Assured Energy Crop Ltd	GRACE	€ 1,165,399.73	€ 12,324,632.86
Vandinter Semo B.V	GRACE	€ 195,500.00	€ 4,923,750.00
Vandinter Semo B.V	LIBBIO	€ 178,500.00	€ 12,324,632.86
SAS YNSECT	Zelcor	€ 546,875.00	€ 5,256,993.00
	AVERAGE	€ 604,159.83	€ 9,582,973.33

It is worth remembering that, since large companies are not eligible for funding in RIAs, the average budget of the agricultural partners when involved as regular partners has been calculated without taking into account the following participations:

Table 20 Agricultural partners involved as project partner not eligible for funding (Reason: they are large companies participating in RIAs)

Name of the project partner	Project	BBI JU contribution received by agri partner	Project BBI JU contribution
ANECOOP S. COOP	Pro-Enrich	Not eligible for funding	€ 3,312,890.86
Conserves France	Prolific	Not eligible for funding	€ 4,672,382.75
Carton Bros - Manor Farm Irish Chicken	RefuCoat	Not eligible for funding	€ 2,300,735.30
Monaghan Mushrooms	BIOrescue	Not eligible for funding	€ 2,635,140.63
Sudzucker AG	EFFECTIVE	Not eligible for funding	€ 7,171,906.64

When looking at of the agricultural partners when they are the project coordinators, as can be seen in Table 21, the average budget is 6,806,669.32 €.

Table 21 Average budget of agricultural partners when involved as project coordinators

Name of the project partner	Project	BBI JU contribution received by agri partner	Project BBI JU contribution
Coöperatie Koninklijke Cosun U.A	PULP2VALUE	€ 3,500,759.50	€ 6,589,180.00
Coöperatie Koninklijke Cosun U.A	GreenProtein	€ 1,924,068.58	€ 4,227,361.37
Glanbia Ireland	AgriChemWhey	€ 14,995,179.88	€ 22,007,931.38
	AVERAGE	€ 6,806,669.32	€ 10,941,490.92

The average BBI JU contribution of agricultural partners when involved as regular partners is 604,159.83 €, and when involved as project coordinators it is 6,806,669.32 €. When acting as coordinators, the average BBI JU contribution provided is 11 times greater, showing a different level of involvement and commitment on the part of the agricultural partners when participating as regular partners compared to as coordinators.

5.1.3 Examples of involvement of the agricultural sector with no agricultural partners in the consortia

Although the involvement of agricultural producers in consortia only reached **23% of the projects funded to date (without considering CSAs)**, the involvement of agricultural stakeholders in BBI JU projects is in practice higher, since in many cases they are involved via other types of cooperation frameworks. From the review of the funded projects, three different types of involvement can be highlighted:

- 1) Subcontracting external farms/farmers to carry out validation work.
- 2) Long term contract with farmers' associations and compensation payment per hectare to foster the cultivation of new dedicated crops. This is the case, for example, in the project FIRST2RUN.
- 3) Involvement of farmers indirectly via representation organisations such as cooperatives federations. This is the case in the project BARBARA.

Example of subcontracting farms/farmers

In one of the funded projects, two farms are subcontracted to carry out commercial scale validations of miscanthus at different locations. This type of collaboration allows easy validation of the project concept in several farms without requiring these farmers to comply with difficult reporting obligations, meeting attendance, travelling etc.

The negative aspects of involving farmers as subcontractors is that they are kept out of the decision-making process of the project. They execute a service for the project, which is already pre-defined, so there is little room for any change in the plans originally designed when writing the project proposal, and there is very limited or no interaction with the rest of the consortium.

Example of involving farmers outside the consortium

The example of FIRST2RUN is highly interesting as inspiration for how farmers can be involved during and after the project. The business model is analysed in chapter 6.

The objective of the IA-FLAG project FIRST2RUN is to develop a process to valorise cardoon crops cultivated on marginal land. One of the challenges of this initiative was to convince farmers to cultivate a crop which is socially seen as a weed that infects cereal fields.

Despite the fact that within the consortium of this IA-FLAG projects there are no agricultural partners, the project includes an agreement with Coldiretti (the largest farmers' association in Italy) to make the link between the project and farmers in Sardinia. The project includes a compensation payment per hectare to foster the cultivation of cardoon crops in Sardinia.

In this project, a strong effort has been made to train farmers on the cultivation of cardoon crops, since this was a crop with which local farmers were not familiar. Different round tables and training sessions have been organized in the project to set up a low-input protocol for cardoon cultivation in marginal areas, targeting the reduction of water use and fertilizers etc. As stated by the coordinator of the FIRST2RUN project:



The First2Run model has a deep root in the local area, from which it takes inspiration and towards which it intends to generate benefits both for the local economy and the environment.

Example of involving farmers indirectly via representative organisations

In several projects, the consortium involves organisations such as federations or associations whose work includes representing the interests of their members at different levels (advocacy, communication, training etc.). For example, the project AGRIMAX involves the participation of "Federacio de Cooperatives Agraries de Catalunya", the federation for agricultural cooperatives in the region of Catalonia. The project BARBARA includes "Federación de Cooperativas Agrarias de Murcia" which is the federation for agricultural cooperatives in the region of Murcia.

The involvement of this type of entity is highly interesting from the dissemination point of view, since they have direct contact with their members, in this case farmers' cooperatives. The involvement of this type of representative organisation, if efficiently implemented, can raise the visibility of the initiative thanks to the multiplier effect of this type of organisation.

5.1.3.1 *Agro-based biomass providers outside the consortium*

From the review of the 74 projects in the portfolio, another 25 projects were identified that make use of agro-based biomass in their value chains during project implementation but do not include agricultural primary producers in the consortia.

Given the importance of this group for the study, and in order to complement the information provided (websites, Description of the Action – Annex 1 to the Grant Agreement – and KPI and impact annual questionnaire), it was decided to carry out a separate survey in which the coordinators of these projects were contacted. The objective was to analyse common factors and drivers that lead to the non-inclusion of the agro-based biomass providers in the consortium (See section 5.2.2).

From these 25 projects, we identified three different cases:

- » Four projects included only forestry-related biomass during project implementation, despite the fact that in the Description of Action (DoA) they referred to agro-based biomass (e.g. they included in DoA lignin from straw but during implementation they obtained only from wood).
- » Five projects declared making use of agri-biomass but from a commercial source, without any direct link to the agricultural sector (e.g. potato starch).
- » 16 projects did obtain their biomass directly from the agricultural sector. As mentioned in Chapter 4 – Methodology, a specific survey was designed for these cases. A total of 14 coordinators replied to the survey.

Table 22 List of projects which involve agro-based biomass in their value chain but do not include agricultural producers in the consortia

	Acronym	Type of action	Value-chain
1	BARBARA	RIA	VC4–organic waste
2	BioBarr	RIA	VC3 – agro-based
3	BIOMOTIVE	IA-DEMO	Across VCs
4	CARBOSURF	RIA	VC3 – agro-based
5	DEMETER	IA-DEMO	Across VCs
6	ECOXY	RIA	Across VCs
7	EXCornsEED	RIA	VC4 – organic waste
8	FIRST2RUN	IAs FLAG	VC3 – agro-based
9	GreenSolRes	IA-DEMO	VC1 – lignocellulose
10	LigniOx	IA-DEMO	VC1 – lignocellulose
11	LIGNOFLAG	IAs FLAG	VC1 – lignocellulose
12	LIPES	IA-DEMO	VC3 – agro-based
13	NEWFERT	RIA	VC4 – organic waste
14	OPTISOCHEM	IA-DEMO	Across VCs
15	POLYBIOSKIN	RIA	Across VCs
16	ReInvent	IA-DEMO	Across VCs
17	ReSolve	RIA	Across VCs
18	SHERPACK	RIA	Across VCs
19	SSUCHY	RIA	VC1 – lignocellulose
20	SUSBIND	RIA	VC4 – organic waste
21	SUSFERT	IA-DEMO	VC3 – agro-based
22	SYLFEED	IA-DEMO	Across VCs
23	UNRAVEL	RIA	VC1 – lignocellulose
24	US4GREENCHEM	RIA	VC1 – lignocellulose
25	VIPRISCAR	RIA	Across VCs

5.2 Surveys of participants involved in agro-biomass BBI JU projects

5.2.1 Agricultural partners survey

A survey was prepared and sent to all agricultural partners involved in the 17 analysed BBI JU projects²⁷. So, 28 online questionnaires were sent to 24 agri-partners. (Four of them participate in two projects.)

The objective of the survey was to obtain qualitative information on the views and concerns of agri-partners when taking part in the BBI JU project, to complement the information already available from other sources such as BBI JU and project websites, Annex 1 to the grant agreements and the answers to KPI and impact questionnaires. The survey was divided in five thematic sections:

Section 1 – Profiling of respondents and entities

Section 2 – Proposal preparation

Section 3 – Implementation

Section 4 – Post-project expectations

Section 5 – Recommendations

It is important to highlight that not all agricultural primary producers answered the survey, therefore the survey does not reflect the views of all agricultural partners but only a part of them. However, 23 out of 28 responded, which means that the **response rate was 82%**, which was considered to be sufficiently representative.

» Summary of data

5.2.1.1 Section 1 – Profiling of respondents and entities

Profiling the survey respondents means asking for the attributes of the individual who takes the survey, and not the whole entity they work in. However, the respondent acts as the project's representative.

44% of the survey participants are middle-aged males (between 35-44 years old). Their highest level of studies includes postgraduate university degrees, participating in project implementation and performing managerial functions in small or medium sized enterprises. Country representation is varied (22% from Spain, 14% from the Netherlands and 11% from Italy, the rest being widely dispersed among the other participating countries), with entities located in rural, thinly populated areas. There was no representation from Eastern European territories.

The main production of entities in the study is plant-based (72%), and companies are involved in various activities, from harvesting crops to also being involved in the transformation of their own products (70% of participants). In most cases, other complementary activities are cited as relevant to their business such as training, research, milling and being engaged in other aspects of the supply chain.

²⁷ The survey was also sent to representative organisations such as cooperatives federations but it was later decided to take those answers out of the analysis (see motivation provided under Section 5.1.1).

Crops cultivated are varied, from grass to fruit, fungi and energy crops (e.g. miscanthus). Animals raised vary from farm animals to insects.

Distribution channels are equally divided between selling their product to industry, retailers and end-users, with the most common being a combination of the three. Only three entities mentioned that they sold their goods to another primary producer.

When asked for information on the application of final products, both food and non-food uses are cited, putting into context their role in BBI JU projects as providers and collectors of seeds, plants, waste and side-stream residues, preparation of soil and testing feedstock quality.

It is interesting to note that while half of the contacted organisations are only involved in one European project (the BBI JU project subject of the survey), there is another half that are involved in more than one European project. There is one organisation involved in four EU projects. The average of EU projects per surveyed partner is 1.78.

Their motivations to participate: the chance of being an active part of a cutting-edge innovative initiative, to obtain funds and to benefit from cross-sectorial connections.

5.2.1.2 Section 2 – Proposal preparation

Results of the surveys indicate that agricultural producers start their engagement within the project via contacts already established with the project's coordinator or another consortium partner. Activities such as BBI JU info days do not appear to be of significant importance, as the **most common way of becoming engaged with projects is thanks to previous contacts and is associated with peer-to-peer relationships**.

Complexity levels of the proposal preparation are assessed as being “**as complex as foreseen**”, regarding it as a “known fact” that the dedication needed for EU projects is high, involving a high level of commitment.

The perception of proposal complexity is greater for first-time participants, but this challenge is solved thanks to the aid of project coordinators, officers, and partners with prior consortium experience. That way, issues can be managed effectively. This perception depends mainly on company size: **small businesses remark that they should not have to comply with the same administrative requirements as bigger companies**.

5.2.1.3 Section 3 – Implementation

Implementation complexity is also regarded as being “as complex as estimated”, and it is related to time-consuming efforts such as the distribution of responsibilities among the consortium partners, assigning tasks and goals per work package and delivering documentation or reporting. **During project implementation, the challenge that they face is that the project requires more dedication than was foreseen**.

When asked about their perception of their influence in the decision-making process of the project, responses were balanced. The highest percentage of participants (35.71%) considered their role to be slightly influential. However, entities thought that their role in the project implementation could not be easily replaced (57.14%).

57% of the entities surveyed believe that no new job positions will be created because of their participation in the project (as assigned responsibilities will fall to pre-existing employees), and the remaining 43% answered “yes”, estimating that new positions might range between one and three employees.

When asked about the skills developed thanks to participating in the BBI JU project, most participants answered that acquiring skills such as increasing innovation capacity (75%) and better understanding of the EU project framework (71%) is very valuable. Few participants consider that they developed skills related to the discovery of new funding opportunities (21%) and better understanding of their own potential (28%) when participating in the BBI JU project. Respondents speak extensively about the individual accomplishments of their entities and project success stories in the free-text comments section, tying this section to the next one, which looks into positive outcomes after their participation in the BBI JU project.

5.2.1.4 Section 4 – Post-project expectations

Positive results are related to a boost in new business lines or the inception of other projects: it is perceived that new employees will be needed as project participation will improve their profile, they will develop new products and will generally have a positive impact for the local economy.

A significant high percentage of respondents (83%) foresee the creation of sustainable and stable value chains and new business opportunities thanks to the participation in the project.

It is interesting to highlight that the entities that answered “no” to this question (i.e. they do not believe a new value chain will be created after the project, they do not believe a new business line will emerge from the participation in the project) are all large cooperatives. The external difficulties highlighted by those who replied “no” to this question were:

- ✖ Product price too high to fit the market
- ✖ Logistical problems
- ✖ Market demand is too low – or too low so far
- ✖ Regulatory issues
- ✖ The product is easily replaceable.

The internal difficulties highlighted in developing a new business line make from the innovation are related to the fact that **further investment will be needed to achieve market readiness**, and that insufficient infrastructure or knowledge of new markets is an issue that must be addressed. They believe that new possibilities are hard to predict. (No accurate data was provided.)

Their expectations are high and they have a positive outlook, as most of agri-partners surveyed are satisfied with their involvement in the project and say that the project has met their expectations: 92.86% are positively willing to participate in a BBI JU project again in the near future.

5.2.1.5 Section 5 – Recommendations

Agricultural partners were asked for recommendations to improve the BBI JU project participation guidelines, annual work plans or topics, to make them more accessible. These were diverse and included:

- Decrease administrative reporting and provide clearer guidance on how to provide the information requested.
- Conduct thematic meetings between potential partners.
- Improve Participant’s Portal and Funding site usability.

When asked for suggestions on how to increase the entity's impact as a result of participating in a project, diverse recommendations were given:

- More funding towards the interaction between science and industry and help businesses to find more financial resources to develop the results obtained.
- Provide grants for training staff on bio-based processing technologies. Promote courses and information related to the bioeconomy.

Further suggestions on how to enhance the entity's involvement in future funding opportunities:

- Increase networking between smaller companies and boost their involvement in BBI JU meetings.
- Write specific tenders to improve agro-based value chains.
- Simplify reporting processes.

5.2.2 Coordinators survey

As highlighted above, during data analysis, we identified 25 projects which did NOT have agricultural primary producers among the consortia but referred to the need of agro-based biomass for the project implementation. It was considered relevant for the study to understand the reasons that led the coordinators of these projects not to include the biomass providers in the consortium as a key part of the new value chain.

» Summary of data

5.2.2.1 Section 1 - Profiling

Two types of organisations represented the majority of the respondents: research organisations (35.71%) and private entities (35.71%). Half of the respondents were coordinating a RIA project, followed by IA-DEMO (35.71%) and IA-FLAGs (14.29%).

Biomass supply characterisation: The amount and type of biomass required for project implementation ranged from 50 kg/year (struvite from agri-food production) to 300,000 tons a year (cereal straw). The agriculture biomass required for their project, listed by coordinators, included some elaborated products such as vegetable oils and first-generation sugars, and by-products such as ashes from agri-food products.

5.2.2.2 Section 2 - Relationship of the project with the biomass provider

Generally, coordinators engage with biomass suppliers during proposal preparation and they contact agricultural suppliers with whom they have previous professional relationships.

The main criteria for coordinators to select agro-based biomass suppliers for their project are **location and proximity, followed by availability and price**. The experience of these biomass suppliers in BBI JU or European projects was not considered relevant.

Comments by respondents referred to other relevant criteria such as:

- Availability of specific machinery to sow the required crop;
- Personal wish of the agricultural producer to diversify business opportunities.

These project coordinators decided not to include biomass suppliers as project partners for many different reasons: 27.34% highlighted the fact that the biomass required for the development of the project was too small; 10.94% did not find suppliers interested in taking part in the project; 10.94% answered that it was not considered relevant to include them in the project at the proposal preparation stage; and 38.28% answered “other” without specifying further.

5.2.2.3 Section 3 – Biomass supplier

Project coordinators have different opinions about the influence of primary producers in their project. While half of the project coordinators believe that the biomass supplier has an influence in the project, it is relevant to highlight that **35.71% stated that the biomass supplier has NO leverage influence at all in the project.**

The majority of the coordinators believe that the role of the biomass supplier could be very easily (28%) or easily (21%) replaced by some other supplier.

When asked if they would include the biomass supplier in the consortium if they were writing the proposal now, **64.29% of the project coordinators surveyed do not consider it relevant to include the biomass provider as project partner.** The main reason stated is that the current relationship framework (e.g. long-term supplying contract) fulfils all the needs and expectations. **35.71% of project coordinators would now include the biomass supplier in the consortium if given the chance.**

To date, the majority of **coordinators (71.43%) did not face any challenges related to biomass supply during project implementation.** Reasons vary, from the fact that the amount required is small, to the fact that there are project partners in charge of making this link with the biomass suppliers.

5.2.2.4 Section 4 - Expectations

Coordinators believe that their biomass providers will receive a positive impact from their participation in the project. *“The creation of a new revenue stream, as now they market something they did not before”* was identified as the main opportunity for the biomass providers. Other opportunities highlighted were the fact that, thanks to the project, agri-partners have to opportunity to improve contact and commercial networks.

Project coordinators do not foresee major issues regarding biomass supply or stock availability after the project. Comments on this question mentioned as main priority the need for long-term supply contracts with agricultural producers to establish a stable framework for both sides.

Coordinators believe that the project facilitates and/or will facilitate collaborations between the project biomass provider and other consortium members (64.29%). They also believe that their biomass supplier is willing to take part again as a biomass supplier in a future BBI JU action (85.71%).

A large majority of the coordinators (85.71%) stated that they believe that the agri-biomass suppliers will be fully integrated in the new value chain that will be created as a result of the ongoing project.

5.2.2.5 Section 5 – Recommendations

Coordinators were asked for recommendations to make the BBI JU programme more accessible for primary sector producers beyond their role as biomass providers, and recommendations were diverse including:

- Improve participation conditions for agricultural partners, for example by offering 100% grants in IAs.

- Adapt topics descriptions to highlight in the topic text the need for primary producers' involvement.
- Simplify administrative procedures, especially for small grants.
- Provide information and training for primary producers.

5.3 Analysis of the socio-economic indicators

Annually, BBI JU collects a series of indicators from all ongoing projects, which are of relevance to evaluate the potential impact of the project related to key socio-economic aspects such as the impact on rural development, on the environment, or on regulatory issues. In order to collect the information, a questionnaire in an Excel file (KPI & impact questionnaire) is sent to project coordinators for them to complete. The coordinators provide information on the expected contribution of the project to these indicators. The analysis of the replies to this questionnaire is presented yearly in the BBI JU Annual Activity Report (AAR).

Among the different aspects the project coordinators were asked about, it was considered relevant for this study to look at the answers provided related to the following socio-economic indicators.



Will the project contribute to...

- ...generating new skilled jobs in rural regions?
- ...generating growth of income for primary producers?
- ...supporting regional development by diversifying the local economy?

In addition, it was interesting to look at the replies given to the set of indicators for the block “expected impact on primary producers and rural development”.

5.3.1 Socio-economic indicators from the complete project portfolio (RIAs, IA-DEMOS, IA-FLAGS)

Answers obtained for the indicators analysed:



Will the project contribute to...

- ... generating new skilled jobs in rural regions? **52% of the respondents answered YES.**
- ... generating growth of income for primary producers? **33% of the respondents answered YES.**
- ...supporting regional development by diversifying the local economy? **40% of the respondents answered YES.**

Half of the analysed projects expect to contribute to the creation of new jobs in rural regions. Additionally, one-third will also contribute to generating growth of income for primary producers, and 40% say they expect to contribute to supporting regional development by diversifying local economies. The values vary significantly depending on the type of project (

Table 23).

Table 23 Percentage of BBI JU projects reporting impact in these indicators

TOTAL BBI JU portfolio	New skilled jobs in rural regions	Growth of income of primary producers	Support regional development by diversifying local economy
RIAs	42%	16%	30%
IA-DEMO	59%	64%	50%
IA-FLAG	100%	43%	71%

It is interesting to note the low expected impact on the income growth of primary producers for RIAs. From a total of 43 RIA projects, only 7 (so 16%, as indicated in Table 19) expect to contribute to the primary producers' income in the future. Expectation for income generation for primary producers is better for higher TRL projects; 64% of the IA-DEMOS expect to contribute to higher income for primary producers, and 43% of the IA-FLAGS.

5.3.2 Socio-economic indicators from the projects with agricultural primary producers in the consortium

When analysing the sub-group formed by the 17 projects with agricultural participants within the consortia (agri-partners), we see significantly more optimistic responses for all three indicators compared to the responses from the complete portfolio:



Will the project contribute to...

...generating new skilled jobs in rural regions?

65% of the respondents answered YES.

...generating growth of income for primary producers?

53% of the respondents answered YES.

...supporting regional development by diversifying local economy?

47% of the respondents answered YES.

However, when looking at the distribution per type of project, that is, comparing projects that count with agricultural partners to the overall answer rate for all BBI JU projects, we see a significantly higher percentage of positive answers in IA-DEMOS, but lower values in RIAs and IA-FLAGS.

Table 24 Percentage of BBI JU projects with agri-partners reporting impact in these indicators

BBI JU projects with agricultural participants	New skilled jobs in rural regions	Growth of income of primary producers	Support regional development by diversifying local economy
RIAs	25%	25%	25%

IA-DEMO	100%	100%	67%
IA-FLAG	100%	33%	67%

5.3.3 Review of indicators on impact on primary producers and rural development

In addition to the review of the three socio-economic indicators, it was considered relevant to look at the complete set of indicators related to the “Impact on primary producers and rural development”, since there are several which are interesting findings for the study.

The questions included in this set of indicators are the following:

- » The project allows primary producers to diversify their income sources.
- » Primary producers belong to project beneficiaries.
- » The project provides qualified jobs to rural dwellers.
- » In the project, the primary producers are involved in decision-making.
- » The new value chain(s) established in the project increase(s) agricultural diversity.
- » The project allows the establishment of stable and transparent (to contracting sides) relationships with primary producers.
- » The new value chain(s) established in the project interfere(s) with previously existing value chains.
- » The new value chain(s) established in the project reduce(s) agricultural diversity.

Figure 2 presents in graphical form the answers of the 72 questionnaires to the questions in the section “Impact on primary producers and rural development”

Impact on primary producers and rural development

Number of projects reporting impact in these aspects

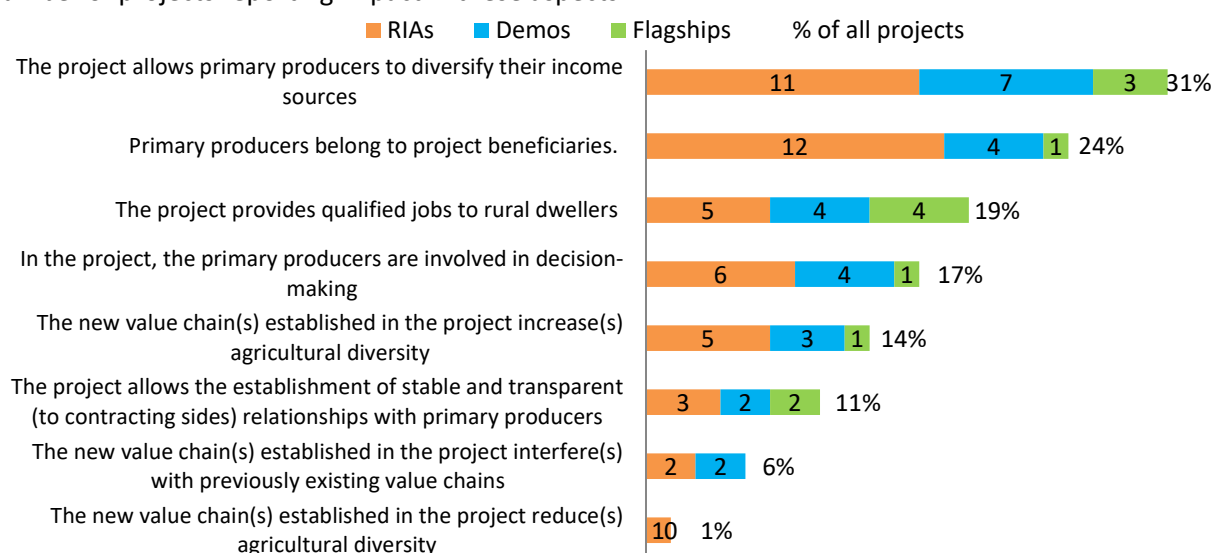


Figure 2 Review of the socio-economic indicators on impact on primary producers for the complete portfolio of BBI JU

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It is worth highlighting that Figure 2 Review of the socio-economic indicators on impact on primary producers for the complete portfolio of BBI JU is an update of the figure published in BBI JU's Annual Activity Report 2018²⁸. The AAR2018 reflects the data of 70 projects, instead of the 72 taken into account in this study, since two projects provided their data with some delay and could not be included in the AAR2018 total counts, but have been included in this study.

In Figure 3, the same data has been laid out, but only for the sample of the 17 projects that have agricultural partners.

When analysing the same socio-economic set of indicators for the set of projects agricultural partners, we obtain the following values:

Impact on primary producers and rural development

Number of projects reporting impact in these aspects

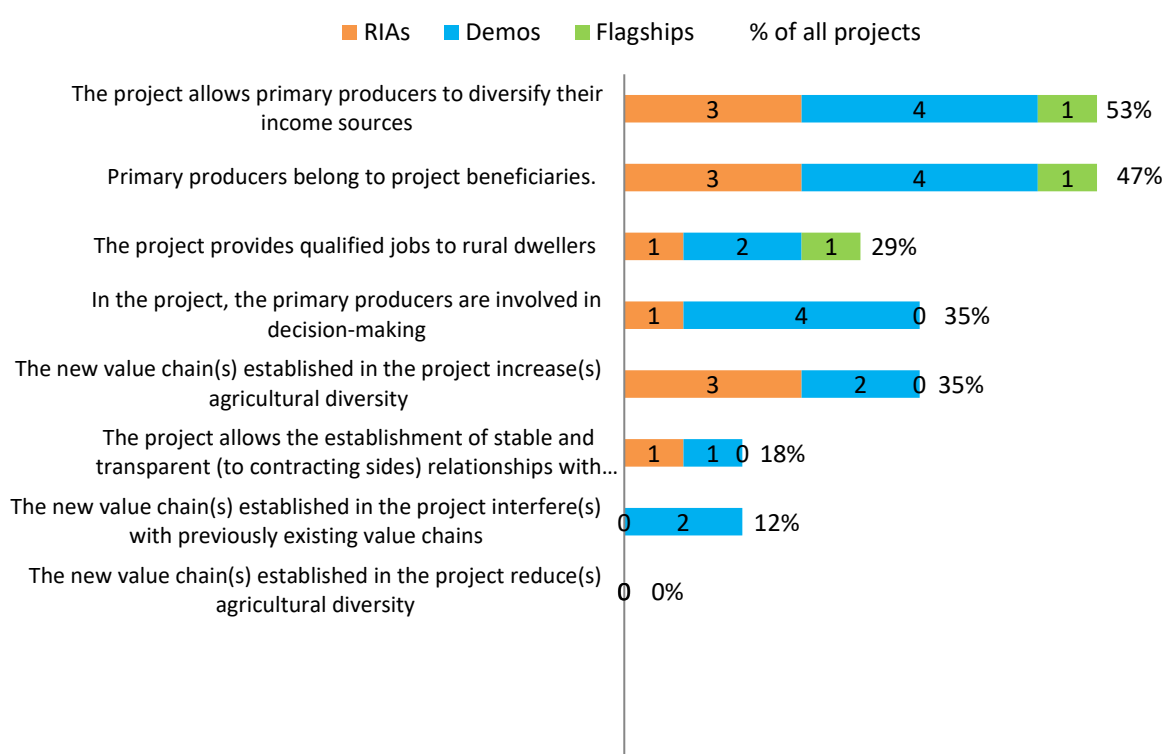


Figure 3 Review of the socio-economic indicators on impact on primary producers for the BBI JU projects with agricultural partners

²⁸ Bio-based Industries Joint Undertaking (BBI JU). (2019). Annual Activity Report 2018. Retrieved from <https://www.bbi-europe.eu/sites/default/files/bbi-ju-aar-2018.pdf>

5.3.3.1 Conclusions drawn from the review of the socio-economic indicators on the impact on primary producers for the BBI JU projects with agricultural partners as part of the consortium:

» **The project allows primary producers to diversify their income sources:**

More than half (53%) of the projects involving agricultural producers in the consortia expect in the near future to contribute to allowing primary producers to diversify their income sources. This value is considerably higher than the value obtained from the review of the complete portfolio, which is 27%.

» **Primary producers belong to project beneficiaries:**

The questionnaire on socio-economic indicators included among its questions whether primary producers belonged to project beneficiaries. We expected 100% positive answers for this question in the subgroup (with agri-partners), due to the fact that we are only looking at projects with primary producers among the project beneficiaries. However, this was not the case. Only 47% of the projects with agri-partners in the consortium answered that primary producers are project beneficiaries.

