ENABLING

Enhance New Approaches in Bio-based Local Innovation Networks for Growth

Deliverable

D3.8 Best Practice Sheet in the EIP-AGRI format

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Table of contents

DISCLAIMER

Acronyms

BBI Bio Based Industry

BBP Bio Based Products

PA Practice abstract

WP Work Package

List of figures and tables

EXECUTIVE SUMMARY / ABSTRACT

The bio-based industry (BBI) is moving faster than ever, proposing innovative and sustainable business models able to trigger economic, social and environmental benefits.

Rural areas retain a considerable growth potential based on the high availability of residuals from agricultural practices, which result in excellent input for the bio-based processes.

Research and technology improvements are contributing to enhance understanding of biomass characterization and its application in the bio-based industry, while creating new market opportunities for these residuals.

However, this potential is held back by the lack of knowledge and systemic frameworks that prevent agricultural businesses and the bio-based industry from interacting and promoting sustainable schemes.

ENABLING will contribute to close the knowledge gap between farmers and foresters with research and innovative solutions. One of the proposed measures is to identify and share successful examples of how sidestreams from agricultural processes are finding new and profitable routes.

The deliverable will start with a short introduction about the mission of the ENABLING project and the aim behind the collection and communication of best practices for biomass valorization.

The document will devote a specific section to the criteria and processes identifying and elaborating useful information for practitioners.

The following section will describe the activity to adapt the collected practices into the EIP-AGRI format. A thorough analysis will focus on the process for the collection of the first practices and their evaluation.

The last part of the Document will present the list and main data emerging from the first Practice Abstracts (PAs).

SCOPE

The deliverable D3.4 "*Best practice sheet in the EIP-AGRI format*", is aimed to present the results achieved in the collection of the first 20 practices for the ENABLING project.

While being a relevant outcome for the upcoming project activities, the Document aims to be a useful and inspirational source of information for practitioners and potential stakeholders of the bioeconomy sector.

Deliverable Description

The Deliverable 3.4 is intended to describe the activities implemented by ENABLING partners for collecting and delivering the first set of Practice Abstracts in the EIP-AGRI format.

It will illustrate the main steps for the identification and analysis of the collected information together with a list of the practices that are ready for publication on the EIP-AGRI website.

The same list will also include an overview of the main types of available biomass and its application to the bio-based industry. This table will be supported by two sections stating the type of "**Biomass source/Crop**" and the final "**Bio-based product**". This would help the reader to make linkages between main sources of biomass and the type of industry or process requiring them.

The Report will conclude with information about the main actors involved in the value chain, with particular focus on the benefits that are emerging for the main practitioners such as farmers and the processing industry.

1 Introduction

1.1 Project overview

The ENABLING initiative is based on the consortium's vision that the biomass to BBPs value chains can enhance economic growth while contributing to a sound management of local and natural resources.

Recent experiences across Europe provide good examples of how biomass for BBPs could represent a viable alternative or a differentiation to most traditional processes, which are typical of bioenergy supply chains.

Research results and technology improvements are contributing to enhance understanding of biomass characterization and its application in the processing and manufacturing industry. In some cases, residuals from agricultural, forestry and fishery activities require sophisticated treatments to be converted into value added products. In others, they have the capacity to be (re)used in the same production process or addressed towards new markets.

Both approaches aim to create marketable conditions for those residuals that would otherwise be discarded, preventing practitioners to make value out of them while putting a big burden in terms of environmental impact.

New market opportunities are achievable through multidisciplinary structures to enable knowledge exchange and creation of synergies amongst different actors in the value chain.

In this framework, the regional dimension plays a crucial role for innovation uptake, "*it is at this level that networks and clusters of SMEs, industries and research institutions are able to develop and trigger knowledge spill-over*."[1]

Yet, this dimension struggles to elaborate systemic frameworks where key actors such as agricultural businesses and the Bio-based industry could interact and promote new schemes. The lack of optimized value chains tends to penalize small rural business, repressing the commercial and social potential on both sides.

While new and excellent practices are emerging across Europe, their impact on the economic sustainability and opportunities for replication are limited by their small and local configurations. Such arrangements restrain circulation of ideas, with less chances to promote knowledge and networks for the deployment of innovative practices.

It is in this context that ENABLING will act to bridge the gap of knowledge between research and practitioners, scouting and spreading best practices to communicate how side streams of agricultural processes are finding new and profitable routes.

1.2 Best practices to enhance knowledge

[1] Matteo de Besi and Kes McCormick, Towards a Bioeconomy in Europe: National, Regional and Industrial Strategies, Lund University, 2015.

The ENABLING project responds to the "Thematic Networks" scheme, which asks partners to take actions against the lack of knowledge and structures affecting a specific agricultural sector in Europe.

ENABLING adopts an identifying-and-sharing approach to collect and spread out those best practices addressing the main challenges faced by practitioners.

The cases identified in the ENABLING project will promote successful business models regarding the valorization of biomass streams as input for bio-based products and processes.