It is understandable that some consortia when completing the field “*Primary producers belong to project beneficiaries*” understood the word “beneficiaries” not as project partners, but as entities that financially benefit from the project, which would be the meaning of “beneficiaries” in the broad sense. This question should have resulted in higher values for this sub-set than the values obtained when analysing every consortium separately. However, the fact that some consortia with agricultural partners claimed not to have “primary producers belonging to project beneficiaries” can only be the result of a misunderstanding of the question. For example, one of the projects replied that they do not have primary producers among their beneficiaries; however, according to the criteria used in the study – which has been agreed with the BBI JU – they have five project partners that are actually primary producers. Another project used a different version of the questionnaire where this set of questions was not included, and therefore the replies were left blank.

» **The project provides qualified jobs to rural dwellers:**

According to the replies to the annual BBI JU questionnaire for the subgroup of projects with agricultural partners, 29% of the analysed projects have the potential to create qualified jobs for rural dwellers. Although it might seem low, it is significantly higher than the value obtained by the complete set of projects which is 17%.

» **The project allows the establishment of stable and transparent (to contracting sides) relationships with primary producers:**

The existence of long-lasting and truthful relationships between suppliers and industry in the value chain is a key factor in increasing the participation of agricultural producers. However only two out of the 17 (18%) projects with agricultural partners involved the establishment of these type of chains. Despite 18% is a low number, it is significantly higher than the value obtained for the general portfolio 11%.

» **The new value chain(s) established in the project interact(s) with previously existing value chains:**

New value chains will be implemented without interacting with the existing ones in a large majority of the cases. Only in 12% of the projects did respondents say new value chains might interact. However, it remains unclear if this interaction is positive or negative.

5.4 SWOT analysis

The SWOT analysis was undertaken by putting together and assessing information from section 5.1, 5.2 and 5.3. The strengths, weaknesses, opportunities and threats were analysed for two types of entities – individual farmers (including SMEs) and cooperatives – as these are the two main groups of participants in BBI JU projects, and the impacts can vary substantially between the two groups

Note: the conclusions and findings that have arisen from the assessment carried out in this chapter feed into the analysis made in section 7.3

Strengths		Weaknesses	
Internal	<p>In the case of individual farmers</p> <ul style="list-style-type: none"> • Unique know-how to understand challenges linked to agro-based biomass production and supply, which is a key factor in the development of any new value chain. • Fast and independent decision-making process. <p>In the case of cooperatives</p> <ul style="list-style-type: none"> • Availability of resources (personnel, time, funding) to invest in project participation. • Potential of having a long-term strategy to invest in innovation. • Availability of sufficient quantities to supply the bio-based industries value chains. • Bargaining power with the consortium/coordinator to influence the role of primary producers in the projects (project objectives, participation in the decision making etc.) 		<p>In the case of individual farmers</p> <ul style="list-style-type: none"> • Difficult to be involved in a project due to limited time, and lack of the language and administrative skills required to comply with reporting obligations. • Weak economic position to invest in long-term, high-risk innovations. • Increasing age of the farming community creates a more conservative approach towards innovation. • Small production volumes, does not meet industry requirements. <p>In the case of cooperatives</p> <ul style="list-style-type: none"> • Potentially slow decision-making process. • Decisions on innovation strategies dependent on managing board, which may change with high frequency. • One-step disconnection from the land or agricultural product, implying that the staff involved in projects may not be directly connected to the actual farmers.
	Opportunities		Threats
External	<ul style="list-style-type: none"> • Farmers are increasingly at centre stage, considered key actors for the development of the bioeconomy. • Bioeconomy can contribute to generating an additional revenue stream for agricultural producers. • Several initiatives at regional level promote involvement of agricultural producers in innovation actions, which might open the doors to future participation in larger initiatives such as BBI JU. • European agriculture is changing fast, agricultural producers are better trained, informed and connected than ever before. Successful experiences can be quickly communicated. 		<ul style="list-style-type: none"> • Project consortia are mainly coordinated by large entities, making it very difficult for small organisations and farmers to participate. • Existing bioeconomy initiatives do not treat biomass providers fairly, which is seen as a drawback for the establishment of future collaborations. • No clear funding path to bring the developed product to the market after finishing a project. • Changes (or lack of changes) to regulations might compromise innovation commercialisation. • Agro-based biomass is easily substitutable by other biomass (from outside the EU or from non-agricultural sources), which creates uncertainties among the agricultural community for investing.

Figure 4. SWOT analysis

The background of the slide is a green-tinted photograph. The upper portion shows a pair of hands gently holding a round fruit, possibly an orange or lemon. The lower portion shows a close-up of a basket filled with many similar round fruits. The overall image has a soft, natural feel.

6. IDENTIFICATION OF RELEVANT AND SUCCESSFUL BUSINESS MODELS

As part of this study, a compilation of successful examples of business models across the bioeconomy has been created in order to demonstrate that a fair distribution of benefits among partners engaged in bioeconomy value chains is possible. These have also been analysed to reveal what factors can be considered to have a positive influence in successfully impacting primary producers.

A **business model** is a company's plan for making a profit. It identifies the products or services the business will sell, the target market it has identified, and the expenses it requires. It is a holistic description of the logistical contexts of how a company generates value for its customers and itself.

Business model innovation is either the creation of a new business model or the change to an existing one that better satisfies the needs of its market. In emerging fields such as the bioeconomy, business model innovation is of paramount importance, since a whole array of new products, new services and new markets are waiting to be explored.

The aim of this chapter is to shortlist and study relevant cases of **innovative business models** that can serve as an inspiration for entities involved in the bioeconomy that want to increase either the involvement of primary producers or their impact on the bioeconomy

The business models that have been sought have one or more of the following characteristics:

- » Involve primary producers in value chains, going beyond their role as biomass providers.
- » Are replicable in different countries across Europe.
- » Promote synergetic collaborations between primary producers and the rest of the actors along the value chains (win-win situations for all the actors across the value chains).
- » Foster socio-economically and environmentally viable participation of primary producers in the value chains.
- » Create positive impacts on rural areas, beyond the empowerment of primary producers.

6.1 Key tools for designing innovative business models

Business model innovation has been of great interest to businesses for a long time. To innovate in a product, a service or a market usually involves taking a risk, since it is uncertain that the innovation envisaged adequately fits the market it is addressed to. However, innovation in the business model of a company – or any other form of commercial organisation – is perceived as one of the keys to generating competitive advantages, and thus to its sustainability and survival.

There are no guarantees of success, since it is not certain that innovating entities or innovative models will obtain sufficient return on their investments to make the attempt worthwhile. But what is certain is that if companies don't innovate, eventually their competitiveness will probably be disrupted and lost.

Business model innovation is a science in itself. Several tools have been designed in order to help innovating entities understand the kind of innovation they are proposing and structure their thoughts when conceiving innovative business models.

We have based our analysis in two of them:

6.1.1 Ansoff's matrix²⁹:

Ansoff's matrix, created by Igor Ansoff in 1957, is a classic strategic planning tool that provides a framework to devise strategies for future growth. It categorises the kind of innovations a company can conceive in a very simple way according to "existing" or "new" "products" or "markets". (See Figure 5.)

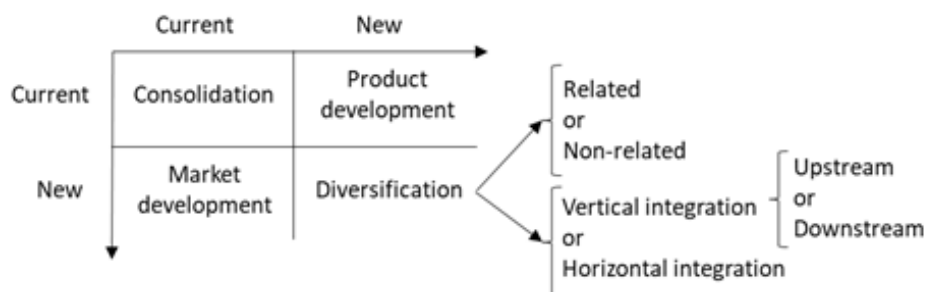


Figure 5. Ansoff's matrix

The strategy is a *consolidation* when it deals with the current product in the current market. When choosing to sell the current product in a new market it is a *market development*. When choosing to offer a new product in the current market in which the company is active, it is a *product development*. Finally, when choosing to innovate both in product and market, that is, when the company chooses to offer a new product in a new market, it is called *diversification*.

There are several reasons that can lead a company to choose to diversify, such as a reduction in the global risk of the company, saturation of the traditional market it operates in, the existence of superfluous resources or capacities, a good investment opportunity, the generation of any synergy with their current product/service portfolio, etc. Generally, there are two kinds of diversification strategy depending on the degree of shared resources between the products in the company's portfolio and the markets to which they are addressed (e.g. distribution channels, production technologies): *related* and *non-related*. The latter are also called *conglomerate*³⁰.

Within the diversification strategy, there is also another possible variation: *horizontal* or *vertical integration*. In horizontal integration, the company increases the production of goods or services within the same part of the supply chain, whereas in vertical integration, the company controls more than one step in the product's supply chain. A vertical integration can either be "downstream" in the value chain – when a company at the beginning of the supply chain controls stages further along – or "upstream" in the value chain – when a business at the end of the supply chain takes on activities related to prior steps.

Both kinds of integration have pros and cons, which have to be assessed strategically in each case. For example, an advantage of vertical integration is that the producer directly controls several stages of the value chain, making it more independent of its suppliers. However, a disadvantage is that this model requires the incorporation of complementary know-how in the company, and normally large investments as well, since it

²⁹ Ansoff, I. (1957). Strategies for Diversification. *Harvard Business Review*.

³⁰ Ansoff, I. (1976). From Strategic Planning to Strategic Management.

entails operating in different markets (e.g. a farm producing vegetables decides to process them as well). Regarding horizontal integration, a clear advantage is that the target market and its dynamics are already known by the innovator, which makes it easier to operate in the market, since the company already has another product in it. However, it can also be seen as a disadvantage; it is riskier to operate in a single market since it makes the company highly dependent on the behaviour of that single market.

6.1.2 Business Model Canvas:³¹

The Business Model Canvas (BMC) is a strategic management template for representing business models, new or existing ones. (See Figure 6) Created by Alexander Osterwalder in 2008, the BMC is a quite recent tool, but it is so versatile and easy to use that it has swept away almost all alternatives, transforming the conception of business model design.

The use of this tool was generalised after being compiled in the “The Lean StartUp”, the game-changing book on entrepreneurship published by Eric Ries in 2011. It is the cornerstone of the “lean methodology”, which consists of a trial-and-error approach for the design of business models that seeks to achieve a well-functioning business model by iterating with a minimal consumption of resources. The lean methodology *“eliminates wasteful practices and increases value-producing practices during the earliest phases of a company so that the company can have a better chance of success without requiring large amounts of funding, elaborate business plans, or a perfect product at a low risk.”*³²

It is a simple chart that covers all relevant areas of a business model in a single sheet, divided into nine areas: value propositions, customers, customer channels, customer relationships, activities, partners, resources, costs, and revenue.

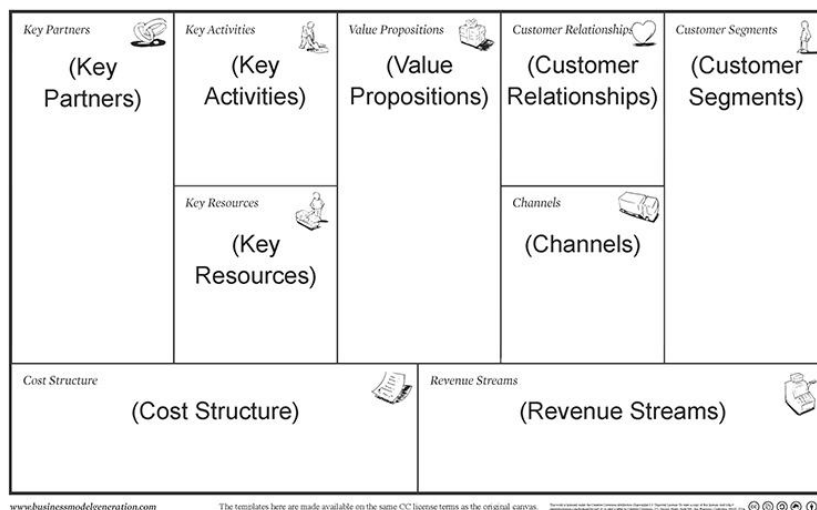


Figure 6. Business Model Canvas

³¹ Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.

³² Ibid.

Contrary to appearances, business model innovations do not necessarily require the development of completely new concepts. Almost all business model innovations are a combination of pre-existing ideas.

Both these tools have been used to deduct, analyse and assess relevant examples of business model innovation in the bioeconomy. From this, in the last section of this chapter, conclusions are drawn about the key factors which make these cases successful examples worth highlighting.

6.2 Reports, studies and H2020 projects relevant to innovative business models in primary production

The topic of successful business model in bioeconomy has been the subject of study in some publications that are a good source of complementary information to the cases highlighted in this study.

The studies most relevant to this topic are:

- The Workshop on "Best practices in integrating primary production (farmers and forest owners) in the Bioeconomy (BE) value chains and boosting the development of the Bioeconomy (BE) in rural areas". European Commission. Directorate-General for agriculture and rural development. September 2018. [LINK](#).
- "Bio-based products – from idea to market: 15 EU success stories". European Commission. Directorate-General for Research and Innovation. Directorate Bioeconomy. February 2019. [LINK](#)
- "Opportunities for farm diversification in the circular bioeconomy" Workshop organised by EIP-AGRI , the European Innovation Partnership 'Agricultural Productivity and Sustainability'. May 2019. [LINK](#).
- Joakim Tell, Maya Hoveskog, Pia Ulvenblad, Per-Ola Ulvenblad, Henrik Barth, Jenny Ståhl (2016), "Business model innovation in the agri-food sector: a literature review", British Food Journal, vol. 118 iss. 6 pp.1462-1476. [LINK](#).
- Smallholder business models for agribusiness-led development. Good practice and policy guidance. [LINK](#).
- EIP-AGRI Seminar on Digital Innovation Hubs: Final report. [LINK](#).

Besides these, there have been several Horizon 2020 calls addressed at reflecting on business models within the *Rural Renaissance* call in Societal Challenge 2 (food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bioeconomy) in which several projects of interest have been funded and are currently ongoing. The most relevant ones for our study are:

- **AgriForValor** "Bringing added value to agriculture and forest sectors by closing the research and innovation divide." Project belonging the topic ISIB-02-2015: Closing the research and innovation divide: the crucial role of innovation support services and knowledge exchange. Grant Agreement no. 696394 (running from March 2016 to August 2018).
- **AGROinLOG** "Demonstration of innovative integrated biomass logistics centres for the agro-industry sector in Europe". Project belonging the topic RUR-08-2016: Demonstration of integrated logistics centres for food and non-food applications. Grant Agreement no. 727961 (running from November 2016 to April 2020).
- **InnoForEst** "Smart information, governance and business innovations for sustainable supply and payment mechanisms for forest ecosystem services". Project belonging the topic RUR-05-2017: Novel public policies,

business models and mechanisms for the sustainable supply of and payment for forest ecosystem services. Grant Agreement no. 763899 (running from November 2017 to October 2020).

- **Rubizmo** “Replicable business models for modern rural economies”. Project belonging the topic RUR-09-2017: Business models for modern rural economies. Grant Agreement no. 773621 (running from May 2018 to April 2021).
- **SINCERE** “Spurring INnovations for Forest ECosystem SERvices in Europe”. Project belonging the topic RUR-05-2017: Novel public policies, business models and mechanisms for the sustainable supply of and payment for forest ecosystem services. Grant Agreement no. 773702 (running from January 2018 to December 2021).
- **LIVERUR** “Living Lab research concept in rural areas”. Project belonging the topic RUR-09-2017 - Business models for modern rural economies. Grant Agreement no. 773757 (running from May 2018 to April 2021).
- **POWER4BIO** “emPOWERing regional stakeholders for realising the full potential of European BIOeconomy”. Project belonging the topic RUR-09-2018 - Realising the potential of regional and local bio-based economies. Grant Agreement no. 818351 (running from October 2018 to March 2021).
- **BE-Rural** “Bio-based strategies and roadmaps for enhanced rural and regional development in the EU”. Project belonging the topic RUR-09-2018 - Realising the potential of regional and local bio-based economies. Grant Agreement no. 818478 (running from April 2019 to March 2022).

There is another Horizon 2020 topic that calls for proposals of potential interest, which is *CE-FNR-15-2020: A network of European bioeconomy clusters to advance bio-based solutions in the primary production sector*. Applications for this CSA will close in January 2020

6.3 Successful and innovative business models in the bio-based sector worth highlighting

A total of 20 examples have been gathered and analysed. Of these examples, 15 are from the EU and five from non-EU countries (US, Canada and Australia). Within the examples worth mentioning from the EU, four have been established in the framework of a project funded by the BBI JU.

The selected examples reflect a wide spectrum of business models (BM) worth highlighting that can serve as an inspiration for entrepreneurs or established entities that wish to establish BMs in which the agricultural y sector is actively involved in the bioeconomy, profiting from it, and participating with a role beyond being mere biomass providers.

This list gathers various kinds of companies and products or services which cover several markets, with varied geographic origins and different degrees of technological complexity. Some of these examples are also fully validated, having already shown a successful fit in the market. However, some of them are still in their preparation and launching stages, but it has been estimated that the BMs contain enough positive factors for achieving commercial success.

The chosen cases represent several sectors (animal husbandry, forest management, horticulture, fruit and mushroom growing) and their BMs have been considered to be illustrative and partially replicable by other actors. The selected cases that have been studied are the following:

Company	Country	Study case	EU funding?
Royal COSUN (Coöperatie Koninklijke Cosun U.A.)	NL	GreenProtein project : Valorisation of vegetable processing industry remnants into high-value functional RuBisCO protein and other food.	BBI JU
Sensowave (MISC International SL)	ES	CattleChain project : Production system that enhances farm productivity and guarantees cattle traceability and welfare with blockchain.	H2020
Pleurette (Pleurette)	FR	ByPleurette: Valorising mushrooms parts which currently are not used, as a raw material for a new product line (meatless Bolognese and "apéro" sauces).	Not applicable
Barryroe (Barryroe Co-operative Limited)	IR	Biorefinery GLAS : Extracting high-added-value products addressed to several industries (agro, food, energy) from remnants (freshly harvested grass) through a shared small-scale biorefinery.	EIP-AGRI
Lantmännen (Lantmännen ekonomisk förening)	SE	AgroInLog project : Extracting high-added-value products from remnants through shared biorefinery (Integrated Biomass Logistic centres), particularly the case of straw valorisation for bio-oil and biochar production and commercialization.	H2020
La Carrera (S.C.A. DEL CAMPO LA CARRERA)	ES	Olive stones as fuel for biomass-fed heaters: Conditioning an agro-based remnant (olive stones) associated with their main production (olive oil) to bioenergy and commercialization.	Not applicable
Bodegas Beronia (BODEGAS BERONIA, S.A)	ES	Processing the agricultural remnants from grape production (pruning residues) to bioenergy for heating their own facilities.	Not applicable
Novamont (Novamont S.p.A.)	IT	First2Run project : Use of cardoon, a low-input and rustic crop produced in marginal land, to produce high added value compounds like oleic acid addressed to several sectors, such as bio lubricants and bioplastics.	BBI JU
Zoiy Pure Herbal Cosmetic (Natural Concept GmbH)	DE	LIBBIO project : Promotion of the use of marginal land to cultivate lupin and extract high-added-value products addressed to the cosmetics industry.	BBI JU
Alcamancha (Cereales Alcamancha S.c.)	ES	Cultivation of lavender in low-productive land to distil and commercialise essential oil, a high-added-value ingredient for the cosmetics industry.	Not applicable

Company	Country	Study case	EU funding?
Ynsect (SAS Ynsect)	FR	Insects feed with food waste to be used as ingredients in high-protein feed and fertilisers.	BBI JU
Caviro (CAVIRO S.C.A)	IT	Holistic, circular approach to upcycling their main by-products (musts, lees and marc) to obtain and commercialise several products such as alcohol, tartaric acid, must, grape juice, pips and enocyanin.	Not applicable
Clariant (Clariant Produkte (Deutschland) GmbH)	DE	Biorefinery that extracts cellulosic ethanol from straw, corn stover or sugarcane bagasse provided by local Romanian farmers.	FP7 / BBI JU
Indulleida, S.A (Indulleida, S.A)	ES	Valorisation of bulk raw materials originating from fruit production in higher-added-value products such as aromas, essential oils, concentrates, purées, juices and dehydrated products, which are commercialised by themselves.	Not applicable
Metsa group (Metsä Group)	FI	Circular economy approach applied to valorise remnants of their whole production in a biorefinery ("bioproduct mill") and obtain products such as tall oil, turpentine and bioelectricity to sell in the market.	Not applicable
CoverCress (CoverCress Inc.)	US	New cash-crop called pennycress that can be added to field rotations between corn and soybeans, improves the soil quality, and is a raw material for edible oil, biofuel, and animal feed.	Not applicable
Ecovative design (Ecovative Design LLC)	US	Mushroom mycelium is used as a biobased scaffold in which other agro-based remnants are added to create bio-based materials addressed to a wide range of uses, such as textiles, packaging or food.	Not applicable
Kalfresh (Kalfresh Pty Ltd.)	AU	Valorisation of carrot discards into fresh, pre-packaged, ready-to-eat snacks.	Not applicable
ABC Honey Group (ABC Honey Pty Ltd.)	AU	Organisation of a high-value supply chain around high-end honey by cooperative of beekeepers.	Not applicable
EPIC (EPIC-EGG)	CA	Egg producer cooperative that jointly processes their raw material into egg-based ingredients.	Not applicable

For all BMs analysed, a brief description of the company is provided, but the focus of the analysis is on the innovative business proposition which, depending on the case, represents a large or a small part of their overall business. Also provided are information on the innovation strategy applied in the specific case, the closeness of the innovation to the market, an analysis of how it benefits the primary sector, and a reflection on key points that make these BMs successful. Finally, a simple compilation of what have been considered their key competitive advantages and factors for success is listed.

After the presentation of the BMs, which have been gathered and deducted based on publicly available data, an analysis of the factors that have positively influenced in their success is provided.

Company	Country	Innovation	
Royal COSUN (Coöperatie Koninklijke Cosun U.A.)	NL	Functional protein from remnants	Not yet in the market (estimation 2021)

Description of the company

[Royal Cosun](#) is an agro-industrial cooperative from the Netherlands, founded in 1899 and dedicated initially to sugar beet cultivation. They have expanded over the years to other complementary agri-food sectors, launching other entities of which the best known are [Suiker Unie](#) (sugar manufacturing) and [Aviko](#) (potato cultivation and transformation). They are a large company with a revenue of 2,046M€, 3,848 full-time employees, 26 production sites in nine countries, and the group is owned by 9,015 members, as stated in their [Annual Report 2018](#). The company has a long tradition of innovation and works extensively in the extraction of valuable compounds from the remnants of their main products. They have several biorefineries and produce bioenergy. The innovation case of GreenProtein is the focus of this analysis.

Description of the innovation

GreenProtein is a biorefinery able to extract food-grade functional proteins, and other ingredients of high added-value, out of mainly sugar-beet's green leaves, which currently are used for lower-value valorisations like soil fertilisation. GreenProtein started as an innovation demo project that has

received funding from the BBI JU (Grant Agreement No. 720728).

Their value proposition is the production of a functional RuBisCo protein, addressed to the food ingredient market. It will be a vegan alternative to egg-white protein, which is extensively used for its texturizing properties in several food industries such as bakery, confectionery, ice-cream etc.

The benefit for primary producer is clear, since through this business model farmers extract and sell a high-added value compound – functional rubisco protein – obtained from an underused remnant – sugar beet leaves and other green leaves – through a breakthrough extraction method. The key partners required for attaining this innovation are technological partners to elucidate the extraction method, and process engineers to build the extraction plant (biorefinery). The revenues generated are the sales of the functional rubisco powder, which is targeted to the food ingredients market. This innovation strategy is a diversification, since the product to be sold is functional RuBisCo powder (new product) to the food ingredients market (new market), which is non-related (currently they don't operate in this market) with vertical integration downstream (since they now transform besides producing).

Key factors of their business model that make it a successful example:

- Proteins are fundamental in the food industry to confer not only nutritional but also functional properties to food products and are an expensive food ingredient.
- In the EU there is a protein deficit, thus there is import dependency.
- The end-product (functional rubisco) is addressed to the plant-based proteins market, a young market which is unsaturated and has a great forecast.

Royal COSUN are their own providers of the raw material, making them independent from market fluctuations.

- Currently the raw material is transformed in a less value-adding process.
- The product is expected to hold several attributes that a fraction of consumers value very positively: it is vegan, made from upcycled vegetal matter, and expected to be non-allergenic.
- Royal COSUN cover the whole value chain, from producing the feedstock, which is used as the product's raw material, to commercialising the outcome.
- Being a cooperative allows COSUN to dedicate financial and human resources to innovation. Besides, farmers share its burden and risk, and benefit accordingly.
- This innovation extends the revenue of the farmers throughout the year, making them less dependent on their crop's seasonality.

Company	Country	Innovation	
SensoWave (MISC International SL)	ES	Meat products from block-chain traceable meat	Not yet in the market (estimation 2022)

Description of the company

SensoWave is a Spanish technological start-up aiming to improve efficiency and safety in farming, industry and health by providing innovative solutions based on wireless sensors, cloud computing, BigData algorithms and RF communications.

Description of the innovation

Regarding innovation, Sensowave is implementing a breakthrough blockchain technology that enhances farm productivity and guarantees cattle welfare and full traceability of the resulting meat products, based on IoT connected devices that the cows carry in their collars. This system provides information on the origin and traceability for each unit till commercialisation. This highly reliable traceability system provides a high added value to the products since there is a fraction of consumers that very much values extensive information about the origin of the product they are buying and the conditions under which it has been produced.

Sensowave is coordinator of the project [Cattlechain \("Connecting farms and consumers through blockchain"\)](#), a Fast Track to Innovation project funded by Horizon 2020 (Grant Agreement no. 853864). By recording different parameters (temperature, position, movement) from the cows tracked with IoT devices, and analysing this data with artificial intelligence algorithms, farmers get

in real-time insights about their herd status. While preventing, controlling and optimising operational costs, they are able to provide reliable information about each unit of their products on its packaging.

This tracing technology impacts positively on the primary producers, livestock farmers, since they can differentiate their product from competitors, providing extensive information about their products which assures animal welfare standards. Since an increasing fraction of consumers positively value the provision of this information, they can set higher selling prices. For livestock farmers the integration of this blockchain traceability system represents a consolidation. By

implementing the Cattlechain technology and ensuring full traceability of the obtained product they don't have a new product; neither it is addressed to a new market, since they already operate in food retail. However, the innovative technology involved in their production provides them a higher added value than their competitors, since, besides allowing them to optimise costs in

managing their farm, they can guarantee to their clients, in a fully reliable way, traceability of their products and welfare in their production.

For Sensowave this innovation strategy is a consolidation, since they already have a set of products and services addressed to the livestock sector (e.g. Digitanimal).

Key factors of their business model that make it a successful example:

- Thanks to Cattlechain livestock farmers can implement a breakthrough production technology which allows them to sell their current product with an increased added value, which is information about livestock products that is appreciated by the consumer and that can be echoed in the product's price.
- To implement the Cattlechain system provides to livestock farmers with two competitive advantages (win-win):
 - It is a digital farm management tool which impacts in optimising their farm.
 - Farmers sell products with a clear competitive advantage over other products since they assure traceability and compliance with animal welfare standards.
- With Cattlechain livestock farmers can increase the selling price of their products while diminishing their operational costs, thus increasing their margin.

Company	Country	Innovation	In the market
Pleurette (Pleurette)	France	Protein-rich meatless Bolognese and "apéro" style range of sauces	since 2018

Description of the company

[Pleurette](#) is a French SME dedicated to mushroom production and several related products. Their first product line has been the production of different kinds of fresh mushrooms (grey oyster mushrooms, yellow oyster mushrooms, shiitake fish, eryngii and nameko) grown in an urban farm, on coffee grounds recovered from restaurants in Lille. The mushrooms are sold in bulk. As a next step, they launched a second line consisting in a self-cultivation small mushroom kit. Lately, they launched a line of vegetarian sauces in which they valorise parts of mushroom which are currently underused.

Description of the innovation

They have recently launched a new vegetarian range of meatless Bolognese and "apéro" style sauces called "[ByPleurette](#)", to works towards the full valorisation of mushrooms.

The benefit for the primary producer lies in their capacity to valorise products obtained from their regular mushroom production, obtaining an ingredient which has a high protein content, is highly appreciated by consumers and provides and added value to a fresh produce.

In this model, no key partner is required as such. However, the key requisite is the required investment in equipment to manufacture, in this case, the sauces. This product line, which is addressed to the food retail market, constitutes a vegetarian-friendly alternative to meat proteins, which also transmits concepts that the targeted segment of food consumers positively values, such as being certified organic, sustainable, and with a circular economy approach.

Pleurette has followed a diversification strategy in which they valorise mushroom products to use them as a raw material in meat-less sauces. This is

a non-related innovation, since they are primarily mushroom producers and have chosen to have a vertical and downstream integration, moving from being primary producers to the secondary (transformation) sector.

It is worth highlighting that this model is a successful example of business model innovation in the bioeconomy without having huge technological disruption. This shows that business model innovation is not always associated with bearing a high technological risk, but lies more in carrying out a smart analysis of the resources that the company has access to.

Key factors of their business model that make it a successful example:

- The market niche to which this product line is addressed is growing fast and has a great market forecast.
- Pleurette are their own providers of the key raw material – parts of mushrooms which currently are underused- .
- They cover the whole value chain: they are producing their main products (mushrooms), transforming the parts currently not valorised, and commercialising the outcome.
- Having more than one product line in the market is especially interesting for a small company since it makes Pleurette lower their risk exposure and gain resilience.