This activity will contribute to raise awareness on new business opportunities from residuals of agricultural activities along the whole value chain, from the type of biomass sources to their final market application.

A specific focus will be given to (but not limited to) the rural areas. The high availability of biomass from agricultural operations makes them as a natural target for the identification and communication of gainful value chains.

At this level, the ground to establish successful business models appears still fertile, with opportunities to trigger economic, social and environmental benefits for the whole territory.

The best practices are not only an awareness-raising activity but also an inspirational input for the deployment of structured networks to encourage entrepreneurial endeavors.

All the Practices will be made available on the ENABLING and EIP-AGRI website as well as shared by project partners during workshops, webinars and coaching services.

2 Best practices

2.1 Identification of Best practices

ENABLING's WP3 aims at running a comprehensive identification of best practices across Europe through the criteria established in the proposal. This would result in the collection of high-impact sustainable cases of biomass residues inputs for the BBP industry. The overall objective is to generate easily replicable models in many different contexts, well beyond the current operational horizon of ENABLING.

During the first six months of the project, the WP3 focused on producing the executive handbook on the identification of best practices (D3.1). 16 partners from different countries and regions undertook a challenging process. They brought up several ideas and opinions and followed the most appropriate methodology, as it had been outlined in the project proposal, to deliver, after 6 months, a handbook that has won the support of all the project partners. The handbook was finalized in M7.

Process of developing the handbook (D3.1)

Start project, kick-off meeting in Rome

During the kick-off meeting in Rome in December 2018, the partners discussed about the WP3 tasks and responsibilities and defined the concept of best practice. On the basis of the positions emerging from the meeting, the partners, coming from 13 countries, agreed on the importance of the context when collecting the practices. In addition, the consortium partners discussed the criteria to be used for their selection. Besides the context, during the meeting different positions emerged on what a best practice entails. ZLTO used the insights that arose from the discussion to create a first draft of the executive handbook on the identification of the best practices.

First draft of the executive handbook on the identification of the best practices

Along with the input from the project plan and the comments given by the partners during the partner meeting in Rome, ZLTO discussed parts of the handbook with several project partners (Itabia, BoerenBond and euknow). ZLTO shared the first draft of the handbook with all the partners in April 2018. In the aftermath, ZLTO included the partners' comments and suggestions on this draft; a second version of the handbook was developed and shared with the partners in May 2018, together with a call for good examples (possible best practices).

Expert group Meeting

As the handbook describes in greater detail, the consortium set up an expert group made up of 6 project partners to keep track of the process and outputs resulting from the collection of the practices. The group examined the collected material and other emerging issues before each partner meeting in order to facilitate the decision-making process. The first expert group meeting was organized through a conference call with the remote participation of the partners involved. On this occasion, the expert group scrutinized the handbook, the intended approach to evaluate the best practices and the first collected good examples. The outcomes of this meeting were included in the third concept handbook that was then shared with the project partners before the 2nd partner meeting.

2nd partner meeting, 's-Hertogenbosch, may 2018

During the 2nd partner meeting in the Netherlands, ZLTO shared the process with the whole consortium, explaining the chosen methodology for collecting and selecting best practices. The feedback received by project partners led to the layout of the second version of the "Enabling Template" [2] for collecting the practices. The file was issued and finalized together with the final version of the executive handbook, in June 2018 (project month 7).

3 Practice Abstracts

[2] See Annex 1 at the end of the document

3.1 Adapting Practices to the EIP-AGRI format

The EIP-AGRI Service asks thematic networks to provide best practices in the form of "Practice Abstract", a short summary published on the EIP-AGRI website and based on the following guidelines:

"*Main results/outcomes of the activity (expected or final)*
The main practical recommendation(s): what would be the main added value/benefit/opportunities to the end-user if the generated knowledge is implemented? How can the practitioner make use of the results?
The summary should be as interesting as possible for farmers/end-users, using a direct and easy understandable language and pointing out entrepreneurial elements which are particularly relevant for practitioners (e.g. related to cost, productivity etc). Research oriented aspects which do not help the understanding of the practice itself should be avoided"[3]

In order to comply with these instructions, the "Enabling Template" has been conceived to provide a thorough description of the practices, with detailed information about the whole value chain. This allowed partners to gather a considerable amount of data that, for the technical characteristics of the EIP-AGRI format, had to be carefully analyzed and narrowed down, while making sure that relevant information for end users was included.
It became necessary then to identify the key elements that would have made a short summary effective in message and useful in contents, focusing on the valorization of biomass streams for the BBI and related economic opportunities for practitioners.
Based on this approach, practice summaries have been developed around three entrepreneurial variables: *what type of biomass is sold (supply), which industry/process can use it (demand), and what economic/managerial benefits are emerging*.