Company	Country	Innovation	Not yet in the market (estimation 2021 if the scale-up investments are secured)
Barryroe (Barryroe Co-operative Limited)	Ireland	Production of a range of high-added value products from biorefining fresh grass.	

Description of the company

Barryroe Co-op is a farmer owned, multi-purpose agribusiness based in Ireland. Its range of business includes purchasing milk, grain and pigs from its shareholders, manufacturing animal feedstuffs, supplying farm inputs, building materials and hardware, as well as grocery retailing. Through its subsidiary [Staunton Foods](#), it is involved in pork processing. It was founded in 1925 and the group now employs 310 staff and has an annual turnover

of €140 million (data from website retrieved in Jun 2019). Its goal is to service the needs of the co-op's owners, providing goods and services to the rural communities.

Description of the innovation

Barryroe Co-op participates as a demonstrator in *Biorefinery GLAS*, a project titled "Small-scale Farmer-led Green Biorefineries", funded by EIP-AGRI , that started in 2019, aimed at improving the

sustainability, value and resource efficiency of Ireland's agriculture sector through farmer diversification into the bioeconomy. They are building a shared small-scale mobile grass biorefinery able to separate into two fractions the fresh grass harvested in each farmer's land. These fractions (press-cake and juice) are further processed to extract high-added value products addressed to several industries in the agro, food, and energy sector. Specifically, they are producing:

- optimised cattle feed fibre
- non-GMO protein concentrate feed for monogastric livestock animals
- a high-value sugar stream of fructo-oligosaccharides

- grass whey for fertiliser or bioenergy applications.

The benefit for the primary producers lies in unlocking their ability to extract high-added value compounds from freshly harvested grass to manufacture a range of well valued products. They rely on technology centres to provide the required extraction methods, and process engineers to build the biorefinery, as key partners. The revenue streams of this model come from the sales of the four products in the market.

In this case, the innovation strategy is a diversification addressed to related markets, since they already operate in the sectors to which these products will be marketed.

Key factors of their business model that make it a successful example:

- This proposal valorises grass, which is an inexpensive resource, and transforms it in a range of ingredients for the food and feed industry, which are products with a high market price.
- Farmers are providers of their own raw material, making them resilient to market fluctuations.
- Currently the raw material is transformed in a less value-adding process.
- Farmers address the whole value chain, from producing the raw material, which is used as the biorefinery's feedstock, to commercialising the outcomes.
- Their structure as a cooperative allows Barryroe to dedicate resources to innovation. Besides, farmers share its burden and risk, and benefit accordingly.
- Having a wider range of products in the market makes the cooperative more resilient and less dependent on the behaviour of a single market.

Company	Country	Innovation	
Lantmännen (Lantmännen ekonomisk förening)	Sweden	Production of straw pellets for bioethanol	Not yet in the market

Description of the company

Lantmännen is a Swedish agricultural cooperative owned by 25,000 Swedish farmers. They have 10,000 employees, operations in over 20 countries and an annual turnover of approximately 4.5

billion€. They mainly cultivate and process cereals (their main products are bakery products), selling 1,500 tons of bread daily. However, besides cereals, they also produce bioenergy and other food-related products such as ready-to-eat-meals.



Figure 7: Straw, countryside

According to their Annual Review 2018, agriculture represents 42%, of the group's sales, food products 32%, and bioenergy accounts for 7%³³. The rest of their revenues come from other business areas, which include machinery for construction and real estate.

Upcycling of resources is central to this cooperative, having a holistic, circular-economy approach. For example, they convert old breadcrumbs and waste from grain production into energy and biofuel, both to heat their premises and to feed into the national energy grid.

Description of the innovation

Lantmännen are partners of the project AgrolnLog, funded by Horizon 2020 (Grant Agreement no. 727961) and aimed at demonstrating Integrated Biomass Logistic Centres (IBLC) for food and non-food products, and evaluating their technical, environmental and economic feasibility. There are three demonstrations: forage dehydration, compound extraction from olive tree prunings and olive pomace, and production of straw-based bioethanol. The last, coordinated by Lantmännen, is the example described.

The value proposition of this initiative is the production of straw-based bio-commodities, particularly bioethanol, a high-added-value product, through an ILBC shared by the farmers.

The benefit for the primary producers is that they are able to valorise their underused straw, which is a by-product obtained from their regular cereal production that currently is harvested and used for feed or livestock bedding, but a significant part has no higher-added-value use today so it is ploughed down into the soil to be used as a fertilizer.

The key partners required are technology centres to design the processing methods to valorise the remnants, process engineers to build the biorefinery for manufacturing ethanol, and specialists in logistics, since a key resource in this model is to adequately store the straw in order to achieve the correct preservation, allowing its use as feedstock for the biorefinery for the longest possible span throughout the year.

The revenue streams of this innovation come from the sales of the bioethanol, which is sold to be mixed with petrol, and it is addressed to the fuel market.

The innovation strategy followed in this model is a new product development, since they are manufacturing a new product (bioethanol from straw) addressed to the energy market, which is a market in which business unit in Lantmannen already operates.

³³ Lantmännen. (2018). *Lantmännen Annual Review 2018*. Retrieved from <https://www.lantmannen.se/siteassets/documents/01-om-lantmannen/finansuell-information/lantmannen-annual-reveiw-2018.pdf>

Key factors of their business model that make it a successful example:

- The farmers own the raw materials necessary for this product line, which insulates them from any potential variation in the price.
- Currently the raw material is transformed in a less value-adding process.
- Being a cooperative allows the farmers to share the burden of the high investment associated with designing and building a biorefinery.
- This model allows the farmers to have an occupation beyond the cereal production season (from August to October), which also extends their revenues throughout the year. This makes them less dependent on their crop's seasonality.
- Dealing with large volumes makes it economically worth the innovation (economies of scale).
- Primary producers control the full value chain, share the risks, and are compensated through an end-of-year dividend on the profits made from the business.

Company	Country	Innovation	In the market
La Carrera (S.C.A. DEL CAMPO LA CARRERA)	Spain	Olive stones as fuel for biomass heaters	

Description of the company

Cooperativa La Carrera is a Spanish cooperative composed of farmers who own olive groves. It was founded in 1969, and it is composed of 1,800 farmers. They have a common olive mill and they commercialise the olive oil they produce, reaching a yearly production of between 6 and 7 million kilograms.

Description of the innovation

The innovation analysed is their valorisation of olive stones. Olive stones are a very well valued biomass for various reasons. They have a great calorific capacity (4,500 cal/g), they naturally have a shape that eases up their management, and they require minimal processing for their use. In their store they sell olive stones – a remnant associated with their olive oil production – as a fuel for feeding biomass heaters, which can be industrial or for home use.

The value proposition in this model is the valorisation of their underused olive stones, which

are a by-product obtained from their regular olive oil production.



Figure 8.; Olive stones

The primary producer benefits from this model, being able to sell one underused remnant associated with their regular production where otherwise they would need to pay for its disposal. The key partner to make this model work is an engineering company able to build machinery to process the olive stones to meet the requirements to be used as fuel for heaters, which is technologically simple (cleaning, drying and,

optionally, milling). Although it cannot directly be considered a key partner, another factor of importance in this model is the generalisation of biomass heaters fed with olive stones, which have been present in the market only in recent years.

Their revenue stream is the sale of the olive stones, which are addressed to the energy market. So, in this case, their innovation strategy is diversification to a non-related market, with vertical integration

Key factors of their business model that make it a successful example:

- The raw material has a very high added value, since it naturally has a great calorific capacity.
- Besides, the raw material's uniform size and shape make it easy to handle industrially. The result is that only a minimal and simple transformation is required.
- Farmers are the producers of their own raw material, which currently is a by-product they need to dispose of following strict environmental regulations and entailing a cost.
- It is a win-win approach in which a profit is made (selling olive stones as fuel for biomass heaters) while also saving the farmers a cost by helping them get rid of a product that involves a financial burden (olive stone disposal).
- It is addressed to a young market, currently expanding, which is forecast to grow steadily.
- Selling olive stones helps the farmers extend their revenue, making them more less dependent on the olive groves' seasonality.

downstream, since they are developing a new product (olive stones as fuel) and targeting a new market (biomass heaters).

The market in olive stones used as fuel for heaters is young, but it is evolving and growing fast. It already has a range of certifications and quality seals that assure combustion capacity.

Company	Country	Innovation	In the market
Bodegas Beronia (BODEGAS BERONIA, S.A)	Spain	Production of wooden pellets/chips/chunks from vineyard pruning as renewable fuel for their own heaters	Not applicable

Description of the company

Beronia is a winery belonging to Gonzalez-Byass, a large Spanish winemaking group producing wines, spirits and sherry. Beronia has 25ha of its own vineyards³⁴. They produce 14 different kinds of red and white wines, ranging from classic styles to premium and organic, in two Spanish locations (Rioja and Rueda).



Figure 9: Wooden chunks

Description of the innovation

The innovation in this case is the valorisation of the grapevine pruning residues, an agricultural remnant resulting from their grape production. They upcycle it into bioenergy for their own use. Specifically, they produce wooden chips from vineyard pruning as renewable input for the winery

needs (non-food application), diminishing their need to outsource the fuel for the daily heating needs of the winery associated with water heating and calefaction. The value proposition in this case, since they don't commercialise the outcoming wooden pellets, is kept internally within the cooperative, contributing to reduce operational costs.

The benefit for the primary producer in this model is that through this practice they diminish the costs of outsourcing energy for heating the winery premises, achieving savings in the energy bill and diminishing the CO2 footprint.

Key partners required are a process engineering company able to build machinery to process the pruning residues into chopped wood and, if necessary, any further treatment they choose to provide to the biomass to improve combustion performance, such as drying. Another key factor is that the company needs to invest in upgrading their heating system to one compatible with this kind of pruning biomass.

It does not directly create a revenue stream, but instead a saving in fuel/gasoil. It provides a win-win saving to primary producers: on the one hand they save on their energy bill, reducing or even removing their need to buy gasoil, and on the other

³⁴ Beronia. (2019). www.beronia.com/es/beronia. Retrieved from www.beronia.com: <https://www.beronia.com/es/beronia>

hand they reduce the amount and cost of the residues they need to get rid of.

The innovation strategy elucidated here is a diversification. It is not addressed to any market, but to manufacturing a product they needed to buy, which belongs to a non-related market, and it can be said they have a vertical integration downstream.

This approach falls within the most straightforward circular economy concept, generating a win-win situation, in which the producers create a resource they need (wooden pellets for heating) from their vineyard pruning residues, on the one hand avoiding the need to outsource this energy, and on the other, saving the cost of getting rid of their pruning residues.



Figure 10: Vineyard

Key factors of their business model that make it a successful example:

Even though this is not formally a business model, since the product – residual wood – is not marketed, but it allows the company to save costs in a key expenditure such as outsourced energy.

- The pruning residues are a sufficiently valuable biomass in energy terms, and this valorisation approach is a simple win-win, circular economy concept. Vineyard managers normally have to get rid of pruning residues, involving a cost, and with this simple upcycling strategy they can make economic savings in their winery heating.
- Beronia produces the raw material of this model as part of their grape production, making them independent from external actors for its supply

Company	Country	Innovation	In the market
Novamont (Novamont S.p.A.)	Italy	Production of bio-based chemical building blocs	

Description of the company

The Novamont Group is a world leader in the development and production of bioplastics and biochemicals through the integration of chemistry, the environment and agriculture. They are a large company (although medium-sized when compared to other chemical companies) and their aim is to produce innovative solutions that deliver strong environmental, social and economic benefits. They specialise in bioplastics and the extraction and marketing bio-based building blocks.

Novamont is a very interesting example of a wide range of innovations related to bioeconomy. They promote the development of a bioeconomy model based on the efficient use of renewable resources and on the regeneration of local areas. They start with the development of new proprietary technologies to, as they say, “rejuvenate” industrial sites that are decommissioned or are no longer competitive, thus generating new industries, new products and new jobs.

Description of the innovation

This report studies the case of the First2Run project (flagship demonstration of an integrated biorefinery for dry crops, sustainable exploitation towards biobased materials production), a project funded by the BBI JU (Grant Agreement no. 669029). The value proposition of this case lies in the production of energy and high-added-value bio-building blocks from high oleic oils (such as azelaic acid, pelargonic acid and glycerol) extracted from cardoon crops, which are rustic and low-

input, and are cultivated in marginal lands in Sardinia.



Figure 11: Cardoon plant

In this model the primary producers have been very much involved (even though data about their exact input, which would be of interest for this study, is not publicly available). They are able to grow an alternative crop (cardoon), which they know will be sold to Novamont, rendering a new revenue stream. Via the First2Run project the primary producers have received specialised training on cardoon cultivation. Besides this, throughout the project, they have received compensation payments to help them decide to move into growing this crop. Most importantly,

they have signed mid-term contracts (six years) with the producers and fixed a guaranteed minimum remuneration³⁵. These kind of measures provide certainty to the farmers, who are therefore more willing to transform their production.

In this model, the key partners required are the owners of marginal lands and the engineering companies able to build the biorefinery in which the extraction of the added-value compounds take place. Another key partner is Coldiretti (Italian national federation of direct growers), who

provider advisory and other important support (e.g. machinery) for cardoon growing.

Revenue streams for Novamont are the sales of the resulting bio-building blocks. The obtained products are bio-based chemical building blocks addressed to the biolubricants and bioplastics market.

The innovation strategy followed in this case is a new product development, since Novamont already operates in the bio-based chemical building block market

Key factors of their business model that make it a successful example:

- Even though Novamont is a large chemical company with no formal relation to primary producers, the value chain of the business line developed in First2Run has been established with the intention of extensively involving cardoon farmers, since they are essential to make it work.
- The raw material (cardoon) is a very resilient and rustic crop that can be grown with very little input. It is capable of growing both in marginal and low-productive lands.
- The bio-building blocks extracted from high oleic oils have a high market price.
- Dealing with large volumes makes the innovation economically worthwhile (economies of scale).

Company	Country	Innovation	
Zoily Pure Herbal Cosmetic (Natural Concept GmbH)	Germany	Formulation of bio-based cosmetic products with lupin peptides grown on marginal lands	Not yet in the market

Description of the company

Zoily Pure Herbal Cosmetic is a German company dedicated to the commercialisation of natural cosmetics. It does not participate as a partner in the project, but is carrying out some trials in the project LIBBIO, to incorporate the valorised fractions of *Lupinus mutabilis* into their formulations.

Description of the innovation

This innovation has been conceived within the project LIBBIO, *Lupinus mutabilis* for Increased Biomass from marginal lands and value for BIOrefineries, funded by the BBI JU (grant agreement 720726).

³⁵ EIP-AGRI. (2015). EIP-AGRI Workshop Presentation 'Building new biomass supply chains for the bio-based economy'



Figure 12: *Lupinus* plant

The project LIBBIO is a research and innovation action whose objectives are to develop consumer food, feed, non-food and bio-energy products from Andean lupin varieties (*Lupinus mutabilis*) adapted to European farming conditions by applying bio-refinery cascading principles for crop value creation and modern crop breeding technologies. Also, they aim at increasing crop yield and harvest index and accelerating supply-chain development via a consumer-driven approach to developing high-added-value food and non-food products by applying state-of-the-art, solvent-free technology for raw material processing.

This project deals with developing and optimising an Andean lupin breeding and cropping programme, plus the primary processing pipelines, while at the same time developing high-added-

value consumer or business-to-business products to reach the market. The focus is on using marginal land to produce lupin and implementing supercritical extraction technology, to extract from it high-added-value products: oils, proteins, alkaloids and soluble fibres.

LIBBIO is a research and innovation action; by the end of the project its technology readiness level will be still far from the market, but their approach has been considered an interesting case to study, particularly the case of proteins (lupin peptides), which are introduced in the formulation of several cosmetic products.

The value proposition is the obtainment of lupin peptides through a sustainable approach. Primary producers benefit from this model since they are able to valorise their marginal lands, by growing lupin and selling it to the cosmetics industry (the exact number of primary producers involved, which would be of interest for this study, is not a publicly available data). A range of cosmetic products (lipsticks and lip-gloss) has been developed, supported by the German brand Zoiy Pure Herbal Cosmetic.

The key partners required for making this model work are technology centres to design the lupin processing and extraction method and a process / chemical engineering company able to build the biorefinery to extract the lupin peptides.

The revenue streams for the primary producers would come directly from selling the lupin to the entity in charge of the extraction. They benefit in this case by having a crop they can grow in their marginal lands with a high market price and a commercial interest.

This product will be sold as an ingredient for cosmetic products and it is addressed to the cosmetic market.

Key factors of this business model that make it a successful example:

- A lupin crop has been found that can be successfully grown on marginal lands, increasing the opportunities for the farmers to obtain revenues.
- Farmers can also use it to improve the quality of their marginal lands. It is a rustic crop with low nutritional requirements for cultivation. In addition, as plant from the *Leguminosae* family it has beneficial effects in the soil since it fixes nitrogen and mobilises soil phosphate.
- The obtained product, lupin peptides, have a high price in the market.

Company	Country	Innovation	Not yet in the market
Alcamancha (Cereales Alcamancha S.C.)	Spain	Lavender crop production on marginal lands and extraction of lavender essential oil	

Description of the company

The Alcamancha cooperative is a second-degree cooperative founded in 1993, integrating eight small cooperatives. They are located in La Alcarria, a rural area in the central part of Spain. They produce several cereals, particularly wheat and barley (the latter used both for malting for beer and for animal feed), and sunflower.

Description of the innovation



Figure 13: Lavender field

This cooperative is launching an innovative business model which is of great interest. Their value proposition is to produce lavender in marginal lands which currently are underused, and to build a distillery to extract its essential oils, which have a high price in the market, and sell it to the cosmetics industry. The primary producer benefits by valorising their marginal or low-

productive lands, by cultivating this rustic but high-added-value crop, by means of a shared risk and investment. One differential part of their approach is that they want to offer this opportunity to the farmer "as a turnkey service", since they foresee the creation of an advisory body from the cooperative that will advise farmers who want to join in the cultivation of lavender, helping them to become familiar with the growing practice. They also plan to buy the necessary machinery for cultivating and harvesting this crop.

It is also of great interest in this model that they wish to take advantage of other layers of this conversion to the cultivation and circular exploitation of lavender as well, which will have a positive repercussion in their rural community:

- They will contribute to the pre-existing apiculture in their region, since lavender is a flower that is involved in honey production, which in this region has a protected geographical indication.
- They plan to organise a variety of touristic activities that revolve around visiting the lavender fields, which would benefit other businesses such as rural lodges, local restaurants, etc. There is a very similar success case in Brihuega, a nearby location, in which they have recently started organising an annual music and gastronomic

festival that attracts a great number of tourists. The whole rural economy has been transformed and developed by this conversion.

In this case, the key partners required are funding bodies that contribute to financing the large initial investment (essential oil distillery, shared machinery and ad-hoc training for farmers).

The direct revenue streams in this model come from selling the distilled lavender essential oil to the cosmetic product market.

This innovation strategy is a diversification to a non-related market with vertical integration downstream

Key factors of their business model that make it a successful example:

- The lavender essential oil obtained is expected to obtain a high market price that can pay off the investment.
- The product has a good market perspective, since the demand for lavender essential oil, which is not covered by current production, is forecasted to grow.
- Farmers share the economic burden of the investment which would not be affordable if they were not collaborating through a cooperative.
- This business model involves primary (lavender growers), secondary (extraction of lavender essential oil) and tertiary sectors (touristic activities organised around the cultivation of lavender), being an example of simple and robust business model innovation.
- An inspiring fact about this model is its conception as a “turnkey project”, helping the farmers to take the decision to step into the production of an unknown product for them.
- This innovation extends the revenue of the farmers throughout the year, making them more independent from lavender’s seasonality.

Company	Country	Innovation	In the market
Caviro (CAVIRO S.C.A)	Italy	Holistic by-product valorisation model according to circular economy	

Description of the company

Caviro is the largest grape and wine cooperative in Italy, claiming to produce 10% of Italian grapes. Founded in 1966, it is an Italian second-degree cooperative of grape producers that produce wine as well. It counts 32 partner wineries and over 13,000 wine growers across the whole country

over 36,000 ha³⁶. They have a large number of wine brands on the global market.

The group includes several companies. Caviro Extra, one of them, is dedicated to valorising high-added-value products mainly from musts, lees and marc. Approximate 86% of the raw material they use comes from their winegrower partners,

³⁶ Tavernello. (2019). Retrieved from www.tavernello.com: <https://www.tavernello.com/about/>

gathering around 370,000 tons of these by-products and remnants annually. They valorise these remnants in two biorefineries, upcycling them into alcohol, tartaric acid, traditional concentrated must (CMT) and rectified concentrated must (MCR), grape juice, grape pips and enocyanin. Once the extraction of these high-added-value compounds is done, the resulting biomass is processed in an anaerobic digester and biogas and fertilisers are obtained. The biogas is upgraded into biomethane, which is 'partially used for their own heating needs and partially sold to feed the national grid³⁷.'

Description of the innovation

Their case is worth highlighting, since they have achieved an economically viable circular economy model that greatly benefits the farmers making up the cooperative.

Their value proposition is that they upcycle by-products and remnants through a cascading approach that allows them to optimise their raw material (musts, lees and marc), by extracting and manufacturing obtain a whole palette of high-added value products.

Key factors of their business model that make it a successful example:

- Their critical mass is huge, allowing them to assure the supply of their necessary raw materials in sufficient quantities to benefit from economies of scale.
- The whole array of upcycled products have a great high-added-value in the market.
- They apply a cascading approach, assuring they completely optimise the potential value of their remnants.
- This innovation extends the revenue of the farmers throughout the year, making them more independent of their crop's seasonality.

Primary producers make up the cooperatives that form Caviro, so they benefit from this project by valorising the by-products and remnants they produce along with their main product (grapes, wine) allowing them to diversify the markets they operate in.

Key partners required for the execution of this innovative business model are the engineering companies to design and optimise both the extraction plants of the high-added value products and to design and optimise the operation of the anaerobic digester.

There are multiple revenue streams, at least one per product upcycled and commercialised.

The markets they address range from food and beverage companies to agronomic, industrial, and pharmaceutical.

Their innovation strategy, with their circular economy overall approach, is a diversification to both related markets (musts, grape juices) and several non-related markets, with vertical integration downstream.

³⁷ Caviro Extra. (n.d.). Caviro Extra presentation: Supply chain, Sustainability, Circular Economy and Innovation. Retrieved from https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/events/presentations/be-presentation-caviro_en.pdf

Company	Country	Innovation	Already in the market
Clariant (Clariant Produkte - Deutschland- GmbH)	Germany	Sunliquid® process: production of cellulosic ethanol from Romanian lignocellulosic feedstock	Yes

Description of the company

Clariant Produkte GMBH is a company that is part of the Clariant group, a large multinational company of Swiss origin producing chemical products addressed to almost every industrial sector, from agriculture to automotive, with over 18,000 employees worldwide. Clariant is a company that invests many resources in R&D projects, and has many initiatives related to innovation.

Description of the innovation

They are the coordinators of LIGNOFLAG, a project titled “Commercial flagship plant for bioethanol production involving a bio-based value chain built on lignocellulosic feedstock” (Grant Agreement no. 709606), which was launched in June 2017 and will last until May 2022.

Clariant has developed the Sunliquid® process. Its value proposition is to produce cellulosic ethanol from agricultural residues such as straw, corn stover or sugarcane bagasse in an on-site process with an entirely energy-self-sufficient process. The ethanol produced will be sold to the energy markets as fuel for transportation.

Clariant is building a cellulosic ethanol plant in Craiova, which is a rural Romanian region mainly dedicated to producing wheat and maize, and with little industrial infrastructure. The development of a bio-based economy in this rural region lags behind other European areas.

So, even though the company does not directly involve agricultural primary producers, the business model designed implies certain benefits for farmers. This cellulosic plant will allow local farmers to establish an additional income stream by selling currently underutilized wheat straw, corn stover or sugarcane bagasse to the plant. During the construction phase of the new plant, several hundred persons will be employed, from locally based companies wherever possible.

The key partners required for this innovation are, on the one hand, the farmers providing the raw materials for the extraction, and on the other, the engineering company able to build the extraction plant (biorefinery).

The revenue stream this model generates are the sales of the cellulosic ethanol, which is marketed in the transport sector as biofuel.

Their innovation strategy can be seen as a product development, since it is a new product in their portfolio, but they already operate in the energy and fuel market.

Key factors of their business model that make it a successful example:

- Clariant is a large chemical company with no direct relation to primary producers, but in the establishment of this business line they have greatly involved the agricultural producers of the Craiova region, since the production depends on the availability of straw, corn stover or sugarcane bagasse, which are provided by the farmers. In order to involve the farming community, Clariant has organised several workshops to explain the project to the farmers, and how they can become part of the agricultural residues supply chain. They aim is to involve about 250 farmers. Apparently, the farmers attending the first official workshop expressed their interest in the opportunity to generate additional income by selling sustainable, formerly unused raw materials³⁸.
- These raw materials are by-products and remnants associated with the current agricultural of the region, so they are readily available at a short distance.
- The product manufactured, ethanol to be used as fuel, has a high market price.
- Dealing with large volumes makes the innovation economically worthwhile (economies of scale).
- Good example of cooperation between the company acting as buyer and farmers acting as sellers in the EU-13.

Company	Country	Innovation	In the market
Indulleida, S.A (Indulleida, S.A)	ES	Extraction of high-added-value compounds from fruit remnants and underused biomass	

Description of the company

Indulleida, S.A was founded in 1980. They are a company founded and owned by fruit farmers. Currently they comprise 170 fruit cooperatives and packing houses, representing more than 18,000 farmers throughout 12 different regions in Spain and three in southern France.

In 1980 several fruit cooperatives decided to jointly create Indulleida, S.A in order to valorise their by-products and remnants, sharing their risks and financial investment, reaching high critical volumes

for taking advantage of economies of scale, and assuring availability of the supply of raw materials due to the close relationship between the company and their suppliers/growers, with long-term supply agreements.

In Indulleida, S.A they manufacture a wide range of products, such as fruit juices, purées, feed pellets, dried fruit products, essential oils, and aromas among others, by transforming their surpluses, discards, by-products and remnants.

³⁸ Sunliquid FP7. (2019). *FARMERS FROM OLTENIA AND CLARIANT TO PARTNER FOR A CLEANER ENVIRONMENT*. Retrieved from [www.sunliquid-project-fp7.eu: https://www.sunliquid-project-fp7.eu/news/farmers-from-oltenia-and-clariant-to-partner-for-a-cleaner-environmentgroundbreaking-for-clariants-sunliquid-cellulosic-ethanol-plant-in-romania-3/](https://www.sunliquid-project-fp7.eu/news/farmers-from-oltenia-and-clariant-to-partner-for-a-cleaner-environmentgroundbreaking-for-clariants-sunliquid-cellulosic-ethanol-plant-in-romania-3/)

Description of the innovation

Indulleida, S.A is active in R&D and innovation projects, having participated in numerous initiatives since its foundation. In this case, the business model of the company as a whole is innovative, and thus it will be analysed as such, instead of analysing the model of one particular innovation in their catalogue or pipeline, since the company can be an inspiration for others.

The value proposition of the business model of Indulleida, S.A lies in extracting a wide range of high-added-value compounds from the fresh produce of its owners that would not have sufficient value in the market (or that have been rejected by the market due to some incompliance with their requirements), as well as other vegetal biomass.

The benefit for the primary producers in this model is channelled through the Indulleida, S.A company, since it is owned by the cooperatives which are composed of primary producers. This case is a clear win-win model since, due to their aggregation capacity, primary producers are able to valorise their underused biomass without middle-men, and the Indulleida, S.A company is able to source the necessary raw material in sufficiently large quantities.

Key factors of their business model that make it a successful example:

- This company, Indulleida, S.A, was established based upon the desire of the farmers to make the most of their remnants and be able to add value to them through innovative processing.
- Transformation of their remnants into ingredients or intermediate products extends the revenue of the farmers throughout the year, making them more independent of their crop's seasonality.
- The critical mass of remnants they can produce is huge, allowing an assured supply of the necessary raw materials, in sufficient quantities to benefit from economies of scale.
- Cooperatives/farmers can share the necessary investment on Indulleida, S.A's facilities.

In this case there are several key partners required: It is fundamental to work with the agricultural

primary producer cooperatives, since they are the suppliers of the raw material. Also, technology centres or academic partners are key to developing the valorisation methods, and engineering companies that build the biorefineries are crucial for extraction and further processing.

Indulleida, S.A's revenue streams come from the sales of the products valorised, which are either sold as ingredients (aromas, essential oils) or intermediate products (concentrates, purées, juices, dehydrated products) addressed to the food and feed industry.

They are partners of Agrimax, a project funded by BBI JU (Grant Agreement no. 720719), running from October 2016 to September 2020 and titled "Agri and food waste valorisation co-ops based on flexible multi-feedstocks biorefinery processing technologies for new high-added-value applications".

Company	Country	Innovation	In the market
Metsa group (Metsä Group)	FI	Valorisation of forest by-products and remnants through their “bioproduct mill”	

Description of the company

Metsa group is a large company whose roots are in the Metsäliitto Cooperative, a cooperative of forest owners who, in the early twentieth century, decided to join forces to establish a stronger position in timber trade negotiations. Currently it is owned by its 125,000 Finnish forest-owning members.

They produce a great range of products such as pulp, sawn timber, wood products for the construction, industrial and distribution sectors, lightweight fresh fibre paperboards, tissue and greaseproof paper, etc.

Description of the innovation

In recent years they have made a significant effort to get involved in the bioeconomy and to consider how to install a holistic circular economy approach in their industrial group.

Proof of this focus towards bioeconomy is that they commercialise a wide range of high-added-value products that they extract from by-products and remnants of their forest exploitation through their “bioproduct mill”, a proprietary biorefinery with 150 employees.

The value proposition of their model is to obtain a range of high-demand products. This mill is fed with underused woody and pulp biomass and extracts tall oil, turpentine, bioelectricity, product gas from bark, sulphuric acid and biogas. It is run

with their self-generated bioenergy (they actually produce 240% of their needs) and uses no fossil fuels. Currently they are optimising the extraction of lignin from forest by-products.

The benefit for the primary producers consists in being able to valorise remnants and turn them into high-added-value marketable products, providing extra revenue streams to their cooperative. Revenue streams in this model come from the commercialisation of the range of products obtained, which are marketed by themselves, covering the whole value chain.

In order to set up a model like this, the key partners required are technology centres to design the processing methods for the several upcycling rounds, and process engineers to build the biorefinery for extracting and conditioning the products obtained.

With the catalogue of products produced in the bioproduct mill they address several markets that range from chemical (tall oil, turpentine, sulphuric acid) to energy (gas, biomethane).

So, the innovation strategy behind their model is a diversification, considering that they were originally a forest cooperative, to non-related markets like the chemical industry or energy market, with vertical integration downstream.

Key factors of their business model that make it a successful example:

- Mesta are their own providers of the raw materials that are used as feedstock for the “bioproduct mill”, making them independent from market fluctuations.
- Currently these raw materials are transformed in a less value-adding process, and the range of products obtained have the potential to reach a high price in the market.
- They cover the whole value chain, from producing the feedstock, which is used as the product’s raw material, to commercialising the outcome.
- Being a cooperative allows Mesta to dedicate financial and human resources to innovation. Besides, farmers share its burden and risk, and benefit accordingly.
- They apply a cascading approach, assuring they completely optimise the potential value of their remnants.

Company	Country	Innovation	In the market
Ynsect (SAS Ynsect)	France	Insects fed with food waste to be used as used as ingredients in high-protein feed and fertilisers	

Description of the company

Ynsect is a medium-sized French company that farms insects to make high-quality, premium natural ingredients for aquaculture and pet nutrition. They were founded in 2011 and started to scale up steadily from the beginning. They established their first lab-scale production in 2013 and built their Ynsect pilot plant in 2015. They are currently building a full-industrial scale plant which is claimed to be the world’s largest facility for insect farming. This project endeavour is backed up by the BBI JU through its flagship project FARMYNG, started in June 2019 and lasting until June 2022. Currently, Ynsect employs over 100 people in France.

Description of the innovation

They grow mealworm (molitor) larvae in organic waste food waste from several origins. These insects contain high quality proteins and other valuable compounds, such as fatty acids and chitosan. Ynsect has designed a production method in which mealworm larvae are able to

grow on food waste, bioconverting it to these scarce compounds with a high market value.

Once matured, mealworm insects undergo a process in which the value-added compounds are extracted and used as ingredients in their range of products: YnMeal™ and YnOil™, which are high-protein feeds for aquaculture and pets, and YnFrass™ plants fertilisers.

Ynsect’s value proposition consists in the obtainment of a very high-added-value raw material, which are the mealworm insects. However, instead of selling them without any further process, which is the approach of other insect farmers, they have developed their three marketed products.

The key partners required for this model are, on the one hand, suppliers of the food waste, which is used as insect feed, and on the other, the technological centres to develop methods for extracting the high-added-value compounds from their insect biomass. Since they are operating in a relatively new area (industrial insect farming) and

their competitive advantage relies in the efficiency of their biomass production and extraction

methods, they have invested greatly in IPR, owning over 25 patents.

Key factors of their business model that make it a successful example:

- They efficiently produce a biomass with a rich composition in compounds with a high market value, such as proteins, fatty acids and chitosan, by means of bioconversion.
- They operate in an emerging sector – insect farming – with a great market forecast and with increasing consumer acceptance.
- They are involved in the value chain as a whole, from growing insects to extracting the high-added-value compounds, to manufacturing and selling their range of products.
- They address two markets, which makes them more resilient than if they only worked in one.
- They own a great number of patents which ensure they will be able to maintain their key know-how through their business exploitation.

Company	Country	Innovation	
CoverCress (CoverCress Inc.)	US	Development of a crop (CoverCress) to fit into two other crop rotations (corn and soy) with valuable products	To be released to the market in 2021

Description of the company

CoverCress Inc is a plant breeding company, founded in 2013 in the United States, dedicated to breeding and optimising cover crops. They are developing, genetically improving and commercializing CoverCress, a dedicated crop that comes from domesticating a weed called field pennycress (*Thlaspi arvense*). They use gene-editing technology to make this pennycress achieve the desired characteristics.

CoverCress is addressed to farmers that cultivate soy and corn in rotation. In industrial extensive agriculture, soy and corn are rotated in two seasons through the year. Normally a fallow period is left between both crops to allow the soil regenerate.

Description of the innovation

CoverCress crop has been designed to provide a cover to the soil in winter and early spring, between corn harvest and soybean planting, which helps preserve the soil, improving the nutrients present. It is also an interesting oilseed crop that can be harvested with the same machinery as soybeans, and is used to yield three main products:

- Its seeds produce edible oil either for food or industrial applications
- It is a viable feedstock for biodiesel and biofuel
- The press cake remaining after pressing the seeds for oil extraction can be used as a nutritious cattle and pig feed.

So, even though primary producers are not directly involved in CoverCress Inc business, they benefit

from a positive impact that allows them to participate in the bioeconomy, generating an interesting business model for them, which will be analysed.

CoverCress Inc's value proposition for soy and corn farmers is to provide them with a crop that has several added values, from improving their soil to bringing them extra revenue streams, since they can have an extra harvest per year of a crop that has multiple industrial applications. The key partner for the farmers to benefit from this model

is exclusively CoverCress Inc, who need to sell them the CoverCress' seeds.

Selling the CoverCress harvest brings additional revenue streams to the farmers without impacting their traditional business, and allows them to have income throughout the year, not only in the soy and corn seasons. CoverCress is addressed to the food, energy and feed market.

The innovation strategy followed by the farmers cultivating CoverCress can be seen as a diversification, since they are cultivating a new product which is addressed to a new market.

Key factors of their business model that make it a successful example:

- Farmers find an extra activity which is totally compatible with their normal dedication. They dedicate soil that normally remains unused and no other special requirements are needed (e.g. the machinery used is similar to soy's, which farmers either have or know how to use).
- The CoverCress crop provides them additional revenue streams while improving their soil and allowing them to prepare it better for their next corn and soy seasons.
- The products obtained from CoverCress can reach an interesting value in the market.

Company	Country	Innovation	In the market
Ecovative design (Ecovative Design LLC)	US	Developing biomaterials based in mushroom mycelium	

Description of the company

Ecovative Design LLC is a company founded in 2007, based in New York (US), which is dedicated to the development of high-performance, environmentally conscious materials.

They specialise in developing biomaterials based on mushroom mycelium, which is a self-assembling 3D scaffolding with adjustable porosity and a controllable fibre orientation. The company is composed of engineers, biologists, artists and designers.

Description of the innovation

They grow mushroom mycelium using a biobased scaffold that is filled with other biobased material, normally agricultural waste such as cotton hulls, to create a wide range of materials with different characteristics and performance.

After being left to grow for about five days, the fungal mycelial network binds the fillers. There is no volumetric limit to mycelium growth. Mycelium can be grown to a 3D form or post-processed to any shape. The resulting material is light, robust, organic and compostable, and can be used within

many products, including building materials, thermal insulation panels and protective packaging.

Key partners required in this case are strong R&D partners, such as technology centres and universities.

In the non-food market, they already have a wide range of sustainable alternatives to plastics and polystyrene foams for packaging, building materials and other applications with their MycoFlex™ and MycoComposite™ materials. Some of the applications they work with are technical wear, with high performance foams, packaging, footwear, textiles and footwear.

They also produce some food products with their Atlast™ material. Mycelium from gourmet mushrooms is edible and offers a range of nutritional benefits, from fibre to protein. They use it as a scaffold to create vegetarian, protein-rich alternatives to meat, both plant-based and cell-based.

Their revenue streams come from the commercialisation, in different ways, of their main materials, MycoFlex™, MycoComposite™ and Atlast™.

Their aim is to fully exploit a new material of their own creation which is highly diversifiable. Their innovation strategy is market diversification since they constantly develop new products to be addressed to new markets.

Key factors of their business model that make it a successful example:

- It is a low-input production which is relatively cheap to produce (mycelium).
- This commercial approach renders a high value-added product from a set of low-cost agricultural by-products (fillers like cotton hulls).
- This solution is highly versatile, providing a fully functional replacement for spandex (fuel-based, currently perceived by consumers as highly polluting), cushions or other textiles.

Company	Country	Innovation	In the market
Kalfresh (Kalfresh Pty Ltd.)	AU	Valorisation of carrots discards into fresh pre-packaged ready-to-eat snacks	

Description of the company

Kalfresh is an Australian fresh produce cooperative integrated and run by farmers. It comprises 1,620ha of land in four growing regions, producing 30,000 tonnes of carrots, beans, pumpkins and onions, and is Queensland's largest carrot producer. It follows a one-in-four-year crop rotation, ensuring the health and viability of the soil.

Description of the innovation

In recent years they have decided to expand their product range from bulk to processed, creating a range of fresh pre-packaged carrots made with the “ugly carrots” that otherwise would be food waste. They saw a great opportunity for valorising their fresh produce that did not meet the standards for mainstream channels, and decided to create a brand for marketing their discards transformed in ready-to-eat carrot products. They also make sure they effectively communicate to the consumers that, with this product line, they have diminished on-farm food waste, which is a fact that consumers appreciate nowadays more and more, since there has been increasing consumer awareness related to this topic. This is their value proposition.

The benefit for the primary producer is the ability to create a product which uses as raw material the

carrots that were previously considered discards because they did not fit in the fresh produce market. They have claimed about the great return that this line provides them: *"It's a smaller part of our whole crop but the return is insane."*³⁹ In order to have sufficient raw material supply for the processed carrot line, they time their plantings to ensure consistent supply.

They have also spoken about the key partners they required. Their in-house engineers consulted world-leading vegetable-product-line manufacturers to create the on-site washing, grading and packing facility.

The revenue streams generated are associated with the sales of the ready-to-eat carrot products. The market it is addressed to is ready-to-eat healthy meal products, which has developed incredibly in recent years, and has a great forecast to continue growing.

This innovation strategy is a market development, since even though the raw material is the same, they transform the carrots, creating a new product (ready-to-eat carrot products), and they address them to a new market, which is part of food retail, the market they already operate in.

³⁹ Courtney, P. (2016). Kalfresh: QLD rural business turns carrot problem into profit by increasing diversity. *ABC net*. Retrieved from <https://www.abc.net.au/news/2016-04-09/kalfresh-rural-business-turns-problem-into-profit/7310450>

Key factors of their business model that make it a successful example:

- They have been able to turn a low-value product – discards – into a valuable raw material.
- They control the whole value chain, being independent of other potential actors involved, since they control the process from carrot production to its transformation and its commercialisation.
- The marketed products have a great added value in the market.
- The critical mass of discards they can count upon is sufficiently large to assure supply of their necessary raw materials in sufficient quantities to benefit from economies of scale.
- Dealing with large volumes makes the innovation economically worthwhile.

Company	Country	Innovation	In the market
ABC Honey Group (ABC Honey Pty Ltd.)	AU	Organisation of a high-value supply chain around high-end honey by a cooperative of beekeepers	

Description of the company

Australian Beekeepers Cooperative (ABC) Honey Group is an Australian company, with the aim of creating a vertically integrated honey business in which the stakeholders involved share equally in the production, packing and marketing of premium grade, pure Australian Honey. The Group is integrated by ABC Honey Pty Ltd and Honeypack Pty Ltd, the two subsidiary companies, which are dedicated to honey production and its packaging and commercialisation respectively.

Description of the innovation

The ABC Honey group produces several kinds of honey, but they specialise in a high-end variety called manuka honey, whose retail price outside Australia can reach 350€/kg⁴⁰. Providing large industrial amounts of this honey is their value proposition. One of their main client is Nature's

Gold, a cosmetic company that has premium cosmetic, honey-based products.

In order to be able to assure sufficient supply to Nature's Gold, the Australian Beekeepers Cooperative was founded, with the purpose of not only gathering sufficient amounts of honey for industrial production, but also of capturing for the honey producers the value-adding processes of packing, marketing, local sales, and export. So, the benefit for the primary producer is to participate in a value chain controlled by themselves, with long-term commitment contracts.

As they state on their website in relation their business approach, "In essence, the structure is designed to create a long-term partnership between investors and primary producers in a balanced and fully vertically integrated group

⁴⁰ Farming Together. (2018). *New co-op sweetens honey hopes*. Retrieved from [farmingtogether.com.au: https://farmingtogether.com.au/new-co-op-sweetens-honey-hopes/](https://farmingtogether.com.au/new-co-op-sweetens-honey-hopes/)

delivering profits equally between the creators of wealth and the owners of capital.”

They have participated in a project funded by the Australian Government called Farming Together (Farm Co-operatives and Collaboration Pilot Program⁴¹), which is of great interest for this study, since the aim of the project, which ran from 2016 to 2018, was to help agricultural primary producers improve knowledge of how co-operatives, collective strategies and supply chain negotiations can improve their returns, and improve the knowledge of business models and collaboration options available to farmers and farm advisors, among others.

Participating in this project led them to establish the Australian Beekeepers Cooperative, with the intention of giving them security of supply and a share in the value-adding process of packing,

marketing, local sales, and export, therefore being able to participate higher up in the value chain.

The key partners required for establishing this approach are the honey producers themselves, and possibly the financial help necessary for the honey processing plant.

The generated revenue streams come from the sales of the honey, both to Nature’s Gold and to consumers. They address, then, two markets: cosmetics and food retail.

The innovation strategy followed is a diversification, since they produced bulk honey and now they also sell finished products, addressed both to a related (food retail) and non-related (cosmetics) market, including a vertical integration downstream, since they are responsible for processing their own raw materials.

Key factors of their business model that make it a successful example:

- Primary producers are clustered in a large cooperative with the aim of assuring large amounts and continuous supplies.
- They are primary producers of honey, but they own the company dedicated to packing, marketing, local sales, and export this honey, which they define as the “value-adding process”.
- They can commit to supplying an industrial value chain (Nature’s Gold cosmetic line formulated with manuka honey) because they have sufficiently large size.
- Their main produce has a high market price.

⁴¹ Farming Together. (n.d.). Retrieved from farmingtogether.com.au: <https://farmingtogether.com.au/>

Company	Country	Innovation	In the market
EPIC (EPIC-EGG)	CA	Egg producers' cooperative that jointly process their raw material into egg-based ingredients	

Description of the company

EPIC stands for Egg Processing Innovations Cooperative, a Canadian cooperative made up of 140 egg farms based in Alberta. They specialise in producing eggs and processing them into value-added ingredients, mainly whole liquid egg, egg whites, egg yolk and customized and specialty blending. They are also in charge of commercialising these products for the food ingredient market.

In the past, egg producers shipped their production as a raw material to external processors and received back the processed ingredients. This approach left them with narrow margins, and they decided to establish EPIC with the aim of assuming the transformation role and increasing revenue to their agricultural and economic stakeholders.

Currently they participate in research projects in which they design processes for the valorisation of other egg-based components with a good fit in the market, such as fractions of the eggshell and the egg-membrane, which are highly demanded by manufacturers of functional foods, food supplements and enriched natural health care products.

Description of the innovation

Their value proposition is to provide a range of industrial egg-based ingredients as finished food

products assuring wholesome values and a local focus very oriented to animal safety and welfare.

Primary producers benefit from this model since they control the whole value chain. They are the main stakeholders in egg production, transformation and commercialisation of the obtained egg-based ingredients.

They claim on their website that “working with research and industry partners, a key goal is to develop innovative ingredients and products for both food and nutraceutical industries”⁴². Other key partners necessary for this model are entities providing financial support for establishing the processing plants.

The revenue streams of this model are mainly the ones stemming from the commercialisation of the egg-based ingredients, which are addressed to the food ingredient market.

The innovation strategy followed by egg producers is a diversification, since they used to produce non-processed eggs, and currently they sell egg-based food ingredients. They address a related market, which is the food ingredients market, including a vertical integration downstream, since they process their own raw materials.

⁴² EPIC EGGS. (n.d.). Retrieved from [www.epiceggs.ca: http://epiceggs.ca/the-process/](http://epiceggs.ca/the-process/)

Key factors of their business model that make it a successful example:

- Primary producers belong to a cooperative with the aim of assuring a fair distribution of the value added by the product transformation.
- The product has a good market potential, since several branches of the food industry (bakery, confectionary, ice-cream) have a high demand for egg-based ingredients.
- Farmers share the economic burden of the investment in the processing machinery, which would not be affordable if they were not collaborating through a cooperative.

6.4 Other business models worth mentioning

The analysed cases are inspiring, but there are numerous other business models that can be studied since they imply an innovative approach to the bioeconomy that positively impacts the primary producers. Here are some of them:

- **AVEBE** is a potato cooperative from the Netherlands whose potato production is directly addressed at extracting their high-added-value compounds, from potato starch for PLA manufacturing, to protein for animal feed.
- **Lyckeby** is a Swedish potato cooperative with a similar case to that of AVEBE, since they grow potatoes in order to extract their high-added value compounds, but they target the food ingredients and fibre markets, and the paper industry.
- **SheepWool** Insulation is a small Irish company that manufactures textiles, thermal and acoustic insulation for buildings from sheep wool. Originally, they were sheep farmers, but turned to upcycling their sheep's wool into high-quality bio-based isolating textiles. Currently they do not maintain a flock of their own but, even though they cannot be considered primary producers any more, they are an original and inspiring case to mention.
- **Amorim** is the largest cork manufacturer globally. This large Portuguese company upcycles their cork remnants, which are mainly cuts, trimming and dust that result from manufacturing wine cork caps, through the development of cork-based materials addressed to all kinds of uses, from technical materials, to furniture or textiles.
- **Borregaard** is a large Norwegian company extracting high-added-value products like nanocellulose from by-products of forest management through a proprietary biorefinery. The nanocellulose is addressed to the chemical industry.
- **BuggyPower** is a Portuguese company that cultivates microalgae and extracts high-added-value compounds such as fatty acids from them, to sell as an ingredient for the agri-food and feed industries. Microalgae and their derived products have very high market price, and their growth also acts as a CO₂ sink.
- **Agro-food Aragon Cooperatives** is a Spanish cooperative that is part of the LIFE Multibiosol project. In this project they provide by-products from several crops (e.g. tomatoes) as a raw material for developing biodegradable bioplastics to use as biomulching. This has great advantages, since the farmers don't need to recollect them, which is very labour-intensive, and they self-degrade into the soil without liberating toxic substances.
- **Moyee Coffee** is a Dutch coffee company that sells premium quality, fair-chain coffee of African origin, mainly Ethiopian. They have developed a blockchain-verified value chain in collaboration with Ethiopian entrepreneurs, roasters and farmers, and have achieved a trust-building system between primary producers and consumers. Producers receive a higher payment for their coffee beans (on average, twice the regular price) and consumers enjoy a fair-trade coffee with certainty about the proper use of their purchase.

6.5 Common factors for the success of innovative business models in the bio-based sector

After analysing the cases described, some common factors can be extracted that are considered relevant to the meaningful involvement of agricultural primary producers in bio-based business models.

- Primary production in the bioeconomy usually entails bulk products. Generally, the more these products are processed or transformed, the more value the producer adds to them, and, accordingly, the higher the price these products can reach when marketed.
- Most of the cases show that this value-addition is achieved by transformation and processing, and the key to ensuring that farmers benefit from this added value is that the transformation process involves them.
- A high degree of technology is not essential for innovations to have a positive impact on the primary sector. Some innovations have “low technological degrees”, although they provide alternative revenue streams to the farmers which complement their earnings. Actually “low-tech” innovations could be easier to implement and usually involve lower investments, so they could indeed be easier for certain farmers to adopt (e.g. small or non-associated producers).
- Establishing cooperatives is the clearest example of farmers grouping their resources in order to undertake risky, expensive, “high-tech”, demanding innovations. Unity gives strength!
- Transformation requires investment (usually machinery), which is easier to access when primary producers are associated or collaborate.
- In order to foster the establishment of a new industrial value chain, raw material supply should be assured in sufficient amounts, which is only possible when farmers associate or collaborate, and with a smart logistics approach. Economies of scale are the key to being competitive.
- The valorised items (ingredients, products, etc.) should ideally have a high market value and should be addressed to markets with good growth potential.
- It seems fundamental for the farmers to establish their business models using their proprietary technology or to assure they have exploitation rights.
- A theme in many models is valorising a by-product or a remnant which used to be considered to have low value, or even to be waste. Ideally this valorisation not only provides an extra revenue stream, but saves the farmers the money associated with the disposal of this by-product or remnant.
- There are plenty of high-added value compounds in agricultural by-products or remnants. When thinking of them as raw materials, they can be considered the “unpolished diamonds” of the agricultural primary sector. Usually, ad-hoc extraction technologies must be specifically developed to valorise them, but if the compounds have a sufficiently high market value, they can pay off the necessary investment.
- Valorised agricultural by-products or remnants can be addressed to markets the companies are not operating in, which can be seen as a market opportunity. Addressing new markets can be a challenge, but it is valuable to gain in resilience.
- The extra revenue streams from the commercialisation of agricultural by-products, remnants or compounds extracted from them can help farmers’ revenues be more consistent throughout the year, diminishing their dependence on seasonality.

The conclusions and findings that have arisen from the assessment carried out in this chapter feed into the analysis made in section 7.3.



7. IDENTIFICATION OF KEY CHALLENGES ENCOUNTERED BY THE AGRICULTURAL SECTOR TO PARTICIPATE IN THE BIO-BASED SECTOR, AND IN PARTICULAR IN BBI JU PROJECTS

Through the two surveys carried out with BBI JU participants⁴³, numerous in-depth interviews with stakeholders, a literature review, reviewing work done by relevant EU networks and projects⁴⁴, and analysis of successful business models, an extensive amount of data has been collected on the challenges encountered by the agricultural sector to participating in BBI JU projects, and in the bio-based sector in general.

This chapter aims at describing and categorising the types of challenges encountered. The results have been contrasted and enriched through discussions with key stakeholders at a focus group meeting.

In sub-chapter 7.1, a detailed analysis of the general challenges for the agricultural producers to participating in the bio-based sector and its value chains is presented. These challenges are related to agricultural participation in BBI JU projects. In sub-chapter 7.2, the challenges that are specific to the participation of primary agricultural producers in BBI JU projects are discussed, with information stemming from the survey results and from the stakeholder interviews. The chapters provide complementary information by analysing the challenges from different perspectives. Whereas the first sub-chapter, 7.1, investigates general challenges for primary producers to actively participating in the bio-based sector, and links these to a potential impact on participation in BBI JU projects, the second sub-chapter, 7.2, describes the specific issues that stakeholders have referred to when asked the question “what are the challenges for agricultural producers to participating in BBI JU projects?”

The final section of this chapter (sub-chapter 7.3), contains brief and concise conclusions on what constitute the principle hurdles for the primary agricultural sector to participating in BBI JU projects, bearing in mind that this analysis is also applicable to other EU-level initiatives with farming participation. The analysis aims at capturing and integrating the main elements stemming from chapters 5, 6 and 7. Results from the mapping and characterisation of current BBI JU participants and from the analysis of successful business models are matched and compared to the challenges identified through the literature review, and through interviews with key stakeholders, as presented in chapter 7. In that sense, sub-chapter 7.3 contains concluding remarks on the most relevant findings of the study and will answer the question “which are the most decisive challenges impacting agricultural producers’ participation in BBI JU projects?”

In the following chapter (chapter 8), recommendations will then be provided to address these challenges.

⁴³ One survey with BBI JU agricultural participants, and one survey with coordinators of projects where agro-based biomass is used but where the agricultural producers are not part of the consortia.

⁴⁴ As well as from the Report on the Workshop on “Best practices in integrating primary production (farmers and forest owners) in the Bioeconomy value chains and boosting the development of the Bioeconomy in rural areas” organised by DG AGRI in 2018, which provides an in-depth overview of available bioeconomy projects and the challenges they are faced with.

7.1 Challenges for agricultural producers to participating in the bio-based sector, including participating along the full bio-based sector value chains, and its relation to BBI JU participation

In chapter 3, on the context of the study, the foundations and the basic challenges for a functioning bioeconomy were outlined, as well as the limitations of the agricultural sector to participating in the bio-based sector and the forces driving farmers to participate. With this as a starting point, the following challenges for agricultural producers to participating in the bio-based sector have been identified:

Main challenges for agricultural producers to participating in the bio-based sector:

- A. The concept of bioeconomy is still new and unclear – the challenge of awareness raising, communication, and increasing the level of know-how.
- B. Policy coherence and consistency – the challenge of contradictory policy goals for various policy areas being converted into regulations with contradictory end-goals.
- C. Importance of market demand – the challenge of deficient market pull, both for final bio-based products, and for agricultural feedstock as input to the bio-based sector.
- D. Difficulties inherent in the initial steps of new bioeconomy activities – the challenge of overcoming difficulties in initiating new relations and new productions.

Challenges for agricultural producers to participating along the full bio-based sector value chains:

- E. The structure and characteristics of the agricultural sector – the challenge of innovating and being an entrepreneur when income is limited and your business is of limited size.
- F. The output of agricultural production is a bulk product – the challenge of adding value to your product as a farmer, and the challenge of taking on a different role in the value chain.

This is a rough clustering, with each challenge encompassing some sub-challenges. The first four challenges outlined (A-D) cover the obstacles for agricultural producers to engaging with the bio-based sector.

The last two challenges described (E and F) are characteristics inherent to agricultural production – agricultural producers are in general small businesses, with limited incomes, and their final outcome is a bulk product. These characteristics make it more challenging to participate along the full value chain, whether it be for food production or in the bio-based value chain. However, some characteristics may make it even more complicated to add value to the product in the bio-based sector than in the agri-food value chain.

In this section, all challenges are described thoroughly, in order to provide an in-depth understanding of hurdles encountered by the agricultural producers. Each challenge is then linked to its potential impact on participation in BBI JU projects by agricultural producers.

7.1.1 Challenges for agricultural producers to participating in the bio-based sector

A. The concept of bioeconomy is still new and unclear – the challenge of awareness raising, communication, and increasing the level of know-how

Since the bioeconomy is a recently developed concept, conceived in an institutional atmosphere, there is some confusion around its overall definition and what it encompasses. Besides, its definition is not easily translatable into practical actions, which means the concept of bioeconomy is still unclear. This means that agricultural producers can have difficulties in identifying how to participate in the bio-based sector and in knowing whether what they are doing counts as bioeconomy or not. There is also a challenge for agricultural producers to know how their products – not only the main ones, but their by-products, residues or waste as well – can be used for bio-based-sector purposes. This limits the number of agricultural producers taking part in the bio-based sector, as well as the number of agricultural producers expressing their interest or seeking support for developing new projects related to the bio-based sector, which in turn might limit the amount of agro-based biomass (biomass of agricultural origin) that is available for the bio-based industry.

Description of the challenge

Even if the bioeconomy has been an established concept in research and policy circles for some time, it is still pertinent to highlight the unclear understanding of the concept as a challenge. “On the ground” there is still not a common understanding of what is meant by ‘bioeconomy’. Hence, the ones who are involved in the bioeconomy do not necessarily know that they are part of the bioeconomy.

This conclusion has become clear through numerous interviews with stakeholders, where the issue of poor understanding of the concept was highlighted by many as a major challenge to achieving higher participation of farmers in the bioeconomy. This conclusion is supported by the findings from the interviews conducted with the support of the ENRD Thematic Group on the bioeconomy study⁴⁵, where the most common comment related to awareness raising was the need to clarify the concept of the bioeconomy. The concept was in general noted to be vague, poorly understood, not formally defined in national legislation in some member states and often confused with other concepts (including organic production or waste management). Our understanding, based on interviews, is that in the EU-13 countries⁴⁶, the challenge is bigger since even fewer relevant stakeholders have a full understanding of what is meant by bioeconomy.

The second part of this challenge relates to how to interpret the concept. The EU definition⁴⁷ includes everything related to the use of biological resources, except for medical/health aspects. This means that all agriculture and food is included, which is, for example, represented in the statistics presented about the bioeconomy. However, when it comes to EU funding opportunities, the interpretation of the definition of

⁴⁵ ENRD. (2019). Exploring the Role of Awareness-Raising and Communication in Promoting the Development of Sustainable Bioeconomy Value Chains. 3rd Meeting of the Thematic Group on ‘Mainstreaming the Bioeconomy. Retrieved from https://enrd.ec.europa.eu/sites/enrd/files/tg3_bioeconomy_education-and-awareness-raising_bowyer_0.pdf

⁴⁶ Group of 13 EU countries: Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Malta (MT), Poland (PL), Romania (RO), Slovakia (SK) and Slovenia (SI).

⁴⁷ From the Bioeconomy Strategies. See chapter 3.

bioeconomy might be more limited, restricting “bioeconomy” to the new, often non-food use of biomass (i.e. “bio-based economy”). Confusion is created around the “bioeconomy” concept among stakeholders on the ground, and as well around when one is actually participating in the bioeconomy and when not.

In brief, there is not a sufficiently clear definition, with a clear limitation to other uses of outputs from biological resources, and it is not communicated in a sufficiently clear way. This has trickle-down effects on all levels of society. Hence, it is essential to translate the high-level definition to something meaningful in the local or regional context where it is being applied and operationalised. The differentiation of bio-based activities and products from ‘traditional’ ones needs to be clarified. The use of a more explicit language can be a useful tool.

Once the concept is translated into something that is more applicable on the ground, more communication and awareness raising around the concept is advisable. Today, it is problematic for national administrations, advisory services and farmers unions to communicate and raise awareness or increase know-how among farmers around bioeconomy, simply because they do not have a clear idea of the concept themselves. This has come out from several interviews, and has again been supported by the evidence of the interviews carried out by ENRD TG bioeconomy,

Because of this limited awareness, there is also limited knowledge within the primary sector about alternative market possibilities for their products. One example mentioned was that farmers regard pruning as waste, not as a resource. Collecting the straw on the fields is usually seen as a cost, not as a potential income.

Hence, a relevant challenge is defining the concept “bioeconomy” in a way that facilitates its common understanding, and then communicating regarding the bioeconomy. Not knowing this has become a real barrier for many to participation (in particular in EU level projects).

Another add-on part of this challenge is that, even among informed stakeholders, the understanding of what is bioeconomy other than bioenergy is low. For example, in the EIP-AGRI conference in 2015, it was concluded that most of the workshop participants had a good understanding of the bioenergy sector. However, the participants had very limited knowledge regarding higher-value products such as bioplastics, biopolymers and fine chemicals.

Consequences of the challenge to agricultural participation in the bio-based sector, and in BBI JU projects

The existence of this challenge might limit the participation of the agricultural producers in the bio-based sector, and therefore also ultimately their participation in BBI JU projects. If the understanding of the term bioeconomy, as well the bio-based sector, were clearer on the ground, then, consequently, agricultural producers would also be better informed about the opportunities that exist to be involved in the bio-based sector, its potential and its benefits. The possibilities and benefits to participating in BBI JU would also be better known by the primary producers.

B. Policy coherence and consistency – the challenge of contradictory policy goals for various policy areas being converted into regulations with contradictory end-goals

The definition of the concept “sustainable” is not sufficiently clear, and this is being translated into contradictory policy goals for distinctive policy areas. Agricultural policy, energy policy, climate policy and environmental policy goals are not fully aligned, either at EU level, national level, or regional level. Furthermore, there is a clear demarcation between regulations corresponding to the various policy goals. As a result, what is being incentivised through one regulation is being penalised, or not facilitated, through another regulation, responding to different policy goals.

Furthermore, not having an overall definition of sustainability has resulted in a moving target for the bioeconomy, meaning that farmers are not provided with predictability with regard to what to invest in.

The deficiency of policy coherence and consistency means that it is harder, and riskier, for agricultural producers to provide biomass for the bio-based sector (compared to not changing their current way of producing), and they may be discouraged from participating in the bio-based sector.

Description of the challenge

Policy makers are not sending clear policy signals to the agricultural producers regarding how and what to produce. At the EU level, on the one hand, “a more sustainable agriculture” is promoted, and at the same time it is communicated that “*the overall use of biomass for energy and industrial purposes should be increased, in a move towards a greener society and bio-based economy*”. These objectives are not necessarily contradictory, but, as stated in chapter 3 (context chapter), production of biomass suffers from a natural limitation – the limitation of land available for production, and there is no agreement on what is a sustainable use of land⁴⁸. Hence, producing more biomass for the bio-based sector means that either the amount of land that can be used for food production is diminished, or the agricultural production taking place is more intensive, or more

⁴⁸ Some examples from literature on the unclear common understanding of sustainability: The EU’s rural land is essential for delivering all ecosystem services – food, energy, timber, as well as clean water, carbon sequestration and landscapes, underpinned by biodiversity. However, there are tensions about how to produce more crops, timber and, energy alongside a healthy environment while rectifying the serious environmental deficit that already exists. These tensions are likely to become more pronounced over the coming decades and will mean that significant trade-offs between different land uses and the intensity of crop and animal production need to be faced. (Hart K, Allen B, Lindner M, Keenleyside C, Burgess P, Eggers J, Buckwell A (2012) Land as an Environmental Resource)

And the US Biomass Research & Development Board pointed out in its recent report that the effect of growing large quantities of biomass for bioenergy on environmental, social, and economic outcomes is not well known. Life-cycle analysis surrounding the sustainability of energy crops is insufficient. Major environmental concerns include potential impacts on soil and water quality, biodiversity, GHG emissions and carbon footprint, net energy values, and direct and indirect land-use changes. Additionally, there are concerns about economic and social issues, such as food security, workforce development, human health, and landowner adoption. The board has sent the message that understanding sustainability will lead to improved legislation and clearer messages to farmers, and that strategies are needed to integrate biomass and bioenergy production into existing agricultural and forestry systems in a way that enhances energy security, economic growth, and environmental outcomes while minimizing adverse effects. (Biomass Research & Development Board, US government; 2018; The Bioeconomy Initiative: Implementation Framework)

land is being used for agricultural production. The first option has been clearly indicated by policy makers not to be acceptable (regulated in ILUC-rules)⁴⁹, and the last two options both have potentially negative consequences for the environment, which is reflected in numerous rules in various regulations on agriculture and environment.

The bottom-line is that an agricultural producer has limited choices of how to participate in the bio-based sector. In general terms, an agricultural producer can cultivate land or raise animals. From animal production, by-products, residues or waste can be used as feedstock for the bioeconomy. On land, the agricultural producer can choose to:

- Grow conventional crops for new non-food purposes. However, this is not incentivised, as the ILUC rules pose limitations on this. Ultimately, the message to the agricultural producers is to not replace food crops with non-food crops.
- Grow additional crops on existing agricultural land (intermediary crops). This is not incentivised, as in many member states (MS) the rules related to the greening payments from the Common Agricultural Policy (CAP) do not allow for the growing of intermediary crops⁵⁰.
- Use grass from land that is being left fallow (i.e. set aside). This option is not incentivised, again because of the rules on greening in the CAP that incentivise farmers to leave land idle, whereby it cannot be used for productive purposes⁵¹.
- Grow alternative crops, energy crops. This is not incentivised because of the potential risks for causing indirect land use change (ILUC rules).

In other words, agricultural producers can choose to do all of the above; the CAP and ILUC rules do not prohibit doing the above. However, the signals sent to the agricultural producers on what society wants them to deliver and grow on their land are not incentivising changing production into providing feedstock for the bio-based industry⁵². Several interviewees underlined the lack of will on the part of policy makers to accept the use of land

⁴⁹ Indirect Land Use Change, rules related to the Renewable Energy Directive setting targets for member states for sourcing transport fuels from renewable sources and introducing sustainability limitations as to what renewable resources can be counted towards the renewable energy target. In other words, incentivising the use of renewable sources which do not displace food crops, and which do not cause higher emissions than the biofuels abated.

⁵⁰ Because of the rules relating to Ecological Focus Areas (EFAs) which aim at stimulating biodiversity, thus complicating the production of intermediary crops. Greening payments are 30% of farmers direct payments, thus being a substantial monetary incentive not to change production.

⁵¹ Rules relating to set-aside under EFA, aiming at increasing biodiversity, do not permit commercial use of products from land receiving support to be left fallow. Same support rules as for previous footnote.

⁵² On the one hand, it is communicated that in order to meet future demand of biomass, the following feedstock is needed; ILUC-free residues; grass leys from currently unused land; additional crops such as intermediate crops and EFA crops; yield increases in grass ley production; doubling of crop production per hectare by adopting cropping systems with longer growing seasons or by doubling cropping; harvest of biomass from wetland areas, and improved utilisation of slurry from livestock production (to mention a few examples) . But this would require changes to several pieces of legislation, including the CAP regulations related to EFA and set-aside and environmental legislation, and national legislation determining what is agricultural land; it will require functioning ILUC certification schemes (and it needs to be clear who bears the cost from

for purposes other than food. At the EIP-AGRI conference in 2015⁵³, **80% of the participants were of the opinion that the land-use competition for the production of food vs bio-products and bioenergy was holding the agricultural sector back from participating in the bioeconomy.**

In the end, using by-products, residues and waste is the least complicated option for agricultural producers wanting to participate in the bio-based sector. However, also in this area, several regulatory hurdles exist related to what products can be used. There are limitations related to the use of “free” raw materials, where the EU waste legislation, and the definition of waste, as well as the regulation on feed, are not up to date with the use that could be made of by-products, residues, and waste. Also, limitations on novel foods and new breeding techniques hinder the development of the use of “free” resources. The strict interpretation of developments in this area by the EU is often referred to as an obstacle for innovation by the industry.

The different views on how the agricultural sector can participate in the bioeconomy, and on what products should be produced and used, has also led to policies changing over time and to moving policy targets. Several interviewees pointed out the importance of policy consistency. A solid and reliable long-term political framework (e.g. on taxes, regulations, safety certifications) is necessary for agricultural producers to take on a new investment. There are several examples from various member states where national legislation (through tax regulations, for example) has ruined investments from the agricultural community when priorities changed after they had invested in new technologies. Hence, the agricultural sector has been “burned” trying new investments. Several agricultural producers have communicated that they want to be advanced, but they do not want to go first because it is too risky from a policy perspective.

This chapter mostly discusses the challenges on an EU-level, but policy coherence and consistency is equally important at all administrative levels – global, EU, national, regional and local levels. To have all strings pulling in the same direction will facilitate the agricultural producers’ decision to try out a new activity.

The fact that there is no agreement on what is sustainable, and thus the varying or sometimes contradictory policy goals for agriculture, energy, climate and environmental policy, trickles down to the agricultural producers, who receive mixed messages regarding what production to prioritise. At the end of the day, it is usually easier to stick to the traditional production, rather than to try something new, which inherently will be riskier if the policy makers have not made up their minds.

Consequences of the challenge on agricultural participation in the bio-based sector, and in BBI JU projects

The challenge above, related to the unclear concept of bioeconomy, policy incoherence and inconsistency, might also limit the number of agricultural producers taking part in the bio-based sector. The number of

the certification); it will require technological advancements, and supporting policies to establish a market for these feedstocks. (Prade, T., Björnsson, I., Lantz, M., & Ahlgren, S. (2017). Can domestic production of iLUC-free feedstock from arable land supply Sweden’s future demand for biofuels?; and Gylling, M., Jørgensen, U., Bentsen, N. S., Kristensen, I. T., Dalgaard, T., Felby, C., & Johannsen, V. K. (2016). The +10 million tonnes study: increasing the sustainable production of biomass for biorefineries.).

⁵³ EIP-AGRI. (2015). Workshop Final Report ‘Building new biomass supply chains for the bio-based economy’. Retrieved from https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/field_event_attachments/report-ws-bioeconomy_final_28052015.pdf

agricultural producers seeking support for developing new projects related to the bio-based sector might be affected by the existence of this challenge, as it is risky to be an entrepreneur, and undertaking an investment is not necessarily associated with higher income. In terms of agricultural participation in the bioeconomy, this is a real challenge.

The existence of this challenge, in combination with other challenges, might therefore reduce the number of agricultural producers that actively participate in the bio-based sector, and ultimately in BBI JU projects. This challenge may also have an impact on the level of interest among producers to participating in the bio-based sector and in BBI JU projects, if the potential pay-off from the investment related to participating is unclear due to shifting policy goals. The interest in participating will also be negatively affected due to the existence of regulatory hurdles, meaning that if the potential for marketability is impacted by the regulatory obstacles, then the interest from an agricultural producer in participating will also be decreased.

C. Importance of a sufficient market demand – the challenge of deficient market pull, both for final bio-based products and for agricultural feedstock as input to the bio-based sector

Description of the challenge

The main driving force for agricultural producers is the pursuit of a higher income, so a clear market value needs to be perceived before investing. In general (as discussed under challenge E), agricultural producers are short on time and financial means, hence they do not have the resources to invest in something without a clear/guaranteed economic benefit. If market demand exists, and is stable over time, then agricultural producers will eventually invest in participating in that market.

For the bio-based sector, seen from the point of view of agricultural producers, the problem is twofold.

First, there is not sufficient existing demand, only incipient, for final bio-based products/materials (including fuel), because the bio-based products are in general more expensive than the fossil-based alternatives. This translates into a deficiency of market pull. Without market pull, fewer bio-based products/materials will be developed, and thus there will be less demand for agro-based biomass. If agricultural producers do not perceive a demand for their products from the bio-based industry, then they do not perceive the benefits of producing for this industry, compared to producing for the food industry (which is considered safer, as there is a known and stable demand).

It is important to highlight that not all interviewees agreed on this point. Some argued that there is a demand for bio-based products even if they are more expensive than their fossil-based equivalents, that it is merely an issue of awareness raising among consumers, and that demand will take off on a large scale in a near future.

However, even if the future prospects may be bright, as long as products based on fossil inputs are cheaper, many consider it difficult to enter the market, and the market for bio-based products continues to be a niche, even if for some sub-sectors the niche can be important. For some end-sectors, such as plastic bags and packaging, which were identified as recent trends, a willingness to pay more for bio-based products was identified. However for most sectors this was not considered to be the case by most interviewees, especially when the bio-based inputs are not easily seen by the end-user, as in industrial goods (e.g. the impact of a bio-

based plastic bottle of water is more easily perceived by an end-user than the impact of a bio-based compound to be used as an ingredient in a varnish/paint).

Secondly, the demand for agro-based biomass from the bio-based industry is problematic.

A major obstacle to market demand for feedstock from agricultural production is that the bio-based industry in many cases needs stable quantities and quality of products delivered, attributes usually not associated with agricultural production.⁵⁴ Constant quantities are needed in order for a biorefinery to run 365 days a year. This runs counter to the seasonality inherent to agricultural production, where a certain type of feedstock can only be provided for a limited part of the year, unless new storage solutions are developed. If the feedstock delivered does not meet the quality expectations, then the industry may turn down the product. The alternatives for an agricultural producer if the industry turns down the product due to insufficient quality are not clear. If this happens with a traditional food crop there are alternative markets (food/feed) where demand is guaranteed. But in the industrial crop market, the alternatives are not that clear, and it leaves the farmer with great risks.

On top of that, as supplier to the bio-based industry, the agricultural producers are competing with the forestry and marine sectors, sectors which, according to our interviewees, are often better at ensuring stability over time of the biomass provided (particularly forestry)⁵⁵. This puts agro-based biomass in a disadvantageous position when trying to sell to the bio-based industry, where feedstock from both sectors is available, and may result in being safer for the agricultural producer to produce for the food industry, where there is no competition from other sectors.

In other words, without the development of new varieties – ensuring quality stability of the biomass – and new storage and transport solutions operating at a cost acceptable to the market – enabling agro-based biomass to be provided in a quantitative stable manner over time – the demand for this type of biomass from bio-based industry will be unreliable and variable, limiting the number of agricultural producers investing in developing new business lines.⁵⁶

⁵⁴ The 15 EU success stories evaluated show that the supply to the bioindustry of a stable supply of feedstock of sufficient quality and amounts, both at the stage of developing a product, and during the phase of scaling up the production, is an essential part of the success of the business. The same study showed that many success stories involve a shift in feedstock along the development path, with the aim of improving product performance and reducing production costs. (European Commission. (2019). From idea to market, 15 EU “Success stories”). 60% of the participants in the EIP-AGRI workshop in 2015 considered the reliability of agricultural residues, such as availability, seasonality and quality, an important obstacle to the development of the bioeconomy with agricultural participation.

⁵⁵ It was pointed out by a chemistry industry representative that biomass coming from forestry is cheaper, because it is less labour-intensive than agriculture. From the point of view of quantity and quality of the feedstock, forestry inputs are considered more reliable (even if, as was pointed out, they may have other problems), and hence are therefore easier to work with.

⁵⁶ The US biomass research & development board states that “Biomass feedstock logistics involve a myriad of combinations of feedstock types and associated systems. Different feedstocks require specific systems due to inherent differences in biomass type, such as trees versus grass crops. ...The complexity of products, techniques, equipment, and systems results in the need for multiple solutions to common barriers. Machines and systems exist that are capable of performing each biomass supply chain operation, but the technology is not designed for the scale and efficiency required for cost-

Furthermore, the biomass market is a global market. Thus, EU suppliers of biomass are competing with producers from outside the EU (for example from Argentina, Brazil and Indonesia), which are often able to produce at lower costs than EU producers due to lower input and production costs, or because the GMO legislation in some countries allows the production of varieties more suitable for industry use. Hence, some interviewees pointed out the challenge that this implies for EU agricultural producers. Trying to compete in a market where your product could be replaced by a cheaper imported product in the near future puts your business at high risk.

The case of straw – examples of challenges related to using a by-product from agriculture

For an agricultural producer, the cost of supplying biomass to a biorefinery is a combination of different crop production and harvest costs, as well as transportation and storage costs. Today, there are not always business-orientated solutions in place for this.

In order to be able to provide stable quantities and qualities, challenges at the beginning of the chain, related to logistics and storage, have to be solved. How to collect biomass that we have not used up until now (such as straw that was left on the field, for example), and how to store it for longer periods of time?

Straw is a very common by-product from agricultural production and has great potential as biomass. Today, a lot of the straw stays on the farm because there is no market demand for it, and so it does not generate any income for the producers. However, if there was an attractive income associated with the straw, then agricultural producers would want help with collecting it (assuming that this would require a new type of machinery, not already available at the farm, and that this machine would only be used for a limited period of time during the year, so that if the farmer him/herself were to buy it, it would signify a big expense). And so, the farmers would need help quickly after harvest, in order for the straw not to be destroyed (by rain or humidity for example). Hence, to put it simply, in order to use the straw, agricultural producers need to solve a) who collects it (big quantities) and b) how to collect it in a hygienic manner?

And then, once it is collected, how to store it? Today, logistics are suitable for cereals, how to store straw, bearing in mind that it needs to be kept dry. The issue could be solved fairly easily, but the facilities need to be provided, and in many cases, they are not there today.

Then comes the factory. Everything needs to go to a factory/refinery in order to be converted to another product. If a factory is built, that factory needs to be fed 24 hours a day, 7 days a week, 365 days a year. It needs a stable flow of inputs in order to be economically viable; it cannot only be run for a few weeks after harvest.

And here is where the real challenge comes in – how can we solve the logistics in order to make it economically viable to have a factory running all year round on the same input (or similar input), given that a similar

competitive feedstocks and subsequent production of biofuels and bioproducts. Challenges associated with the inherent heterogeneity of biomass and with inconsistent and low-quality feedstocks remain. Therefore, the costs of supplying biomass using currently available technologies are too high for market acceptance. Reducing logistics costs is essential to create an economically competitive, sustainable biofuels industry.” Biomass Research & Development Board, US government. (2018). The Bioeconomy Initiative: Implementation Framework.

technology will be needed and input materials cannot be easily exchanged/substituted. If this issue is solved, then the market demand issue can be solved; it will “come by itself” over time.

Consequences of the challenge for agricultural participation in the bio-based sector, and in BBI JU projects

The insufficiently clear market demand for final bio-based products/materials, and consequently its insufficiently stable and reliable demand for agricultural feedstock from the bio-based industry, and the insufficiently developed solutions for logistics/storage/transport that would enable the use of agro-based biomass by the bio-based industry, translate into a relatively low number of agricultural producers investing in participating in the bio-based sector compared to if there were a clear and pronounced market demand.

Hence, this challenge limits the number of agricultural producers participating in the bio-based sector, because it reduces the interest from agricultural producers as the profitability from investing is not clear. Consequently, the feeble market demand might affect the number of agricultural producers participating in BBI JU projects, if the prospects of marketability of the product after the project is over is limited.

D. Difficulties inherent to the initial steps of new bioeconomy activities - the challenge of overcoming difficulties in initiating new relations and new productions

Changing production, or investing in new uses for by-products or waste, as well as changing business partners, is associated with risks, costs and new needs. The challenges discussed in this chapter relate to the alternative costs of changing from only producing for the food value-chain, to also producing for the bio-based industry value chain. These challenges are not interlinked with one another but have the common denominator that they constitute a challenge for the farmer compared to continuing to produce only for the food sector.

It is inherent to these challenges that if there was a clear market demand from the bio-based sectors, then it would be worthwhile assuming the risks that changing the production implies or making the additional effort to find a new business partner.

The types of hurdles referred to in this challenge include:

- The difficulty of finding adequate machinery on a large, commercial scale for new types of production;
- the difficulty of switching back to production of food crops if you change to production of industrial crops;
- the difficulty of using marginal land for new uses;
- long distance to biorefinery;
- the difficulty of access to finance for high-risk investments;
- the difficulty of finding new business partners; and
- a poor tradition of collaboration between to some key industrial sectors (chemical, materials, energy) with the agricultural sector, translating into few established business relations, such as long-term contracts (stability) for agricultural producers.

The existence of these hurdles means that the trade-off for the agricultural producers of producing for the bio-based industry compared to producing for the food value-chain is high, and hence limits the participation of the

agricultural producers in the bio-based sector. An agricultural producer may try something new on a small-scale, but a larger shift will often not come about until the small-scale trial has proven to generate a solid value.

Description of the challenge

The difficulty of finding adequate machinery on a large, commercial scale for new types of production.

Farmers have made significant investments in machinery to perform the necessary management practices on existing row crops, to plant, spray, and cultivate crops. Transitioning even a small portion of farmland to biomass feedstocks (industrial crops) will require purchase of new specific machinery or the development of custom operations⁵⁷. This kind of financial undertaking in many cases requires a contract with your customer before you take the risk, and even when an agricultural producer is willing to take the risk, the necessary machines may not be easy to buy. Today, machines and systems exist that are capable of performing each biomass supply chain operation, but the technology is often not designed for the scale and efficiency required for cost-competitive feedstocks.

Hence, changing production, or using a by-product that is currently not being used, may be hindered by the availability of machinery. For example, several interviewees pointed out the difficulty of finding adequate machinery to recover by-products that are unused today (e.g. pruning).

Production of industrial crops vs food crops, and the case for using by-products, residues and waste

As pointed out previously, from the farming perspective, the production of a food crop is relatively safe, because there are several different markets to which the product can be sold, depending on the quality level of the production. Specialising in an industrial crop means that the demand is limited to only the bio-based industry market, and if the quality does not meet the requirements, there is potentially no alternative market for the product, meaning that the risk is concentrated in a much narrower area. Furthermore, for a farmer to shift from production of a food crop to an industrial crop is risky because of the unknown yields and technologies (the potential of these crops is still not clear), because of unclear policy directives, and because of unclear market demand. Also, once the producer has changed crop, there may be difficulties with going back to the previous production, should they wish to do that.

The case of hemp – examples of challenges related to changing type of agricultural production⁵⁸

Hemp has been identified as a very interesting crop with interesting technical use, with fine fibres for textile production. In Germany some years ago, the textile industry sent out the message that they wanted to buy more, and asked agricultural producers to grow hemp. But once hemp was grown, and farmers were trying to sell it, the industry turned down hemp from several producers. It was considered too expensive, partly due to transport costs. Furthermore, industry demanded a specific quality, and hemp was not accepted from farmers whose hemp did not deliver that quality. For hemp, there is no alternative market, and so for the farmers whose hemp had been turned down, the only alternative was to throw it away. This would not have been the case for a food crop,

⁵⁷ Biomass Research & Development Board, US government. (2018). The Bioeconomy Initiative: Implementation Framework.

⁵⁸ Based on an interview example from Germany.

where there is always an alternative market. Hence, growing industrial crops is associated with high risks for farmers, because of the common lack of alternative markets. This explains why few farmers grow hemp today, even if it has great technical potential.

It is therefore much easier and less risky for the agricultural producer to produce food crops which can be sold anytime, as there are numerous buyers and usages available. Many interviewees argued that this issue will be solved over time, once more industries establish more stable relations with farmers, and a tradition of long-term contracts will regulate several of the risky aspects that agricultural producers are faced with today⁵⁹. However, today, this is a challenge to the agricultural sector, meaning that many producers are hesitant to try new production lines.

Rather than trying a new type of production, agricultural producers are more likely to be attracted by a new business line that minimises the producers' risk while providing a solution to a problem – for example, resolving issues linked to by-products, residue and waste. If the bioindustry offers to solve a problem for the agricultural producer (for example straw collection), then agricultural producers are likely to demonstrate more interest, because they do not have to change production methods or type of production (which is riskier and more expensive). In order for the participation in the bio-based sector to be attractive, methods have to be found to transform current costs – such as collection of residues – from a burden to an agricultural producer into a value stream⁶⁰.

When agricultural producers can put on sale whatever they have, and when that may be used by others who will pay for it, instead of the producers paying for getting rid of it, then agricultural producers will demonstrate a great interest in providing biomass, and several interviewees underlined that this is where the real potential for agricultural producers to participate in the bio-based sector lies.

Use of marginal land

Sometimes increasing biomass production by taking up production on land that is today considered marginal, is presented as a win-win solution, with new opportunities for agricultural producers. But this was considered unrealistic by several interviewees.

Much of the land abandoned today is not used because it has low productivity. It is often land located in mountainous/hilly areas with slopes, with thin soil, or land suffering from severe water scarcity. Even though opportunities to use that land are possible, it is often not straightforward for profitable agricultural production to take place on this land. Hence, it is a major undertaking to find the right crops for that land, and also to rebuild an agricultural structure where there are often plenty of abandoned farms, populations with a high

⁵⁹ One interviewee argued that there needs to be a regulation in place which would force the industry to buy and work with the biomass, even if it is (in parts) not of the best quality, which could help agricultural producers to overcome the difficult start-up phase.

⁶⁰ This conclusion came out of several interviews, and was also one of the conclusions from the conference organised by DG AGRI in 2018: European Commission. (2018). Report from Workshop on “Best practices in integrating primary production (farmers and forest owners) in the Bioeconomy value chains and boosting the development of the Bioeconomy in rural areas. Retrieved from https://ec.europa.eu/agriculture/sites/agriculture/files/bioeconomy/pdf/2018-09-20-workshop-report_en.pdf

average age, and limited functioning infrastructure. To solve the logistical costs related to transport from these areas is often a problem.

Hence, marginal land could in some cases provide the potential for producing biomass, but it is by no means clear that the marginal land in the EU provides an untapped resource that can provide miracles for the bioeconomy, or where agricultural producers would have a secure business case.

Proximity to a biorefinery

Another issue relates to proximity barriers, and the issue of requiring a critical mass of agricultural producers in an area being willing to invest in the production of biomass. If there is no bio-refinery close enough to the potential agro-based biomass producer to make transportation economically viable, then it is difficult for an individual to drive the change. This concern varies greatly according to the geographic location of the agricultural producer.

Because of the volumes involved, feedstock movements pose a significant transportation challenge. Hence, transportation infrastructure must be located near the anticipated geographic development patterns of the bioindustries. Distribution pathways for biomass are dictated by the conversion facility siting. This means that if there is no refinery within a reasonable distance, then it is difficult, or even impossible, for individual agricultural producers to find buyers for their biomass because it is difficult/expensive to transport over large distances.

In the EU-13 countries in particular, this can be considered a major obstacle to the agricultural producers' participation in the bio-based sector. The largest numbers of plants are located in Italy, followed by Germany, France, the Netherlands and Spain. Germany has the largest number of commercial (active) plants (16), whereas Italy has the largest number of pilot and demonstration plants. Most of the bio-based facilities are within or near the EU chemical industry clusters.⁶¹

The BIOEAST area has a relatively low number of biorefineries, and a smaller proportion of the processing industry. Hence, even if there is an untapped potential, participation today in the generation of higher-value-added biomass in rural areas is more difficult than in areas of the EU where the industry is further developed.⁶²

Access to finance for high risk investments

New undertakings, be they new types of production, using "new" land, or using resources that until now have not provided value, require investments. These investments are considered risky investments, so financial institutions are in many cases not providing finance for this type of investment, be it for the agricultural sector

⁶¹ European Commission. (2016). The EU Bio-Based Industries: Results from a survey. Retrieved from <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC100357/jrc100357.pdf>

⁶² European Commission, JRC. (2018). Socio-economic insights into the Bioeconomy in BIOEAST countries. Retrieved from https://ec.europa.eu/knowledge4policy/sites/know4pol/files/2018_socio_economis_insights_jrc_researchbrief_bioeast.pdf

or for other economic sectors. This is confirmed by the recent *fi-compass* study⁶³ where the riskiness of an investment was the primary reason for rejecting loan applications. The DG AGRI workshop in 2018 also reached the conclusion that “access to finance remains a horizontal issue important for all types of investments”. In the past, often agricultural producers were the bank’s best customers, because they had solid collateral – agricultural buildings, land etc. Today, many say that is no longer the case. The agricultural business is in general risky, due to price fluctuations and products not necessarily being in demand. Hence, banks generally have a restrictive approach in backing up investments of this kind. This means that even for producers who are willing to take the risks related to new forms of production, they may not have the opportunity to make major investments due to the shortage of credit available. The issue of access to finance is not restricted to farmers but applies to all economic sectors active along the bio-based value chain. As projects are often not considered bankable, credit is not provided, whereby grants are in many cases the only option for obtaining finance for these kinds of projects.

This problem is found in several of the EU-13 countries, as underlined by the interviewees. A Bulgarian interviewee stated that the main problem for agricultural producers wishing to participate in the bio-based sector, next to the level of education, is the shortage of access to finance. Even when a producer has the knowledge and the will to try something, the financial resources are difficult to obtain. An Estonian interviewee highlighted the same problem, claiming that the tough climatic conditions for the past three years have meant that banks were for the moment not willing to invest in the agricultural sector, thus holding back investments that could have been made by producers willing to try new things related to the bio-based sector.

Finding new business partners and establishing new business relations

As one interviewee put it, “*bioeconomy does not happen because the various sectors involved do not know the impact and importance of the other, potential partnering sector*”. In order for the bioeconomy to happen, interaction between economic sectors who are new to one another is crucial. A dialogue among all the actors of the value chain is essential. Building trust and a strong relationship between innovative industrial models and the growers/main agricultural stakeholders is of the utmost importance. At the EIP-AGRI conference in 2015⁶⁴, 70% of the conference participants mentioned the lack of communication between the agricultural sector and the industry as a major obstacle to the development of the bioeconomy.

Agricultural producers have their traditional business partners, such as cooperatives or middle-men, with whom they normally have long established relations, and relations based on trust. Entering a new business collaboration with a new economic sector means agricultural producers would in some cases have to learn

⁶³ *fi-compass*, European Investment Bank; 2018. (2018). Joint Initiative for improving access to funding for European Union Young Farmers.

⁶⁴ EIP-AGRI. (2015). *Workshop Final Report ‘Building new biomass supply chains for the bio-based economy’*. Retrieved from https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/field_event_attachments/report-ws-bioeconomy_final_28052015.pdf

many new business skills that they may not possess. This is unless it is the cooperative or the middle-men who enter the business collaboration, because then it can be business as usual for the agricultural producer, which may facilitate the transfer to new activities.

Even when the agricultural producer concerned is already participating in the bio-based industry value chains⁶⁵, they referred to the difficulties of entering new markets and finding the right business partners, simply because of the limited network and contacts in the new industrial sectors, compared to selling to the food value chain.

Also, from the point of view of industry, it was mentioned how difficult it was to find agricultural producers with whom to cooperate. Direct contact with individual producers was often not considered feasible, because they lack the time to devote to exploring new production paths, and representatives of cooperatives or farmers' unions were considered to lack the practical knowledge needed. Hence, finding a counterpart from the agricultural sector was cited by several as a problem. It was repeatedly said that this was much easier when working with input from the forestry sector⁶⁶.

Furthermore, once a new business partner has been identified, new forms of doing business need to be established. Practical issues such as "What type of contract do we establish? What does the contract contain? Who bears the risk for each part of the production?" need to be resolved.

Hence, in order to enhance the potential participation of the agricultural sector in the bio-based sector, trust and new contacts need to be established between the economic actors that are new to one another. More creation of clusters is needed. Several interviewees also underlined the important role of "innovation brokers" or "facilitators", in other words consultants who can help make the link between the various sectors, and who can help the actors in the start-up phase of the relationship.

Consequences of the challenge to agricultural participation in the bio-based sector, and in BBI JU projects

The existence of risks and costs related to initiating new productions and new business relations, in combination with the existence of other challenges, might limit the number of agricultural producers participating in the bio-based sector, and ultimately, therefore, their participation in the BBI JU projects. The challenge of overcoming these risks, together with potentially limited market demand, limits the interest in changing from food production to producing for the bio-based industry.

EU-funded projects can provide temporary funding which may help a producer overcome certain difficulties, but the producer will always be focused on what happens after the project. Most of all, participating in a project is not perceived as an additional income source, but as a cost that is perceived by some to be an investment. This investment is only worthwhile if there is the expectation of additional demand for your products, or new demand for new products, once the project is over. In other words, if the new production developed will be financially viable on its own, not because of public funding.

⁶⁵ Here referring to an interview with a rather big Swedish cooperative, representing 600 potato growers and with 350 employees.

⁶⁶ The forestry sector is in general better organised, and has more resources, so it was easier to identify qualified representatives with whom to initiate collaboration.

7.1.2 Challenges for agricultural producers to participate along the full bio-based sector value chains

For an agricultural producer who has overcome the first four challenges, or to whom these challenges were not relevant in the first place, the next level of challenges relates to how to participate along the full value chain – how to get a higher value out of your product than by simply providing a bulk product to the bio-based industry. The following characteristics of the agricultural sector make it more challenging to participate along the value chain, be it for food production or in the bio-based value chain. However, some characteristics may make it even more complicated to add value to a product in the bio-based sector than in the agri-food value chain.

E. The structure and characteristics of the agricultural sector – the challenge of innovating and being an entrepreneur when economic margins are limited by having a business of a limited size

The agricultural sector is characterised by having limited economic margins, consisting mainly of small, often family-run, enterprises, and with an average age of the farm manager higher than the average age of a business manager⁶⁷. Participating in new initiatives, influencing processes, and innovating, be it for the bio-based sector or for the food sector, requires investment, both in terms of time and financial means.

Hence, the structure of the sector hampers the potential to participate in the bio-based sector, particularly to participate higher up the value chain where innovation or entrepreneurial skills are required. Furthermore, in the bio-based industry value chain, agricultural producers are competing with forestry producers, who are often better organised and whose production is less time-consuming than agricultural production, whereby the forestry sector has an advantage over the agricultural sector when it comes to influencing the value chain.

Description of the challenge

Limited economic margins

Low economic margins mean that, in general, as an agricultural producer, you need to see a clear market value before investing. You do not have the resources (time and financial means) to invest in something without a clear/guaranteed economic benefit. If an agricultural producer is normally already dealing with a low profit margin, and may be engaged in a side activity to their main farming in order to make ends meet (which is often the case), then it will be very difficult to set aside time to invest in new techniques, markets, know-how etc. Furthermore, agricultural producers are already under pressure to comply with several regulatory obligations,

⁶⁷ Some examples from the literature: Only 5.6% of all European farms are run by farmers younger than 35 years, more than 55% are over 55 years. *European Commission. (2018). European Commission Staff Working Document Impact Assessment, final.*

Farmers' incomes lag behind salaries of the overall economy in all MS. *European Commission. (2017). The future of Food and Farming.*

"The sector is still dominated by many very small farms. These are primarily run part-time, often by elderly farmers, and the large majority of agricultural labour is provided by family members". *fi-compass, European Investment Bank (2019). Survey on financial needs and access to finance of EU agricultural enterprises.*

in particular environmental legislation, meaning that they do not have time to set aside for thinking about additional projects; they need to devote all possible time to problem solving on the ground.

It is clear that if agricultural producers do not perceive significant and stable economic advantages from biomass production, then they will not get involved.

Adding to the general economic problems of the sector is the difficulty of access to land, and ownership of land. This has been identified by several interviewees as a barrier to participating in the bio-based sector. Investing in new land can be a major undertaking. Renting land is very expensive in parts of Europe, in particular in the areas that are naturally more fertile. Hence, paying high interest on land that has recently been bought, or paying someone rent for the land you are using, means that you will be even more risk adverse.⁶⁸

In brief, if your farming business is not profitable, or marginally profitable, then you will not have time to develop new products, or think about new business lines. Profitability is always the starting point.

High average age of the sector

An additional barrier to farmers' involvement in the bio-based sector is identified as the age of the people involved. In general, the younger a person is, the more willing that person is to take risks and try new opportunities. Young producers are commonly considered to be more open to trying innovations, whereas older producers manage the farm in a more conservative manner, being more reluctant to introduce changes.

Hence, the fact that the agricultural sector is characterised by having a high average age may imply that the sector as a whole is less willing to invest in new opportunities and ventures. This issue has been identified by several interviewees and by the networks of ENRD and EIP-AGRI as a potential obstacle to agricultural producers' involvement in the bio-based sector.⁶⁹

Small farms, low level of cooperation and collaboration

The farming sector is characterised by having relatively small businesses, which many times are family run. They are usually small in terms of turnover value, and in terms of negotiating leverage compared to the next step in the value chain. Furthermore, in general, the level of collaboration and coordination by farmers in the EU (few cooperatives, or cooperatives badly organised) could be improved.

⁶⁸ A German farmer interviewed gave the following example of his own personal situation: "More than 60% of the land I am cultivating is rented. I pay about 700-800 euros per ha per year for leasing it, hence I have to earn at least 800 euros per hectare per year to make ends meet. That means my margins for error and failure are very limited, whereby it is not always possible to try new things."

He also gave the account of how many side activities farmers already have to deal with (what to do with slurry, administration to deal with, machinery that needs revision as a few examples), which according to him means that farmers do not have time to care about new crops.

⁶⁹ ENRD Thematic Group Bioeconomy, 1st workshop, https://enrd.ec.europa.eu/news-events/events/1st-meeting-thematic-group-mainstreaming-bioeconomy_en Bioeconomy value chains and rural development: overview of ongoing initiatives in Southern Europe and main barriers, Sandro Angiolini; and EIP-AGRI Workshop; 2015; Building new bio-mass supply chains for the bio-based economy.

Linked to the first point about economic margins in the sector, it is evident that managers of small businesses, with limited resources in terms of time and capital, are likely to do what they do best, meaning their agricultural activity, and they will have to prioritise the existing agricultural activity ahead of new, risky activities. One Swedish interviewee carrying out applied research in the agricultural sector put it in the following terms: *“Farmers are farmers and like to do their thing. They are specialised in their particular production; they cannot be good at everything. They cannot be asked to manage technical development, and market their products to new sectors etc.”*

This means that, to some extent, in order for agricultural producers to participate higher up the bio-based industry value chain, they have to be part of a bigger organisation, they need professional staff with experience from areas other than agriculture to guide and advise them. But this requires resources that go beyond the capacities of small businesses.

A comparison with the forestry sector, the other big primary sector providing feedstock for the bio-based industry, is interesting. Forestry producers are often also small family businesses. However, they are often organised in big cooperatives, with professional staff and substantial resources. Furthermore, the timescale for a forestry producer is different than for an agricultural producer, because the production is not linked to food, and so it is not perishable. Forestry is less time consuming as an activity, so it is easier to invest your time as a resource in developing new business lines.

Summing up, the characteristics of the agricultural sector – small businesses with limited economic margins, and often run by a manager with an average age higher than the average age of a business operator – make it more challenging to participate along the full value chain, be it for food production or in the bio-based value chain.

However, the advantage that agricultural producers have with innovating and being entrepreneurs in the food value chain is that it is a value chain that they are very familiar with. They have long traditions of working with business partners from the food chain, so the knowledge of what attributes of their products add value to the chain, and how they can influence it, is much more profound than in the case of the bio-based value chain. This implies that it may be even more difficult for agricultural producers to participate higher up the value chain in the bio-based industry than in the food value chain.

Consequences of the challenge of agricultural participation in the bio-based sector, and in BBI JU projects

The structure of the agricultural sector does not necessarily influence agricultural producers' participation in the bio-based sector, but it makes it harder to influence the bio-based industry value chain, and potentially therefore makes participation in the sector overall less attractive.

Participating in a BBI JU project is *per se* a manner in which to influence the overall process, and thus to participate higher up the value chain. Hence, if the structure of the agricultural sector poses a general challenge to influencing the bio-based industry value chain, it implies that – for the general agricultural producer – participating in a BBI JU project might also be difficult. The lack of time, financial means, and entrepreneurial skills means that the average producer will not be able to participate.

Clearly, the structure of the agricultural sector is one of the major obstacles to the agricultural sector having an active, influencing and consolidated role in the bio-based value chains, and ultimately in the BBI JU projects.

F. The output of agricultural production is a bulk product – the challenge of adding value to your product as a farmer, and the challenge of taking on a different role in the value chain

Description of the challenge

Bulk products vs. differentiated products

The agricultural product is usually a bulk product, that is normally easily substitutable, and where the price per unit is usually a decisive factor. Hence, it is very difficult for a farmer to add value at individual level, because the kind of value a farmer can add at the individual level is not valued by the energy or chemistry markets (or other bio-based industry markets for that matter)⁷⁰.

In the food market, adding value at individual level is complicated enough, but it can be done. There are always examples of locally produced products, or high-quality products, where consumers are prepared to pay more for knowing where a product has been produced, and by whom, and in what manner. Or on an industrial scale, the example of children's food, where farmers are paid extra by the industry for respecting certain criteria in their production related to higher quality. Hence, in these cases, specific agricultural practices are valued in the final product, whereby the agricultural producer receives a higher price for the product.

In the energy or chemistry markets (for example), it is harder to establish the link between agricultural practices and production place, and consumer willingness to pay a higher price. Many would argue that the consumer rarely cares if the ethanol or bioplastics are locally produced, and furthermore, where the input comes from will not make a difference to how well the car functions or for how good your plastic bag is. Hence, if the agricultural producer position is weak in the food value chain, then many interviewees argued that it is even weaker in the energy and chemistry value chains.

Following upon this, some interviewees argued that the problem is not the poor demand for agro-based biomass from the bio-based industry, the problem is that also in this market (as in the food value chain), farmers are price takers, limiting their negotiation power⁷¹.

Some interviewees disagreed with the fact that agricultural producers have a harder time adding value to their product in the bio-based market than in the food market. They argued that consumers are increasingly willing to pay for "the storytelling", and less interested in buying bulk products, and that this will also be reflected in

⁷⁰ Not all interviewees agreed, see below.

⁷¹ However, one could argue that the more product outputs are generated from agro-based biomass – food, energy, chemical building blocks etc. – the more demand there will be for agricultural products, and hence agricultural producers would be in a stronger negotiating position, and should thus be better paid. If there is a demand for agricultural products on several markets, then the producers should have a bigger chance of increasing their profitability. Different income streams should lead to better profitability, and potentially a better position to negotiate prices with buyers, even if they are not participating higher up the value chain.

the prices of the bio-based products, which will eventually trickle down to the producers. This can be understood in two steps. First, demand for bio-based products is expected to increase as consumers are increasingly willing to pay for products with a lower environmental impact, assuming that bio-based products have lower negative environmental impact *per se*. This will then lead to increased demand for agro-based biomass, but the opportunity for the agricultural producers to impact the value chain would still be limited. At a second stage, consumers would then demand and differentiate products not solely on the basis of their being bio-based, but also that they should meet higher climate standards.⁷² If this becomes reality in the future, then this would be a way for agricultural producers to distinguish their products, move outside of the bulk-product trap, and thus be able to charge a top-up price, even if the farmer does not participate higher up the value chain.

But this is far from a reality today. Hence, it is difficult for agricultural producers to participate higher up the value chain by distinguishing themselves through a differentiated product. It could potentially be done in the future, if consumers are prepared to pay for climate aspects of consumer goods, but for the moment it is rarely done.

Importance of economies of scale to the bioindustry vs. the average small farm business size

As noted previously, farming businesses are in general small businesses whereas their counterpart in the value chain, the bioindustry, is a typical example of a processing industry. The bigger the scale, the cheaper the production, as long as transportation can be carried out at a reasonable cost. Economies of scale in the production are essential for energy and chemicals production.

Often agricultural producers find themselves in an exposed situation, as price takers, according to interviewees, because they rely on middle-men to sell their products, i.e. farmers are cut off from the value chain as they are merely paid a price for a product that has readily available substitutes. Or – even if farmers sell directly to industry – often the buyer is not the end-user in the value chain, hence it is difficult for farmers to influence price setting, as their product is simply a bulk product and the buyer in turn wants to maximize margins.

It was noted by Bulgarian and Hungarian interviewees that the agricultural producers in these countries are primarily producers of raw material for export, and very little added value takes place within the country with regard to food production. Hence, there is a challenge related to changing this culture, and changing the mindset regarding producing when the input is also intended for other end uses.

The exposed situation of agricultural producers in the chain, related to the business size and to the easy substitution of the product, means that in order for agricultural producers to participate higher up the value chain, they need to provide input quantities big enough to be able to influence production decisions. In other

⁷² Hence, the bioindustries would be offering, marketing and differentiating products based on high climate standards, and charging a higher price to compensate for the higher climate standards required, and the price mark-up would be passed on to the agricultural producer. This is done, for example, for some bread products in Sweden. The brands market their high climate standards throughout the whole production process. Thus, for products from the bioindustry, it would not be enough to say that the product is based on bio-based inputs, but the full climate impact would have to be communicated. When the consumers then pay for the higher climate value, then the agricultural producer could get part of the add-on to the price (and this needs to be regulated in a contract with the company/cooperative).

words, agricultural producers need to match the size of the next actor in the value chain (or at least come close to a comparable size) in order to exert influence. As most farms are small businesses, this requires cooperation and collaboration between producers. However, as noted in the section related to the agricultural sector's structure, in general there is a low level of cooperation and coordination by agricultural producers.

How can agricultural producers participate along the full value chain?

Cooperatives, or other forms of economic associations agreed by producers, can, by pooling resources from several actors, act as equivalent business partners to the bioindustry by simply representing bigger quantities. Or a cooperative can take its role even further: It can use its pooling of resources to hire professional staff to develop a new business line – such as biorefineries – on its own, thus not depending on the industry, just as cooperatives have developed food industry business lines.

Agricultural cooperatives (or economic associations) are owned by the agricultural producers, who are therefore also the owners of the R&I labs as well as the production facilities (e.g. a biorefinery). In this way they have full control over the supply chain and fully participate in the redistribution of benefits as well as in the formulation of strategic goals for the business. In this case, the benefits for individual primary producers are normally linked with a better and more stable price for their biomass, as well as with redistribution of dividends.

In other words, by cooperating amongst themselves, farmers can take part along the full value chain. However, as pointed out by an interviewee from a large Swedish cooperative which is also the owner of a bio-refinery, even when a cooperative is formed and is active, if the cooperative wants to compete in the energy sector it has to be big. According to this interviewee, to be small and local are values that are not paid for by consumers of bio-based products (today).⁷³

Even when a cooperative has not developed its own biorefinery business line, agricultural producers can benefit in other ways than merely by providing inputs for the industry. For example, two-way collaborations can be developed where agricultural producers provide input for an industry whose by-product from the refining process is useful to the agricultural producer, and which is then channelled back to the agricultural producers. Both the agricultural producers and the industry benefit from the two-way collaboration. There are several examples of these kind of practices taking place, which is an indirect way for agricultural producers to benefit from the value chain.

Another way in which agricultural producers could be influential in the value chain, without owning a bio-refinery themselves, is if large, long-term collaborations are established between industry and primary producers, and the industry sees long-term opportunities for collaboration with many partners involved on the other side. Then the industry may look at sustainable price setting, which benefits the whole value chain, in order for the agricultural community to be sustained at a decent economic level and continue to deliver the appreciated inputs.

⁷³ It should be noted that farmers who are large individual land-owners with the ability to invest in technology and carry out other relevant business steps, i.e. primary producers who run their farm as a corporation, could potentially participate higher up in the value chain on an individual basis without collaborating with others, but there are very few examples of this happening throughout Europe.

And finally, influencing the bio-based industry value chain could also be seen on a smaller scale. Local projects, involving a limited number of agricultural producers and producing for local needs, hence not intending to participate in the global energy and chemistry markets, are a different set-up that can generate great benefits to agricultural producers and provide them with influence over the value chain. Several interviewees have pointed out that **small-scale bioeconomy projects can have more climate advantages by requiring less energy, less transport, and generating potentially better resource efficiency.** If this is paid for, then there is a chance of it taking-off – and agricultural producers have a greater chance of being involved in the decision-making process⁷⁴. One example is biogas production on a local scale, where the producers are not competing with global actors.

To sum up, the characteristics of the agricultural product, being a bulk product and easily substitutable, make it more challenging to participate higher up the value chain, be it for food production or in the bio-based industry value chain.

However, some aspects make it even more complicated to add value to the product in the bio-based industry value chain than in the food value chain. These aspects are:

- The energy and chemistry industries are processing industries, operating on economies of scale, meaning that price is the most important competition factor for the feedstock.
- Consumers do not (up until now) value “locality” in the final bio-based product (as is sometimes the case for food products), so agricultural producers cannot compete on the location of their agricultural production.
- Production methods of biomass for the bio-based industry matter less than for food, meaning that it is difficult for agricultural producers to get an add-on to the price based on sustainable production methods.

By cooperating, agricultural producers can exercise more influence. Several examples of this exist. Local niche markets for small-scale production can also be developed. Agricultural producers can also benefit from the bio-based industry value chain in other ways than by influencing the decisions of the chain, for example by two-way collaboration, or by making itself an irreplaceable input provider, thereby entering into a long-term relationship with the industry and claiming a higher price for the product.

The examples discussed on how agricultural producers can benefit from the value chain are all based on existing examples; however, they are still practiced on a limited scale in Europe, and hence the challenge of developing these practices remain. Please see chapter 6 on business models for more examples on this.

Consequences of the challenge to agricultural participation in the bio-based sector, and in BBI JU projects

The fact that the agricultural product is a bulk product, and hence easily substituted by similar products, does not necessarily influence agricultural producers’ participation in the bio-based sector, but it makes it harder to hold an indispensable position, and to have an influential and consolidated role in the bio-based value chains

⁷⁴ Also discussed at the DG AGRI workshop in 2018. European Commission. (2018). Report from Workshop on “Best practices in integrating primary production (farmers and forest owners) in the Bioeconomy value chains and boosting the development of the Bioeconomy in rural areas. Retrieved from https://ec.europa.eu/agriculture/sites/agriculture/files/bioeconomy/pdf/2018-09-20-workshop-report_en.pdf

(even harder than influencing the food value chain), and potentially therefore makes it less appealing to participate in the sector overall.

As stated for the previous challenge (E), this might also be reflected in the agricultural sector manifesting less interest in participating in BBI JU projects. Participating in a BBI JU project is *per se* a manner in which to influence the overall process, and thus to participate along the full value chain. Hence, if the characteristics of the agricultural product means that it is of less interest for the agricultural producer to participate in the bio-based industry value chain, compared to participating in the food value chain, because it is even harder to add value in the bio-based industry, then this might also be reflected in a limited interest in participating in BBI JU projects.

If a BBI JU project can demonstrate that the particular agricultural feedstock used is necessary (and irreplaceable) for the future development of the final bio-based product, then the agricultural producer might find it more attractive to participate. Otherwise, the final benefit for the agricultural producer from participating in the project might not be clear.

Hence, the fact that agricultural feedstock is easily substituted by other feedstock, and the producer participating in the bio-based value chains has limited means of protecting the kind of feedstock being used, means that the interest from individual agricultural producers in participating in the bio-based value chains, and ultimately in BBI JU projects, might be reduced.⁷⁵

⁷⁵ As a matter of fact, two of the projects responding to the survey of coordinators of projects using agricultural feedstock reported that they had shifted to forestry feedstock during the duration of the project.

7.2 Challenges for agricultural producers to participating in BBI JU projects

This sub-chapter describes the answers given to the question “why is it difficult for agricultural producers to participate in BBI JU projects?”, provided by stakeholder interviewees and survey participants from BBI JU projects. Hence, this section analyses the issue of low agricultural participation in BBI JU projects from a narrower perspective than the previous section, based on comments given from stakeholders directly involved with, or closely related to BBI JU.⁷⁶

In general, it should be noted that several stakeholders pointed out that it is difficult to involve primary sector (agriculture) in any EU level project, this is not specific to BBI JU.

The answers with regard to the challenges to participation relate to: difficulties with seeing the benefits from participating in BBI JU projects; challenges related to the resources and skills that are needed to participate; challenges related to the fact that participating in the bio-based sector is a new activity for farmers; and challenges related to the functioning of the BBI JU. The answers provided from interviewees and survey participants are grouped together and briefly interpreted and summarised. Where relevant, quotes from the interviews and from survey responses that are considered illustrative are provided in bullet point format, in order for the reader to get a better feeling for the type of answers provided⁷⁷. The challenges are presented without a hierarchy.

In the concluding section, 7.3, an overall assessment of these challenges together with the challenges identified in the previous section is presented.

7.2.1 Difficulties with seeing the benefits from participating in BBI JU projects

Limited confidence in the potential marketability of the obtained products: According to the analysis carried out, the top four external challenges that can limit taking full advantage of a BBI JU project outcome, are the following:

- » Product price too high for the market
- » Current market demand is too low
- » Regulatory issues
- » Logistical problems.

Additionally, in the survey, the fact that the innovation developed within the project required further investment to achieve market readiness, which might compromise the route to market, was highlighted as a major internal challenge.

⁷⁶ For example, stakeholders that have applied to the BBI JU but who have not been awarded projects, or stakeholders that could have applied to the BBI JU but who have decided not to for various reasons.

⁷⁷ Quotes are not corrected for language correctness to do not modify the original information.

The text provided in the rest of the section in italics and bullet points are direct quotes from the interviewees.

These challenges relate to the fact that agricultural producers do not see, or see obstacles to, the final marketability of the product being developed. This greatly limits their interest in participating in BBI JU projects.

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“There is a general problem with funding of agricultural research & innovation. We fund innovative work, but rarely (with public money) we fund commercialisation of the product. Maybe this is an opportunity for BBI JU? Because the concern of the farmer is also what happens after the end of the project? Will there be market demand for my product?”.

“EU projects require huge administration. There is no way individual farmers can participate themselves, they have to hire a consultant that supports them full-time with the project. In order to do that, they need to see the clear market value and availability of financing, also after the project has ended”.

“BBI JU projects are in competition with other initiatives, we cannot prioritise everything. Until we see a clear market potential, we can/will not invest major resources in the development/exploration of new products/projects⁷⁸”.

Potential benefits only in the long term: Linked to the previous point on the risk of uncertain marketability overall is the issue of not seeing the marketability of the final product in the near future. It is difficult for farmers to understand the benefits of being involved in a project, since the objectives of projects are mid- and long-term (5-7 years), while agricultural producers usually work with shorter time horizons.

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“Time between the starting of a project and a real supply in commercial stage is huge. (4 – 8 years?) This long time demotivates them”.

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“Primary producers are very good at existing products for existing markets, and this is not what the BBI JU is searching for”.

Projects are considered to have limited applicability locally/regionally: Generally, BBI JU projects are large initiatives with an EU-wide focus. This is often perceived by farmers as something that is not applicable to their business. Due to the significant differences across the EU, farmers see limited applicability to initiatives

⁷⁸ Stated by a very big cereals cooperative already producing biofuels and undertaking innovation and research projects related to developing bio-based products.

implemented outside their area. Individual agricultural producers are worried about their everyday business and are looking for projects closer to where they are operating, which are not carried out on too large a scale, and which can be done in their national language.

“Farmers do not see the need to invest in developments which are outside of their scope. Farmers have excellent knowledge and an interest in developing knowledge relating to, for example, yields, plant health, logistics, and other skills closely related to farm management, but the further away one gets from these activities, the more it is out of the scope”.

Projects are technology-focused and not fully familiar to agricultural producers: Many of the proposed topics are not of relevance to agricultural producers since they are too technology-focused for the immediate needs of the farmers.

“Processes are not flexible enough to adapt to new developments occurring. There are lots of by-products that can be used, from the animal sector for example, not sure that these are captured by the calls? In general, the calls need to be better adapted to the agriculture sector”.

“The processes developed in the projects are too complex, this dissuades farmers to participate”.

7.2.2 Challenges related to skills and resources

Language barrier: Being able to communicate fluently in English is not common today for agricultural producers in large parts of Europe. Since all documentation, proposal, reporting, emails etc. are exclusively in English, this represents a simple but strong barrier for agricultural participation. However, although today the language barrier is one of the main challenges that limits the participation of the agricultural sector in BBI JU (identified in the surveys and in the interviews), it is expected that this will not be a critical factor in the near future. There is already a younger generation of farmers with increasing influence, a generation familiar with different languages and with international experience. Reinforcing the dissemination work towards young farmers is a clear opportunity for BBI JU to overcome the most important barrier for agricultural participation.

Difficult proposal preparation and low success rate discourage participation: Taking time away from the daily farming business often poses a significant challenge to agricultural producers. Therefore, investing time in preparing a proposal where the outcome is considered a lottery is often not feasible, and farmers prefer to invest the time in developing something closer to the daily farming activity.

“Farmers see the process from outside so complex that they think it is out of their reach”.

“Behind the success rate there is always a very complicated process that is too complicated for many farming businesses”.

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“The calls are not an open playing field, even when we have hired consultants for helping us with proposals (for H2020), we did not succeed, it is not worth the time and money you have to invest in preparing a proposal”⁷⁹

“Industry knows the final market and is used to different ways of interacting and searching for opportunities. From the farmer’s point of view, the success rate of project applications is very low, and BBI JU is just one of other EU projects. If a farmer has tried once to run for a project, and been burned (by any EU project), then that farmer will be hesitant to try again (because of the time and resources it requires to prepare a proposal)”.

“In order to be awarded a project you need to have an established name in the EU circles. There is too much work required for the application process in relation to the possibility of succeeding, it means that after trying a few times (for EU projects in general) you rather dedicate the resources to your own business, and developing something yourself, rather than trying to participate in calls”.

“There is a lot of bureaucracy to deal with, applications cannot be done on a part-time basis, one needs to invest a lot in order to get the application right, and need to try several times before succeeding. Agricultural cooperatives are generally smaller than forestry cooperatives, hence they have less resources to dedicate to this type of actions”.

Projects are too time demanding: This is linked to the previous point and stems from the lack of time/resources that farmers have at hand. Participating in a consortium, and the time required for project reporting and monitoring, means investing time away from daily farming. It involves travelling internationally and sometimes in periods of the year when farm activity is very demanding.

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“The amount of extra work required is too demanding for small companies with really good ideas and new products. You have to have free capacities to organize project partners, develop and write a proposal, get the financial planning right etc., all this has to be done in parallel to running your business and without the certainty that the input done will be rewarded”.

“Our application to the BBI JU failed because of the lack of involvement of the agricultural producer higher up the value chain (the agricultural producer involved was not willing to take lead for the project because of lack of resources), maybe BBI JU needs to allow different types of participation from the agricultural producers?”.

Economic difficulties in co-financing projects: Many farming businesses are small, family farms with limited margins. This greatly limits the participation of agricultural producers, especially in IA - DEMOs and IA - Flagships where they are requested to co-finance with at least 30% of their own funding.

⁷⁹ Said by a farmer-owned/driven company (through economic association) with 350+ employees, 100m€ in turnover per year, and with patents on solutions that are unique in the world.

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“It is too risky to apply for BBI JU projects, because they are co-financed. Even projects of 2-3 million euros may be too much for an agricultural business. The size of the projects required by BBI JU are too big for the agricultural businesses”.

“In order to participate in the BBI JU it has to be a big company. Small and medium agricultural enterprises do not have the knowledge, resources, or courage to go for a BBI JU project. It requires money, and human resources. The one looking for agricultural partners in the consortia choose the easy option, they will choose to work with the ones who have money and human resources already, as they are much easier to take on-board, the once missing will be the small farmers”.

7.2.3 Challenges related to the fact that participating in the bio-based sector is a new activity for farmers

The role of farmers in the new value chains is unclear: In some cases, farmers have difficulty understanding what their added value is in a project, and in a new value chain. They often see themselves as easily substitutable, and so it is not clear that the resources devoted to a project will benefit them in the long run.

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“Not clear for farmers what’s expected from them in the new value chains. Farmers should receive support to understand this sector and to know what’s expected. They need support to understand these new crops”.

“My suggestion is that there should be a compulsory contract to ensure that they (farmers) always get a revenue in the commercialisation of the final produce even though the farmers are supplying the biomass. Farmers need to have a guarantee that they will be participating in the commercial exploitation”.

Few working examples: This concern is related to the fact that participating in the bio-based sector is still a new activity for farmers, and they may not be aware of the potential benefits this could provide for them.

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“Farmers do not usually believe what they do not see!! There is little technological vision. This is why it is essential to have demonstrations of the projects. When you see with your eyes that the technology works, that it is real, it is the key!”.

“Europe would need training to divulgate alternatives to just composting the biomass. That is to say: from this biomass levulinic can be extracted that is worth this much money”.

“Give examples!! Disclose the success stories that are already working. When the information is commented, it must be said that it is current, that it is already happening, that it is a reality, not a future possibility. Let’s explain what machinery, what prices, what processes. You have to lower it to reality! Do not lose sight of the fact that being biomass providers may already be very interesting for them”.

7.2.4 Challenges related to the functioning of the BBI JU and to its limited visibility

Challenges related to limited visibility of BBI JU and limited understanding of the functioning of BBI JU among agricultural stakeholders: The agriculture sector has limited understanding of how BBI JU works, which seems to be a common concern. How to reach farmers, and how to communicate with them, is a challenge. As a consequence, agricultural producers' participation in the projects is limited, as the projects are not considered to be of relevance to them, or seem to be focused on topics that are perceived to be distant from their daily farming priorities.

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“It’s unclear how they (BBI JU) are structured. It’s a bit opaque. Companies are paying but not clear for what. It’s generally understood that the projects’ budget is distributed among themselves. It’s a closed shop and clearly a big business thing”.

“BBI JU is industry driven. One of the main problems with attracting agricultural participants is that BBI JU itself is not well connected with agriculture and food research at EU level. There is a lack of understanding from industry side of farmers motivation. From the farmers point of view, bioeconomy is very uncertain”.

“Farmers’ representatives were involved in the start-up of BBI JU, but are not represented as board members today, and so BBI JU has lost touch with the farming community and its needs. As most funding is coming from the industry, BBI JU has moved more in the direction of what industry wanted, and there is less communication with other partners from the value chain. BBI JU has lost its focus during the process. If BBI JU wants to ensure agricultural participation in the projects, then BBI JU needs to make sure that farmers cooperatives are really partners and part of the process”.

“BBI JU projects are presented as something systematic, big, and complex, farmers would never assume that it could involve them”.

“Awareness raising. Outreach. Farmers do not understand, and do not know about BBI JU. They are probably not properly informed about BBI JU possibilities. Information is not properly shared. There is only a limited communication by BBI JU. Who should be responsible for the awareness raising? Ministries of agriculture? Is it the role of the processing industry? Should Copa Cogeca or farmers unions have a role? Should there be direct communication with cooperatives? “We” have to educate agricultural companies on how to apply and what it means to run EU projects (or we have to involve innovation agents)”.

“Communication to farmers – how can farmers find BBI JU? They need to be on Google, that is where farmers go to search for information. BBI JU has to revise the language it uses, it is an EU project language, too complicated for farmers to understand, and it is too difficult to access because the information is in databases etc. A farmer needs to already be involved in another project, in order to be aware of the possibilities offered”.

7.2.5 Summary

The types of challenges identified in this sub-chapter, resulting from asking stakeholders what they perceive to be the challenges for agricultural primary producers to participating in BBI JU projects, are fivefold; challenges related to the perception of the benefits for agricultural participants from participating in projects being limited; challenges related to the resources and skills required to apply for and participate in projects; challenges related to the fact that the bio-based sector is a new value chain for farmers; challenges related to awareness of BBI JU; and challenges inherent to the operations of the BBI JU.

Not seeing the benefits of participating is related to the unclear marketability of a product after the end of a project, and to the fact that the overall focus of the BBI JU on ground-breaking innovation is not what the agricultural producers are looking for in order to develop their business. The type of projects supported are far from the daily activities of the average farmer.

It is no surprise that the amount of time and resources required for preparation of a proposal and participation in a project is considered an obstacle. However, this obstacle may be especially relevant to the farming community, who in general have limited resources to dedicate to entrepreneurial activities.

Furthermore, it is not surprising that raising awareness among agricultural producers on the existence of BBI JU and its projects is a challenge, but it is worth noting that if the calls had been considered more relevant to agricultural producers, then potentially their awareness of the existence of the entity, and of its possibilities, would also have been higher.

Ultimately, stakeholders consider the BBI JU to be industry-driven, which means it is perceived as having a poor understanding of the needs and drivers of the agriculture sector, and this in turn means that the calls are more adapted to the needs of industry, and less relevant to the needs of the agricultural sector.

7.3 Conclusions on the principle hurdles for the agricultural primary sector to participating in the BBI JU initiative

An extensive amount of information relating to the agricultural primary sector's participation in the BBI JU initiative has been collected and presented in this study. Chapter 5 provided a mapping and characterisation of the current BBI JU participants, chapter 6 contained an analysis of successful business models from the bio-based sector, and sub-chapters 7.1 and 7.2 described the main challenges for agricultural primary producers to engaging with the bio-based sector and to participating in BBI JU projects.

This sub-chapter aims at binding together all the information provided through a brief and concise analysis of what constitute the principle hurdles for the primary agricultural sector to participating in BBI JU projects. This analysis is applicable not only to the BBI JU, but also to other EU-level initiatives with farming participation. The analysis aims at capturing and integrating the main elements stemming from chapter 5, 6 and 7.

7.3.1 Challenges related to agricultural producers' interest in and opportunity to participate in BBI JU projects

The main challenge for agricultural producers to participating in BBI JU projects is that projects are **large initiatives, time consuming, and require a financial investment**. This is a real difficulty for many individual agricultural producers, as the average farm is small, has limited economic margins, and hence also limited time to dedicate to entrepreneurial activities that are not immediately income-generating, and limited financial capacity to participate in a large-scale project. Hence, **the average agricultural producer finds it difficult to participate in a BBI JU project**. Farmers participating need to possess a rather rare combination of time, English-language skills, financial capacity and curiosity. Unfortunately, the number of individual agricultural producers that possess the combination of these attributes is limited and, as a consequence, the number of individual agricultural producers that can participate in projects is limited.

In order to identify a greater number of agricultural producers that could participate, BBI JU either have to work with associations of agricultural producers, and/or work with projects on a smaller scale, and/or design different funding rules for the agricultural sector to make it more attractive. This will be elaborated in chapter 8.

At the same time, **incentives for agricultural producers to participate are limited**, because the potential income benefits from participation, once the project is finished, are not always evident. This is partly because projects end before the product reaches the market, partly because at the moment there is not sufficient market demand, and partly because the agricultural feedstock used as biomass is potentially easily substitutable by feedstock from other sources (either the same feedstock acquired at a lower price from other sources, or feedstock from a different source). Hence, whereas an industry partner involved in a project can patent its technological innovation, or otherwise proclaim ownership of what was developed with the help of public funding once the project is over, the agricultural producer participating has **limited ways of ensuring that potential profits after the project is finished benefit him/her individually**.

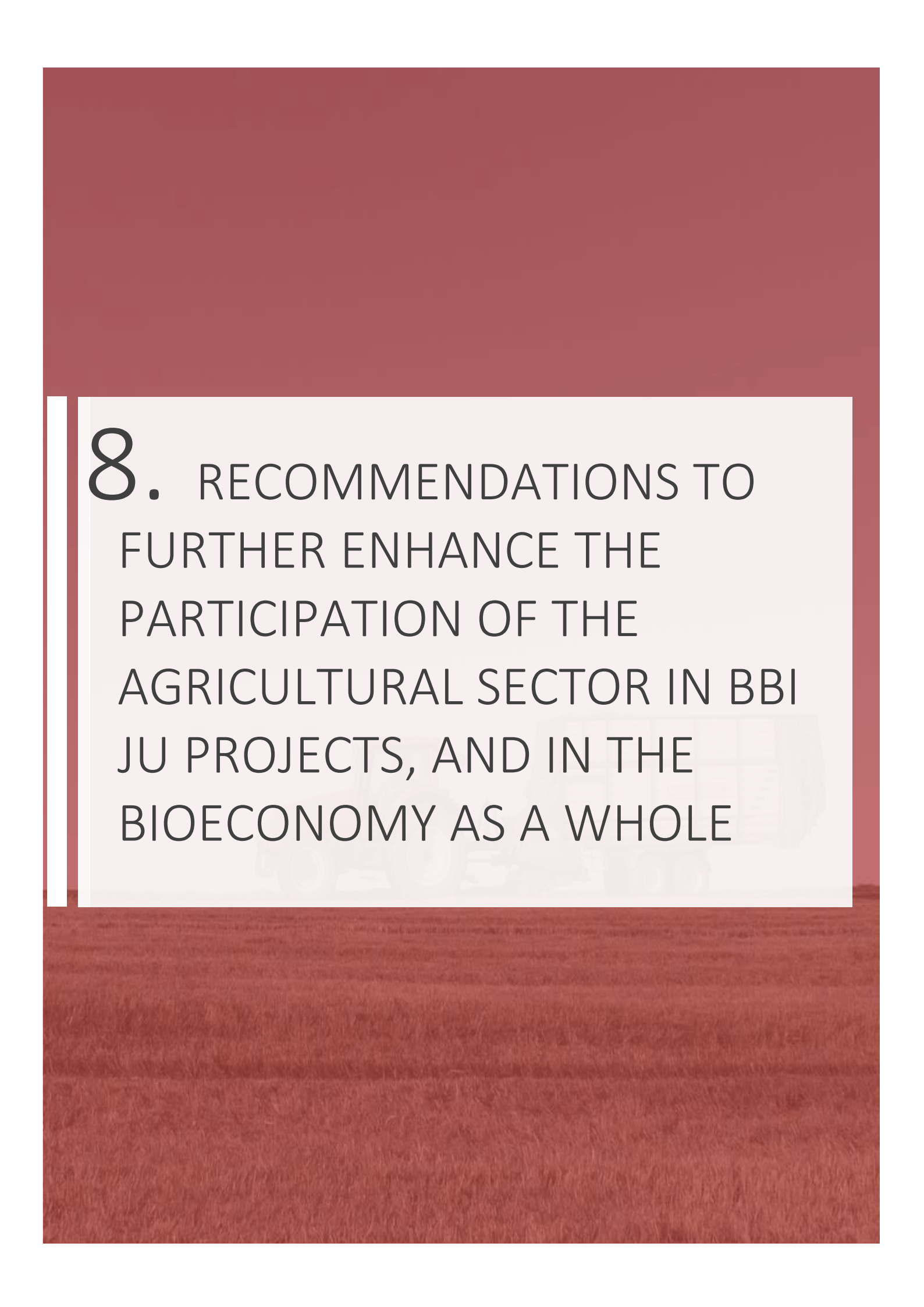
As a matter of fact, the overall purpose of the public funding of BBI JU projects is to develop products and materials that can then benefit wider society. In other words, that all agricultural producers should benefit from the innovations that have been funded, by providing them with additional outlets for their production.

In brief, the incentives for an individual agricultural producer to invest his/her time and financial resources in a project that, once it is over, has no guaranteed marketability, nor a guarantee, even if it is marketable, that the biomass produced by the individual agricultural producer involved in the project will be used, are limited. The most practical thing for many agricultural producers is usually to let someone else (industry, or another agricultural producer) do the investment and the entrepreneurial work, and once a new product/material has proven its marketability, try to sell biomass to the industry demanding it.

Also, the types of projects funded, with a **strong technological focus**, are far from the daily activities of agricultural producers, which limits their interest in participating. Ground-breaking innovation projects scare away agricultural producers; they need projects closer to their activities, both in terms of the activity (what is being developed) and in terms of the area targeted (collaboration between various actors in various countries makes a project too big to oversee). Innovation actions (DEMOs and Flagships), covering the full value chain and working close to the market, are closer to the activities of farmers and make it more realistic for a farmer to participate.

Additionally, focus on technological innovation (as is the case with many BBI JU projects) is not especially relevant for agricultural producers, who are more worried about how to comply with environmental objectives and requirements. Hence, the technological focus makes the projects feel less relevant to agricultural producers, who do not always make the direct link with what is needed for their daily business. Direct links with the daily concerns of farmers, linked to environmental compliance, would potentially make more agricultural producers see the benefits of participating, even if the marketability after a project was not evident.

There are also concerns that there will be **regulatory hurdles**, generating problems for commercialising the product after the project is finished.



8. RECOMMENDATIONS TO FURTHER ENHANCE THE PARTICIPATION OF THE AGRICULTURAL SECTOR IN BBI JU PROJECTS, AND IN THE BIOECONOMY AS A WHOLE

The objective of this study is to provide recommendations in order to increase the number of agricultural participants in BBI JU projects, as well as to improve the quality and relevance of this participation. In its extension, **the ultimate aim is to increase the overall participation of the agricultural producers in the bio-based sector**, in order for this to lead to positive economic, social and environmental impacts in European rural areas.

A total of 28 recommendations are provided in this chapter. They aim at responding to the main challenges identified by the study (presented in chapter 7) for the agricultural primary producers to participating in the BBI JU initiative.

The general challenges for the agricultural sector to engaging with the bio-based sector and its value chains, also identified in chapter 7, should be considered by policy makers. The findings presented can stimulate debate and actions aimed at improving and consolidating the role of the agricultural sector in the bio-based sector and its value chains, in order to enhance the economic, social and environmental impacts in European rural areas.

The challenges identified result in a number of concrete issues with regard to BBI JU participation:

- 1) The number of BBI JU projects with biomass coming from agriculture is 42 out of 82 projects.
- 2) The participation of agricultural primary producers as partners in consortia where agro-based biomass is used is only 17 out of 42 projects.
- 3) Currently, the agricultural partners participating in consortia are not in the driving seat, i.e. their influence on the process is limited (they are usually only biomass providers).
- 4) The potential income gain for primary producers after projects end is not clear. (According to the data published in the 2017 BBI JU Annual Activity Report, only 29% of projects reported an expected income growth for primary producers after the end of the project).
- 5) The multiplier effect of agricultural participation in projects is low. In other words, the effect on the wellbeing of the overall agricultural primary sector from the participation a single agricultural entity in a project is limited. Therefore, the contribution to rural development is limited.

The recommendations suggested address at least one of these issues and are presented in clusters. The recommendations are:

- » Related to the funding priorities (2 recommendations provided)
- » Related to annual calls and topics description (13 recommendations provided)
- » Related to the evaluation process: selection of projects for funding and monitoring of ongoing projects (4 recommendations provided)
- » Related to participation rules (3 recommendations provided)
- » Related to better visibility of the BBI JU initiative (4 recommendations provided)
- » Related to links to other EU measures (2 recommendations provided)

While all recommendations are formulated so as to improve the participation of the agricultural primary sector in BBI JU projects, the implementation of the recommendations would also contribute to improving and consolidating the role of the agricultural sector in the bio-based sector, and to enhancing the economic, social and environmental impacts in European rural areas. The recommendations provided that link BBI JU actions to other EU measures would specifically aim at improving the multiplier effects of the BBI JU projects, whereby the impact on rural areas would be greater.

A wide array of recommendations is offered; however, it is not realistic to implement all recommendations provided; rather, numerous options are provided in order for the BBI JU and its partners to be able to choose and prioritise among these. The reader needs to bear in mind that some recommendations may address one issue, while potentially having a negative impact on another issue. Where this is the case, it is pointed out. While the recommendations are numbered for reasons of ease of reading, there is no hierarchy among the recommendations, i.e. recommendation 1 is not considered more important than recommendation 2 etc.

The recommendations will look at how the agricultural sector can be targeted differently on the part of the BBI JU by adjusting the funding priorities, the design of calls and topic descriptions, the evaluation process, the participation rules, and the visibility of the BBI JU initiative, as well as looking at links to other EU funding programs related to the agriculture sector and the bioeconomy.

8.1 Recommendations related to the funding priorities

The number of projects with biomass being sourced from agriculture is determined by the budget allocated to, and by the requirements outlined in, the annual call for proposals. The following recommendations address the fundamental issue of having more projects that use agro-based biomass. Following on from that, the other issues may also be addressed, but having a sufficiently high number of agricultural projects is a starting point for addressing the other issues as well, whereby the recommendations would contribute to improving and consolidating the role of the agricultural sector in the bio-based sector, and to enhancing the economic, social and environmental impacts in European rural areas.

Recommendation 1.1: Foster funding lines adapted to, and ring-fenced for, agro-based biomass

In order to foster the participation of the agricultural sector in the BBI JU initiative, specific funding lines adapted to agro-based biomass could be promoted. For these funding lines, a specific budget could be ring-fenced for projects using agro-based biomass and for projects concerning other aspects related to agro-based value chains. In doing so, a certain number of agriculture related projects can be guaranteed.

Motivation for the recommendation

Ring-fencing the budget could be done for a certain period (a few years?), until the sector has been “fostered” and trained. This would ensure a certain number of projects with agro-based biomass. A potential downside with this option is related to problems of positive discrimination, i.e. there is a risk of financing weak projects if money is locked into one sector and the proposals presented are not up to the quality standards expected.

Recommendation 1.2: Promote the use of agro-based biomass

In topics where several types of biomass are allowed, projects with at least one source of agro-based biomass should be prioritised in the selection procedure. Additionally, it is recommended that in the topic text of a certain number of topics, proposals include at least one agricultural producer, or related associations as part of the consortium. Furthermore, this action could prioritise projects where several types of biomass from different sources are used simultaneously, in order to increase the learning potential for the agricultural sector.

Motivation for the recommendation

Prioritising agricultural projects is another manner in which the number of agricultural partners can be increased, and this potentially addresses the issue of having to fund projects of lower quality that may arise from ring-fencing money, as it is a less prescriptive way of steering the funding towards a certain sector.

Prioritising agriculture may be indicated bearing in mind that, in calls where agro-based biomass is competing with biomass from forestry, it is more likely that the forestry feedstock will be the one included in projects, because the forestry sector is better organised, better prepared (more likely to be first processors), and have

more resources in general. Hence, in order to stimulate agricultural participation in the projects, a prioritisation could potentially be useful.

Example: Lignin is a feedstock that can be sourced from forestry and from agriculture (pruning biomass, straw etc.). As mentioned above, if the topic does not request agro-based biomass to be present, it is likely that the consortium will comprise only with forestry participants since this is the easier option. This is the case for example, of the topic “*BBI2019.SO1.D1 – Scale up conversion of lignin into valuable compounds for application in specific market sectors*”. There is no specific request for agro-based biomass providers to be included and therefore it is highly probable that this topic will not provide participation opportunities to agricultural producers.

8.2 Recommendations related to annual calls and topics description

Including more agricultural expertise in the drafting of the BBI JU call for proposals could increase the relevance to agricultural producers of the topics formulated, as well as increasing the relevance of the projects selected with regard to their impacts on the agricultural sector. By increasing the relevance of the topic descriptions to agricultural producers, greater interest would be generated, thus increasing the potential number of agricultural partners in total in the consortia, and as well the relevance of the participation of the agricultural producer. It would also have higher potential to increase the income generated for primary producers after the end of the project. The implementation of the recommendations would consequently also contribute to improving and consolidating the role of the agricultural sector in the bio-based sector, and to enhancing the economic, social and environmental impacts in European rural areas.

Recommendation 2.1: Include a significant representation of agricultural producers in the design of the annual calls and topics descriptions

Inviting farmers’ representatives (either by involving agricultural producers directly, or by involving farmers’ associations, or farm advisors) to take part in the work plan drafting process by setting priorities and defining the description of the calls should result in topics of higher relevance to the agriculture sector. This will facilitate that the identified priorities are translated into specific topics that take into account the particularities of the agricultural sector.

Motivation for the recommendation

Current BBI JU annual work plans, driven by the SIRA, are developed through a collaboration between the Bio-based Industries Consortium (BIC), the European Commission and the BBI JU. Improving the representation of agricultural interests in the drafting process would result in a set of priorities with higher relevance for the European agricultural sector, and consequently in a higher interest among the agricultural sector in taking part in projects. The under-representation of agricultural interests in the drafting process has resulted in a set of priorities with low relevance for the European agricultural sector, and consequently in a low interest from the agricultural sector in taking part.

The active involvement of a wide representation of the agricultural sector in the drafting of the BBI JU annual calls and topics description is expected to have a positive outcome in the participation of agricultural stakeholders and consequently in the future impact on rural development of the funded initiatives.

Recommendation 2.2: Focus on projects with higher TRLs (from 6 to 8)

To foster the participation of the agricultural sector in BBI JU projects it would be advisable to include more topics where the final technology readiness level (TRL) would be around 8. Projects not only focused on the technology used in biorefineries but also on agricultural practices would be highly advisable. To reach up to TRL8, validation activities need to be carried out during the project at a significant scale. This type of activity serves as an excellent opportunity for primary producers to better understand the solution and to decrease the risk associated with the project, since the starting point is closer to the market than with lower TRLs.

Motivation for the recommendation

The survey shows that agricultural producers are more attracted by topics in which they see a short-term application to their involvement. Currently IAs (both FLAGS and DEMOs) are more attractive than RIAs for agricultural partners. There are agricultural producers as beneficiaries in 42% of the IA-FLAGS, in 25% of the Ia-DEMOs and in 18% of the RIAs.

The closer a project is to the final application, the more interesting the project is for the primary sector involved. Hence, by prioritising projects with a higher TRL level, the projects will be more interesting to the agricultural sector. Concepts developed with TRLs below prototype 6 are diffuse and unclear to agricultural producers. The attractiveness for farmers of participating increases when the potential income benefits are not far off in the future.

Recommendation 2.3: Promote the inclusion of the agricultural producers in the consortia in projects with higher TRLs using agriculture biomass

By recommending the participation of the primary producer in the projects where agro-based biomass is used, the number of agricultural partners in consortia will increase.

Motivation for the recommendation

This recommendation would address the issue of low participation of agricultural producers in consortia whose projects depend on agro-based biomass. However, it does not address the issue of the relevance of the participation of the primary producer, nor of the project having an impact on the agricultural producers' income, nor does it necessarily have a positive impact on rural development. In order to address these issues as well, this recommendation would have to be linked to having farmers evaluating the projects, otherwise there is a risk that the consortia include the agricultural producers in order to "tick the box", and not because there will be real benefits for the agricultural producer.

Recommendation 2.4: Allow for smaller projects and simplify reporting requirements

The recommendation is to develop approaches so that smaller projects, for example with a BBI JU contribution per project between 0.5 and 2 million euros, could be financed. This action, combined with a more flexible approach (see recommendation 2.5), would also allow coverage of projects focusing on a specific sector, which currently do not fit in the proposed topics.

Simpler reporting requirements (see recommendation 4.3) would also contribute to making the BBI JU more attractive for smaller players. For instance, the use of "cascading grants" or lump sum grants (allowed by Horizon 2020 rules) could open the door for smaller players since they could participate and benefit from support with lighter reporting requirements.

Motivation for the recommendation

In the BBI JU call 2019, the average recommended BBI JU contribution per RIA was between 2 and 5 million €, for IA-DEMOs 7 million €, and for IA-FLAGS between 15 and 20 million €. This budget recommendation leads to large initiatives, targeting many sub-sectors and implemented by large consortia. This wide focus of the topics and wide ambition of the projects limits the attractiveness of the initiative to individual agricultural partners, which are often too small for an initiative of this size.

Hence, distributing the same budget among smaller initiatives would facilitate the participation of the agricultural sector, and it would increase the multiplier effect from the BBI JU initiative, by funding a larger number of smaller projects, instead of fewer and larger projects.

Recommendation 2.5: Allow projects to be proposed via a bottom-up approach

The recommendation is to allocate a percentage of the total budget for proposals via an open topic, with a bottom-up approach, in the agro-based value chain. This could be linked to the previous recommendation (2.4) of allowing for projects with smaller budgets. Open topics, developed with a bottom-up approach, would set requirements related to final objectives and impacts to be achieved, but they would not define specific themes. It would leave it open to all sectors to propose the best approach, allowing for projects without being restrictive, and would open doors to creativity.

Motivation for the recommendation

A bottom-up approach would allow for more demonstrative projects, or pilot projects, considered highly relevant by agricultural producers. It would also allow a focus on skills rather than on technology. All this would increase the relevance of the projects to farmers, thus increasing the attractiveness of the BBI JU, with initiatives focused on a specific sector which currently do not fit into the proposed topics.

Individual primary producers do not see themselves represented in the current large projects with topics outside their daily business and where their contribution is minor and their level of influence in decision-making classified as "slightly influential". It is expected that by offering smaller grants via an open topic (a combination of recommendations 2.4 and 2.5), a different set of initiatives coordinated by smaller organisations, which are more in contact with the local network of agricultural producers, can find their place.

Recommendation 2.6: Topic descriptions could explicitly request impact on rural areas during the project implementation

In the relevant topic descriptions, it would be advisable to request explicitly that projects addressed to this topic produce an impact on rural areas during the project's duration. Proposals would need to provide a detailed explanation on how this impact would be achieved, and the impact actually achieved would be evaluated.

Examples of activities to be implemented during the project's duration in order to foster future impact on rural areas could be:

- Promote that consortia work on creating synergies with already established networks in the area working on rural development (LEADER groups, EIP-AGRI initiatives).
- Foster the implementation of biorefineries in rural areas.
- Request that dissemination and communication activities include agricultural stakeholders and rural areas.
- The project budget allocated to activities/partners established in rural areas should be quantified and ranked.
- Involve local, rural entrepreneurs active in, for example, logistics, pre-processing and stockage of biomass, disposal/use of by-products and waste, and other services (thus encouraging local sourcing of support services).

Motivation for the recommendation

By explicitly requesting that project activities have an impact on rural areas, engagement with the rural population is already fostered during the period of the project's implementation. This way, the potential of having agricultural producers involved higher up in the value chain is maximized, as is promotion of networking activities among different actors active in the same area, whereby opportunities to collaborate in future initiatives might arise. Rural SMEs are a key motor of rural development and local employment. Often, they also are run by farmers as their secondary activity. Hence involving local, rural entrepreneurs may be a powerful tool to accomplish a greater impact on rural areas

Recommendation 2.7: Require participation in projects from agricultural producers from different geographical locations to ensure representativity and applicability of the developed solutions

Increase the requirements on the geographical spread of the projects.

Motivation for the recommendation

The agricultural sector is highly diverse across the EU in relation to production, environmental and socio-economic factors. This is important to consider when designing a multiplication strategy for the developed solution. Therefore, we believe it could contribute to the potential for future replication of the project if a wider representation of agri-participants from different agro-climatic areas and from different production systems participate.

It should be noted that this recommendation may increase the multiplication effect of projects but may at the same time hamper the participation of agricultural producers by making it more complicated both to find relevant partners, and to run the project. This recommendation is in contrast to recommendation 2.4 on providing for smaller projects.

Recommendation 2.8: Project applications have to reflect relevance of project to farming community

Projects could be required to demonstrate their relevance to the farming community of their ongoing activities by other means than having agricultural producers participating in the consortia. For example, by counting on an advisory board of farmers which collaborates with the consortia by advising, and by measuring the impact of the project.

Motivation for the recommendation

This would force projects to interact with farmers, even if farmers do not wish to participate directly in the consortia as project partners (because it is too resource-demanding for example) and would facilitate the positive impact on the farming community. The agricultural partner does not necessarily have to coordinate or have a role which requires lots of resources – it is not always relevant to the project as such – but that does not mean that agricultural partners cannot be included in a different way, without having to administer it. This recommendation should ideally be combined with the recommendation of having agricultural producers evaluating the project proposals (recommendation 3.1), in order to assess the real potential positive impact on the farming community.

Recommendation 2.9: Foster the inclusion of cooperatives or other forms of agricultural cooperation in the topics

It is recommended to promote the participation of agricultural cooperatives as members of consortia, by giving them an active role in the topic description.

Motivation for the recommendation

Agricultural cooperatives, or other forms of collaboration among farmers, have a central role in transmitting innovations to the field. Individual agricultural producers and small businesses often have limited resources. By collaborating with agricultural cooperatives, and seeking out a particular niche of projects for these entities, several benefits could be obtained. It would, for example, increase the multiplier effect of the projects (as the participant would represent a larger group of producers), and it would substantially facilitate the participation of the agricultural sector, as agricultural cooperatives usually have more resources than individual producers to dedicate to projects. Cooperatives are efficient facilitators for disseminating innovation. (See link to recommendation 2.12.)

Recommendation 2.10: Strengthen the environmental and climate requirements of the projects

Reinforcing environmental and climate requirements in the description of the topics in the annual call for proposals and making it compulsory to demonstrate and measure the environmental and climate impacts (in addition to the technological advancements), will increase the relevance of the projects to farmers. Projects can, for example, be required to deliver on the net-zero-carbon economy, on soil quality, lower erosion, or fewer irrigation needs, by including the environmental benefits in the business case.

Motivation for the recommendation

Farmers are often driven to develop and participate in innovative activities by needs, rather than by curiosity. Farmers' needs often relate to environmental or climate concerns. Hence, by linking technological advancement to the needs of farmers to adapt to environmental requirements, the relevance to farmers of participating increases. Rather than trying a new type of production, agricultural producers are more likely to be attracted by a new business line that minimises the producers' risks while providing a solution to a problem.

Today, BBI JU projects claim to generate environmental or climate impacts, but these impacts are not sufficiently documented or monitored. If projects are required to document and measure these, then farmers have a natural way of participating, as they usually know or can measure what the impacts are in the field. Usually the primary sector will be the one in the chain best suited for demonstrating the environmental impact, and the one that is best aware of what type of solutions are needed to maximize the impact on the natural resource that they are managing. Hence, sustainable diversification should be as much a driver as income diversification when designing topics, which will increase the relevance to farmers of participating. The downside of this recommendation is that it is difficult to measure the impact during the life-time of a project. This recommendation is therefore linked to the following recommendation (2.11).

Recommendation 2.11: Support projects with longer time horizons to record mid-term impacts in agricultural contexts

Including topics with longer project durations would enable the measurement of their impact on key indicators which are only possible to observe in the mid-term, such as environmental indicators. These indicators are of high relevance to farmers and would thus potentially make the projects more relevant to farmers. This recommendation is linked to recommendation 2.10.

Motivation for the recommendation

In the annual BBI JU calls for proposals there were suggestions for the duration of different kinds of projects. In some calls, up until 2018, RIAs were advised to last 4-5 years, and in 2019's call the suggestion has only been kept for CSAs. The suggestion of this duration might limit the possibility of measuring some mid-term beneficial impacts that the initiative might produce, in particular potential positive effects on the environment.

The project design and evaluation could be inspired by the projects of LIFE who have longer time horizons than the average BBI JU projects.

Recommendation 2.12: Foster the role of facilitators to increase the participation of farmers

The recommendation is to foster the role of advisors/innovation brokers to support farmers during the project implementation. A better recognition of the important role of facilitators is recommended. This could for example be done by introducing this suggestion, as well as a definition and/or acknowledgement of the role, in the annually published guide for applicants. The “innovation broker” is a tool that already exists today, for example in EIP-AGRI, and that has a great potential for stimulating agricultural participation, but project applicants may benefit from being reminded of the possibility of including this role in their project descriptions.

Stimulating the role of innovation brokers could also be done by linking the facilitator’s role to a requirement to have farmers involved in the project (recommendation 2.3). It could also be done by providing for funding for facilitators through a flat-rate/lump-sum in smaller projects (recommendation 2.4 and 2.5).

Motivation for the recommendation

Even with full economic support from BBI JU, or grants that are easier to manage (see recommendations 2.4, 2.5, 2.9, 4.2 and 4.3) the participation of individual primary producers is still challenging. Other factors such as language barriers, shortage of time, or shortage of trained personnel greatly limit the participation potential of small farmers in these types of initiatives. Therefore, it is suggested to articulate the participation of farmers via a facilitator or innovation broker who could work as an intermediary between the more research-focused part of the consortium and the farmers. This would facilitate farmers’ participation.

The implementation of this proposal could be inspired by the EIP-AGRI innovation brokers, which work in a similar manner. They are often farm advisors, working in a concrete region, sometimes with a particular crop, and with a different skillset than farmers, but with the capacity of translating farmers needs into project language

Recommendation 2.13: Improve possibility to allow compensatory payments to farmers

Today compensatory payments to farmers exist, but they are difficult to integrate into the project budget. This could be eased up.

Compensation payment *per se* is not eligible under H2020 regulations. Farmers need to “carry out a specific service” which needs to be reflected in an invoice. Therefore, advice could be provided in the guide to applicants regarding how to potentially include compensatory payments to farmers, which could significantly increase the interest in participating from the farming community.

Motivation for the recommendation

The experience from many Operational Groups funded through EIP-AGRI is that agricultural producers consider participation in projects a cost, as it requires time away from the daily activities on the farm. It has therefore been considered relevant to include payment for farmers to as an eligible cost for participating in projects. Further use of this tool could potentially increase participation rates also for BBI JU projects.

8.3 Recommendations related to the evaluation process: selection of projects for funding and monitoring of ongoing projects

Project evaluation and monitoring is a key part to ensure that the initiatives funded are in line with the BBI JU priorities. This process could be strengthened or improved in various ways in order to increase the quality and the relevance of the agricultural primary sector's participation in BBI JU projects. The implementation of these recommendations would also contribute to improving and consolidating the role of the agricultural sector in the bio-based sector, and to enhancing the economic, social and environmental impacts in European rural areas.

Recommendation 3.1: Involve agricultural producers in the evaluation of project proposals

In topics where the role of agricultural primary producers is considered relevant, it is strongly advised that the evaluation panel includes at least one agricultural producer or related stakeholder (for example farm advisor, innovation broker, farmers' representative) to guarantee that the involvement of the agricultural sector presented in the proposal is planned in an effective way, that it is realistic and relevant.

Motivation for the recommendation

By involving agricultural stakeholders' in the evaluation process, we increase the possibility of the project achieving real progress for farmers in the mid- and long-term.

Recommendation 3.2: Introduce requirements in the topic text to be evaluated during the selection of proposals

In topics where the role of agricultural partners is considered relevant, the topic text should include this requirement as an important factor to be evaluated. Factors such as budget allocated to primary producers' entities, the active role in the project of leading WPs, or a role in the business plan, should be considered during the project evaluation process and thus should be presented as requirements in the topic text.

Motivation for the recommendation

Evaluating the participation of agricultural stakeholders in a project is a direct and effective way to ensure that projects funded are actively involving the farming sector.

Recommendation 3.3: Ensure that BBI JU activities on monitoring the impacts of projects fully and realistically cover the reality of the agricultural sector

The BBI JU carries out an important work annually in collecting information from all ongoing projects to monitor their performance against the key performance indicators (KPIs) and other socio-economic and environmental indicators. This data is then used to draw conclusions and form actions plans. Consequently, it is important to

ensure this data is realistic and represents well the reality of the agricultural partners. The specific recommendations for improvements related to the collection are the following:

- The collection of this data would be more realistic if carried out on an individual basis, not only to project coordinators, but to every project beneficiary, ensuring that the respondents understand the questions and that all the answers include a brief explanation.
- Currently, the questionnaire is sent out to the coordinator's main contact. The specific person answering each questionnaire should be clearly identified. She/he should have a relevant position in the consortium with a clear overview – preferably the respondent should be the person in charge of the daily coordination. Contact details of the person responding should be collected to allow the opportunity to clarify any doubts.
- To ensure reliability and neutrality of the data collected, it is good practise to have it managed and followed up by an operational partner perceived as neutral by the consortium, to avoid potential overestimations (e.g. participants can provide too optimistic impact numbers to the entity providing the funding for their project, particularly if they are asked or reminded to do so by their Project Officer, who is responsible for assessing project progress).
- Currently, data is collected annually to enable the inclusion of the KPI and impact analysis in the BBI JU Annual Activity Report. However, most data are future estimations, so most of the values collected are stable along the project. In order to allow the beneficiaries to ensure that the necessary attention is paid to answering this questionnaire, this data collection could be carried out only once during the project, for example as a part of the mid-term review. It will not allow the inclusion of this information in BBI JU's Annual Activity Report, but the data provided could be more realistic.

Motivation for the recommendation

Improved mechanisms to launch the KPI and impact questionnaire, to have filled in it by project partners, and to process the data by BBI JU would allow BBI JU to better target its actions towards designing measures to contribute to improving the participation of farmers in the bio-based value chains.

Recommendation 3.4: Adapt BBI JU monitoring indicators (KPIs and socio-economic impacts) to capture better the reality of the agricultural sector

Some questions included in the annual KPI and impact questionnaire, mainly related to the socio-economic and environmental impacts, are not fully adapted to the reality of the agriculture sector. Problems with understanding the questions might trigger unrealistic answers. The following modifications are proposed:

- Currently projects are asked if the initiative will provide "*GROWTH of income for primary producers*". The suggestion is that the question is re-formulated to ask only for whether it will provide "*income for primary producers*". Motivation: Due to the uncertain situation of many agricultural producers, when asked about higher incomes in the future usually the answer is negative. However, they recognize that a new product, or a new value chain, can contribute to ensuring the survival of the farm, but not necessarily lead to income growth (which is associated with becoming rich). Thus, the answer that a project will provide income may already be considered positive, as it may be interpreted that the overall income of the farm is not negative.

- Currently projects are asked if the initiative will generate “*NEW skilled jobs*”, our suggestion is that the questions is re-formulated to ask if the initiative will generate “*skilled jobs*”. Motivation: As highlighted above, the uncertain situation of many farms, with increasing labour costs and lower margins, often only allow agricultural producers to have the ambition of maintaining jobs, not creating new ones. Hence, maintaining jobs may be something positive for an agricultural producer, as it allows him/her not to lay off workforce. In other words, with its current phrasing, answers to these questions may be misleading when evaluating the projects.
- It is also recommended to simplify the wording, avoiding “EU Project” language and complex English. For example, the question which is currently present in the KPI questionnaire, “Primary producers belong to project beneficiaries” can be understood in two ways:
 - o Are primary producers involved as project partners?
 - o Is the project benefiting primary producers?

Motivation for the recommendation

Monitoring the socio-economic impact for rural areas is key to assessing the relevance of the BBI JU initiative for the agricultural sector. Therefore, having a more precisely formulated set of questionnaires might result in a more realistic overview of the benefits for the sector, which might at this moment be underrated.

8.4 Recommendations related to participation rules

Two different paths can be explored in order to better adjust the participation rules and funding rates to the structure of the agriculture sector. One path aims at making it easier for smaller companies to participate in BBI JU projects; the other path aims at facilitating the collaboration with associations of agricultural producers. The two paths are complementary, not mutually exclusive. Rather, both paths aim at facilitating agricultural producers’ participation in projects.

These recommendations address issues 1 and 2, i.e. increasing the number of projects with agricultural participation, both through having more projects with agro-based biomass, and more projects where agro-based biomass is the feedstock used and that count the presence of an agricultural producer in the consortia. As for recommendations 1.1 and 1.2, increasing the number of agricultural partners would consequently also contribute to improving and consolidating the role of the agricultural sector in the bio-based sector, and to enhancing the economic, social and environmental impacts in European rural areas.

Recommendation 4.1: Modify funding rates in RIAs to foster the participation of large agricultural cooperatives

Unlike for H2020, in BBI JU, large companies are not eligible for funding in RIAs. In many cases, agricultural cooperatives qualify as large companies, which have to participate using their own funding. The recommendation is to consider agricultural cooperatives as a specific type of entity, in order for them to be eligible for funding in RIAs.

Motivation for the recommendation

It is of importance to involve the agricultural primary sector in early TRLs in order to ensure that the research being developed fits the requirements and the limitations of the agricultural sector. However, the agricultural primary sector often has limited capacity to set aside resources for participating in projects that are far from being ready for the market.

The motivation for this recommendation is to create incentives for agricultural cooperatives to participate in RIAs and to remove current obstacles linked to the participation of the agriculture sector in low-TRL initiatives. Currently, RIAs are initiatives that, because they are far from the market, are of lower interest to agri-participants. Therefore, in order to foster the participation of the agricultural sector in this type of initiative, it is advisable to facilitate the participation of cooperatives by providing the required economic support.

Recommendation 4.2: Provide 100% funding for small and medium agricultural producers in IAs

The recommendation is to modify funding rates in IAs from the current 70% to 100%, to foster the participation of small and medium agricultural producers as beneficiaries in projects.

Motivation for the recommendation

As highlighted previously, it is of strategic importance to actively involve individual primary producers as beneficiaries' "partners" in the consortium. However, given the structure of European farms, with limited economic margins and time, in order to make it more attractive to participate, it is necessary to economically facilitate their participation. It should be pointed out that in general, agricultural enterprises are not regular SMEs; they have even more limited resources, which motivates the exception made for this sector.

By the integration of **recommendations 4.1 and 4.2** we suggest the following modifications to the funding rates

Table 25 Current BBI JU Project funding rates

	RIA	IA (DEMO/FLAG)	CSA
Non-profit entity	100%	100%	100%
SME	100%	70%	100%
Large company	0	70%	0

Table 26 Recommended BBI JU Project funding rates (changes highlighted in blue)

	RIA	IA (DEMO/FLAG)	CSA
Non-profit entity	100%	100%	100%
SME + farmers' cooperative	100%	70%	100%
Small and medium farm	100%	100%	100%
Large company	0	70%	0

Recommendation 4.3: Implement an instrument to provide agricultural producers with small grants and reduced reporting requirements

The recommendation is to design and implement instrument that would allow participation of farmers via lump-sum or cascading grants, with lighter reporting requirements. This instrument could learn from what has been implemented as H2020 Phase 1 SME Instrument, where €50,000 grants have been provided as lump sums or from the many projects implemented via “cascading grants”. This recommendation is linked to recommendation of smaller projects 2.4.

Motivation for the recommendation

The involvement of agricultural partners in consortia, when articulated via individual farmers, is often associated with small grants (in many cases lower than €50,000)⁸⁰. However, these participants need to comply with the same set of reporting requirements (timesheets, financial reporting, intermediate reports) as partners that have larger grants and specialised personnel for handling this. Project reporting is time consuming, complicated and linked to tight deadlines, difficult to meet by agricultural partners. It is currently one of the first limitations for the participation of agricultural partners in a consortium. By easing the reporting requirements for farmers, it is expected that a higher number of agricultural partners would take part in BBI JU projects.

8.5 Recommendations related to better visibility of the BBI JU initiative

Recommendations aiming at increasing the visibility of BBI JU projects would address issues 1 and 2 as outlined in the introduction. Hence, by having more agricultural producers and actors close to the agricultural sector aware of the activities of BBI JU, more agricultural partners could participate in projects and in consortia. These recommendations would also contribute to improving and consolidating the role of the agricultural sector in the bio-based sector, and to enhancing the economic, social and environmental impacts in European rural areas.

Recommendation 5.1: BBI JU joint dissemination actions with local actors

BBI JU could seek active collaboration with actors close to farmers, for example with representatives of agricultural cooperatives and farmers’ associations, with farm advisors and with officials from managing authorities (for example with RDP officers designing measures related to bioeconomy). This could be done through:

- Brainstorming days with cooperatives/associations;
- Institutionalised exchange of information;
- Reach out on regional and local level, in addition to national outreach activities.

⁸⁰ See for example the Pro-Enrich Project where individual agricultural partners have grants ranging from €41,000 to €45,000.

Motivation for the recommendation

By zooming in better to local/regional needs, awareness raising activities would enable greater awareness among agricultural producers. These activities could also be used for exchanges on the needs of the agricultural sector, hence also contributing to increasing the relevance of the topic descriptions.

Recommendation 5.2: Appoint 'farmer champions' who can promote BBI JU among other farmers

The recommendation is to set up the infrastructure for supporting a handful of farmers' champions – BBI JU ambassadors – to be active across Europe. BBI JU would identify the candidates based on project participants. The role would be linked to a small amount of funding, and as a result the farmer champion would have to undertake advocacy/communication work on behalf of the BBI JU.

Motivation for the recommendation

Farmers tend to be receptive to peer-to-peer advice between farmers. Appointing farmers champions to spread the work of the BBI JU could facilitate the communication with farmers and increase the perception of benefits by the farming community.

Recommendation 5.3: Include requirement for agricultural project participants to participate in events related to their project

In the communication plan of the projects, a requirement for agricultural producers participating in projects to participate in events related to their project on a regional/national level could be included. This would serve to spread information and knowledge about BBI JU activities. Projects can also be required to publish information about their project, in order for information to reach other networks.

Motivation for the recommendation

In order to contribute to multiplier effects of projects, recipients of public money could be required to share their experience with those in their proximity. Besides contributing to spreading know-how, this would also improve the awareness of the BBI JU as such within the farming community.

Recommendation 5.4: Use young farmers' networks and programmes to increase the visibility of BBI JU

It is recommended to use established networks and programmes to support young farmers across the EU as a dissemination platform to increase the visibility of the BBI JU initiative

Motivation for the recommendation

Young farmers are identified as an interesting target audience among agricultural partners for two reasons: Firstly the incidence of the language barrier (the main barrier identified in the study) is lower since in general terms the younger generation in Europe has a higher level of English, and secondly, linked to a younger age is a more open attitude to innovation.

8.6 Recommendations related to links to other EU measures

These recommendations address all of the issues outlined in the introduction but can in particular contribute to the issue of the need to increase BBI JU projects multiplier effects. Thus, the recommendations aim at increasing the effects of participation in a project by a single agricultural entity on the wellbeing of the overall agricultural primary sector. As a consequence, the possibility of contributing to improving and consolidating the role of the agricultural sector in the bio-based sector in general increases, as well as the possibility of enhancing the economic, social and environmental impacts in European rural areas.

Recommendation 6.1: Create synergies and follow-up strategies with RDP and/or EIP-AGRI initiatives

It would be highly advisable that breakthrough innovations funded by BBI JU could be followed-up, or spread on a wider level, through Rural Development Program (RDP) measures. This could be done in various ways.

- BBI JU could, together with DG AGRI, develop a follow-up strategy to ensure continuity and replication of the solutions developed through BBI JU projects in other EU locations. Design of BBI JU calls and use of RDP measures can be streamlined and made complementary. This could then be put into action by collaboration with national/regional RDP managing authorities and paying agencies. Also, Local Action Groups (LAGs) that manage LEADER-funding could be informed about BBI JU calls and projects.
- Design of or changes to RDPs should consider the scope of current and potential future BBI JU calls to ensure that the right measures and supporting instruments are available to enable wider roll-out of initiatives.
- Direct links could be created to RDP measures, for example by introducing support for participating in BBI JU projects⁸¹, and/or for preparing a proposal to participate. BBI JU project proposals could also include a section where opportunities for complementarity with RDP funding to enhance farmers' involvement would be described.

Furthermore, EIP-AGRI Operational Groups and Focus Groups⁸² could be informed of BBI JU innovation projects, in order to encourage further farmer-centred spin-off projects through EIP-AGRI, possibly in BBI JU projects regions. The EIP-AGRI network can also be used to disseminate BBI JU innovations to other regions in Europe.

⁸¹ In addition to the grant received from the BBI JU, which may not compensate the time a farmer has to invest in participating, taken away from farming activities.

⁸² Operational Groups (OGs) implement innovation projects, Focus Groups identify and research possible areas of work where EIP-AGRI OGs could do innovations.

Motivation for the recommendation

Linking BBI JU funded innovations to other EU initiatives would bridge the gap between various EU funding mechanisms in order to increase the multiplier effects.

ENRD [recommendations](#) on supporting inclusive and sustainable bioeconomy value chains are a very relevant tool to identify the existing RDP measures that could be complementary for the BBI JU projects. In particular, attention should be paid to the RDP investment measures that can be applied in a complementary way with BBI JU projects, for example to update farm-level infrastructure. Such complementarity is often practised between RDP investment support and ERDF⁸³ projects.

Recommendation 6.2: Collect recommendations from ongoing and finished projects relating to regulatory hurdles, to be assessed by an EU-level task force

Towards the second half of the project implementation period, or linked to the final reporting, the project participants could be asked for input relating to regulatory hurdles that have influenced the project's development or that are expected to limit future developments. The reports from the projects could then be analysed by an EU-level task force involving the relevant DGs in order to ensure that the relevant steps are taken by the European Commission to address the regulatory concerns of the stakeholders on the ground.

Motivation for the recommendation

The survey results showed that regulatory hurdles are considered one of the main obstacles to bringing a product to market after a project is finished. By addressing the issues identified and flagged by the projects, greater interest could be generated for participating in BBI JU projects, as they could be considered more relevant. Furthermore, the potential for the agricultural sector to participate in the bio-based sector in general would increase, as it could be expected that the regulatory hurdles reported would be relevant not only to the project participants, but to the wider agricultural community. Thus, implementing this recommendation would increase interest in participating by eliminating regulatory hurdles, therefore making the future after the project ends more "certain".

The establishment of a task force to analyse the recommendations provided by projects could be modelled on how the revision of potential ethics issues⁸⁴ for H2020 proposals is currently carried out by a H2020 committee.

⁸³ European Regional Development Fund

⁸⁴ All Horizon 2020 projects need to address in their application stage whether they have any issues related to certain aspects, ranging from treatment of personal data to the use of stem cells or human embryos. This answer provided by the applicants, if the project is selected for funding, is further checked by a committee which ensures the project has the correct measures in place to meet ethics requirements satisfactorily.

BIBLIOGRAPHY

- Angiolini, S. (2018). *1st Meeting of Thematic Group on 'Mainstreaming the Bioeconomy', Bioeconomy value chains and rural development: overview of ongoing initiatives in Southern Europe and main barriers*. ENRD CP. Retrieved from https://enrd.ec.europa.eu/sites/enrd/files/tg1_bioeconomy_enrd-cp_angiolini.pdf
- Ansoff, I. (1957). Strategies for Diversification. *Harvard Business Review*.
- Ansoff, I. (1976). From Strategic Planning to Strategic Management.
- Beronia. (2019). www.beronia.com/es/beronia. Retrieved from www.beronia.com: <https://www.beronia.com/es/beronia>
- Bio-based Industries Consortium. (2017). *SIRA, Strategic Innovation and Research Agenda*. Retrieved from <https://biconsortium.eu/sites/biconsortium.eu/files/downloads/SIRA-2017-Web.pdf>
- Bio-Based Industries Joint Undertaking (BBI JU). (2018). *Annual Activity Report 2017*. Retrieved from <https://www.bbi-europe.eu/sites/default/files/bbi-ju-aar-2017.pdf>
- Bio-based Industries Joint Undertaking (BBI JU). (2019). *Annual Activity Report 2018*. Retrieved from <https://www.bbi-europe.eu/sites/default/files/bbi-ju-aar-2018.pdf>
- Bio-based Industries Joint Undertaking. (2019). *Guide for Applicants*. Retrieved from <https://www.bbi-europe.eu/sites/default/files/bbiju-gfa-2019.pdf>
- Bioenergy Europe. (2018). *Statistical Report*. Retrieved from <https://bioenergyeurope.org/statistical-report-2018/>
- Biomass Research & Development Board, US government. (2018). *The Bioeconomy Initiative: Implementation Framework*.
- Bowyer, C., & Allen, B. (2018). *1st Meeting of Thematic Group on 'Mainstreaming the Bioeconomy', Bioeconomy value chains and rural development – the policy context*. ENRD CP. Retrieved from https://enrd.ec.europa.eu/sites/enrd/files/tg1_bioeconomy_ieep_allen-bowyer.pdf
- Cavero Extra. (n.d.). *Cavero Extra presentation: Supply chain, Sustainability, Circular Economy and Innovation*. Retrieved from https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/events/presentations/be-presentation-cavero_en.pdf
- Courtney, P. (2016). Kalfresh: QLD rural business turns carrot problem into profit by increasing diversity. *ABC net*. Retrieved from <https://www.abc.net.au/news/2016-04-09/kalfresh-rural-business-turns-problem-into-profit/7310450>
- EIP-AGRI. (2015). *EIP-AGRI Workshop Presentation 'Building new biomass supply chains for the bio-based economy'*.

- EIP-AGRI. (2015). *Workshop Final Report 'Building new biomass supply chains for the bio-based economy'*. Retrieved from https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/field_event_attachments/report-ws-bioeconomy_final_28052015.pdf
- ENRD. (2018). *1st Meeting of Thematic Group on 'Mainstreaming the Bioeconomy'*. Retrieved from European Network for Rural Development: https://enrd.ec.europa.eu/news-events/events/1st-meeting-thematic-group-mainstreaming-bioeconomy_en
- ENRD. (2019). *2nd Meeting of Thematic Group on 'Mainstreaming the Bioeconomy'*. Retrieved from European Network for Rural Development: https://enrd.ec.europa.eu/news-events/events/2nd-meeting-thematic-group-mainstreaming-bioeconomy_en
- ENRD. (2019). *3rd Meeting of the Thematic Group on 'Mainstreaming the Bioeconomy'*. Retrieved from European Network for Rural Development: https://enrd.ec.europa.eu/news-events/events/3rd-enrd-thematic-group-meeting-mainstreaming-bioeconomy_en
- ENRD. (2019). *Exploring the Role of Awareness-Raising and Communication in Promoting the Development of Sustainable Bioeconomy Value Chains*. 3rd Meeting of the Thematic Group on 'Mainstreaming the Bioeconomy'. Retrieved from https://enrd.ec.europa.eu/sites/enrd/files/tg3_bioeconomy_education-and-awareness-raising_bowyer_0.pdf
- ENRD. (2019). *How to mainstream the bioeconomy in rural areas?* ENRD. Retrieved from European Network for Rural Development: https://enrd.ec.europa.eu/sites/enrd/files/s11_bioeconomy-handout_how-to-mainstream-bioeconomy.pdf
- ENRD. (2019). *How to use RDPs to support rural bioeconomy?* ENRD. Retrieved from https://enrd.ec.europa.eu/sites/enrd/files/s11_bioeconomy-handout_how-to-support-bioeconomy.pdf
- European Bioeconomy Stakeholders. (2017). *European Bioeconomy Stakeholders Manifesto*. Retrieved from https://ec.europa.eu/research/bioeconomy/pdf/european_bioeconomy_stakeholders_manifesto.pdf
- European Commission. (2012). *Innovating for sustainable growth: A bioeconomy for Europe*. Retrieved from <https://publications.europa.eu/en/publication-detail/-/publication/1f0d8515-8dc0-4435-ba53-9570e47dbd51>
- European Commission. (2016). *The EU Bio-Based Industries: Results from a survey*. Retrieved from <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC100357/jrc100357.pdf>
- European Commission. (2017). *Sustainable and optimal use of biomass for energy in the EU beyond 2020*.
- European Commission. (2017). *The future of Food and Farming*.
- European Commission. (2018). *A sustainable bioeconomy for Europe: Strengthening the connection between economy, society and the environment, Updated Bioeconomy Strategy*. Retrieved from https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf
- European Commission. (2018). *European Commission Staff Working Document Impact Assessment, final*.

- European Commission. (2018). *Report from Workshop on “Best practices in integrating primary production (farmers and forest owners) in the Bioeconomy value chains and boosting the development of the Bioeconomy in rural areas.* Retrieved from https://ec.europa.eu/agriculture/sites/agriculture/files/bioeconomy/pdf/2018-09-20-workshop-report_en.pdf
- European Commission. (2019). *European Commision; Biomass.* Retrieved 2019, from <https://ec.europa.eu/energy/en/topics/renewable-energy/biomass>
- European Commission. (2019). *From idea to market, 15 EU “Success stories”.* Retrieved from <https://www.ecologic.eu/sites/files/publication/2019/3513-bio-based-products-15-success-stories-2019.pdf>
- European Commission, JRC. (2018). *Socio-economic insights into the Bioeconomy in BIOEAST countries.* Retrieved from https://ec.europa.eu/knowledge4policy/sites/know4pol/files/2018_socio_economis_insights_jrc_researchbrief_bioeast.pdf
- Farming Together. (2018). *New co-op sweetens honey hopes.* Retrieved from [farmingtogether.com.au: https://farmingtogether.com.au/new-co-op-sweetens-honey-hopes/](http://farmingtogether.com.au/new-co-op-sweetens-honey-hopes/)
- fi-compass, European Investment Bank. (2018). *Joint Initiative for improving access to funding for European Union Young Farmers.*
- fi-compass, European Investment Bank. (2019). *Survey on financial needs and access to finance of EU agricultural enterprises.*
- Gylling, M., Jørgensen, U., Bentsen, N. S., Kristensen, I. T., Dalgaard, T., Felby, C., & Johannsen, V. K. (2016). *The +10 million tonnes study: increasing the sustainable production of biomass for biorefineries.*
- Hart, K., Allen, B., Lindner, M., Keenleyside, C., Burgess, P., Eggers, J., & Buckwell, A. (2012). *Land as an Environmental Resource Final Report.* The Institute for European Environmental Policy (IEEP). Retrieved from <https://ec.europa.eu/environment/agriculture/pdf/LER%20-%20Final%20Report.pdf>
- Langeveld. (2010). *Bioenergy production chain development in the Netherlands: key factors for success.*
- Lantmannen. (2018). *Lantmannen Annual Review 2018.* Retrieved from <https://www.lantmannen.se/siteassets/documents/01-om-lantmannen/finansieell-information/lantmannen-annual-reveiw-2018.pdf>
- Milken Institute. (2013). *Financial Innovations Lab Report. Unleashing the power of the Bio-Economy.*
- Prade, T., Björnsson, I., Lantz, M., & Ahlgren, S. (2017). *Can domestic production of iLUC-free feedstock from arable land supply Sweden’s future demand for biofuels?*
- Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.*

Romanillos, A. (2018). *Bioeconomia y Sociedad*. Mediterráneo Económico 31. Retrieved from <https://dialnet.unirioja.es/ejemplar/501908>

Sunliquid FP7. (2019). *FARMERS FROM OLTENIA AND CLARIANT TO PARTNER FOR A CLEANER ENVIRONMENT*. Retrieved from www.sunliquid-project-fp7.eu: <https://www.sunliquid-project-fp7.eu/news/farmers-from-oltenia-and-clariant-to-partner-for-a-cleaner-environmentgroundbreaking-for-clariants-sunliquid-cellulosic-ethanol-plant-in-romania-3/>

WEBPAGES

AgroInLog. (2019). *www.agroinlog-h2020.eu*. Retrieved from <http://agroinlog-h2020.eu/en/home/>

Bio-Based Industries Joint Undertaking (BBI JU) . (2019). *BBI JU Webpage*. Retrieved from <https://www.bbi-europe.eu/about/about-bbi>

BIOEAST. (n.d.). *www.bioeast.eu* . Retrieved 2019, from www.bioeast.eu

BioRescue. (n.d.). *BioRescue*. Retrieved from www.biorescue.eu: <https://biorescue.eu/>

BioStep. (2019). *BioStep*. Retrieved from www.bio-step.eu/: <http://www.bio-step.eu/>

ENRD. (2019). *European Network for Rural Development*. Retrieved from enrd.ec.europa.eu: https://enrd.ec.europa.eu/enrd-thematic-work/greening-rural-economy/bioeconomy_en

EPIC EGGS. (n.d.). Retrieved from www.epiceggs.ca: <http://epiceggs.ca/the-process/>

European Committee for Standardization. (2019). *European Committee for Standardization*. Retrieved from www.cen.eu: <https://www.cen.eu/work/areas/chemical/biobased/Pages/default.aspx>

Farming Together. (n.d.). Retrieved from farmingtogether.com.au: <https://farmingtogether.com.au/>

Rubizmo. (2019). *www.rubizmo.eu*. Retrieved from Rubizmo: <https://rubizmo.eu/>

Tavernello. (2019). Retrieved from www.tavernello.com: <https://www.tavernello.com/about/>

AGRICULTURAL PARTNERS, PROJECT COORDINATORS AND BUSINESS WEBPAGES

For the purpose of writing this study, the webpages of the agricultural partners and project coordinators mentioned throughout the study have been reviewed, even though not all them were used as references in the end.

The same situation applies to the webpages of the companies described in Chapter 6 “Identification of Relevant and Successful Business Models”, which are linked in the chapter for convenience of the reader.



innovarum

Fostering innovation in the agri-food sector