Partners have been focusing on many and different type of practices, notably European cases. Yet, other regions of the world are being studied as long as they have the potential to be easily replicated in the European territory.
The several steps towards the creation of the Practice Abstracts required a constant interaction between the task leaders (EUKNOW, ZLTO) and the partners in charge of collecting the practices. During this phase, when a practice was found non-compliant with the criteria set in the handbook, it was either rejected as a whole or sent back to the partners for the necessary improvements.
This process required two "WP meetings" between two partners, "euknow" from Belgium and "ZLTO" from The Netherlands (September and October 2018), to discuss and analyze in depth

[3] Eip-Agri common Format

those examined practices, while preparing feedback to the partners about the weaknesses of the material collected.

At this point, once the partners were able to set a methodological approach for gathering and processing considerable amount of data, it has been possible to elaborate and produce the first practice abstracts.

Before being integrated into the EIP-AGRI format, the short summaries have been sent back to the partners for a final review and translation into the native language of the partner organization.

3.2 Results of the first best practices

ENABLING succeeded in the identification and collection of practices in its first year of implementation. The consortium managed to deliver a total of 27 practice abstracts against the 20 established in the grant agreement.

Numerous and interesting examples, mainly coming from the countries or regions of the project partners, emerge from the first PAs. Yet, a number of cases are originating from other regions of the World, as a confirmation of the consortium's commitment to cover a wider geographical area.

The 27 cases have been identified in 13 different countries: Italy, Belgium, Norway, Ireland, Austria, Bulgaria, UK, The Netherlands, The Czech Republic, France, Germany and Canada.

Several types of biomass from different agricultural practices[4] have been highlighted. This can be seen as a positive aspect as it contributes to address a wide range of stakeholders, especially European famers producing the same agricultural residuals as those identified in the project and succeeding in creating profits out of them.

One of the benefits that has been observed is that different sources of biomass are finding specific application in the Bio-based industry, becoming excellent input with the capacity, in some cases, to be integrated in conventional production processes.

The economic potential of biomass is not limited to their suppliers (farmers) and buyers (bio-based industry). Other actors, along the value chain, can benefit of these schemes, providing different skills and services to support and empower the whole business model. Research centers, logistics, technology advisors and retailers have all been identified as additional actors that play a decisive role in the value chain, highlighting how bio-economy can trigger economic benefits in numerous and different sectors.

First practices show how biomass originates, either as a direct consequence/outcome of an initial process or as a side stream of a secondary treatment.

[4] See Figure 1. *List of practice Abstracts*

Residuals such as straw, leaves, husk and other small detritus fall within the first category as a side effect of harvesting and land management activities.

According to the current findings, it is possible to identify a number of crops proposing viable input for the bio-based industry such as meadow grass, corn, wheat, flax but also grape, apple, hazelnut and olive.

Among the most common residuals of traditional agricultural activities, manure keeps being one of the biggest problem for farmers to deal with, especially in regions with high phosphate surplus. Nevertheless, current practices suggest a cascade process where the initial biomass is applied for biogas production while the remaining material is converted and used as biofertilizer.

Further examples of secondary biomass treatments come again from the livestock sector. The "*Green Woolf*"[5] project (Italy) is proposing a valuable alternative to coarse wool from sheep farming, which resulted unserviceable for further textile application. The discarded or remaining material is converted into soil conditioner fertilizer using small-scale local hydrolysis plants.

Encouraging results are also emerging from practices as traditional as milk production and related products. In countries such as Ireland, with the dairy industry expanding rapidly, it was essential to take steps towards waste reduction and waste valorisation in response to the 1.5 billion litres of whey produced annually. The solution proposed by the "*AgriChemWhey*"[6] project is a "polymer grade lactic acid" for bioplastics production from whey permeate and delactosed permeate. In addition to this process, residues from the same input can be converted through fermentation to derive minerals for human consumption and biofertilizers.

ENABLING is also contributing to shed light on the valorisation of biomass streams from rare or uncommon crops such as Thistle and Russian Dandelion. Extracts from these plants are resulting a suitable raw material in the form of oils and bio-polymers applicable in the rubber, plastic and cosmetic industries.

Despite it is not always possible to quantify the financial outcome behind each activity, it is possible to say that there is an economic advantage generated in different ways by each practice. This depends much on the type of business model supporting the value chain and the relationships between the farmer and the industry. In some case, the benefit is a direct financial compensation for the amount of biomass sold to the downstream industry; in others, there are indirect economic gains originated by a reduction of costs for collecting and treating residuals. In that event, it is the processing company that will take care of collecting the biomass from the supplier facilities.

[5] http://www.life-greenwoolf.eu/
[6] https://www.agrichemwhey.com/

Excellent examples are represented by those practices that are drawing a circular business model "From Farmer to Farmer". Numerous types of biomass are used to produce items or ingredients that are required in the same agricultural sector, sometimes in the same farm originating those residuals.

4 Conclusions

ENABLING identified 27 practices in the first year of project implementation. As a result, it confirmed what had already been highlighted in the proposal phase, i.e. the existence of a high number of interesting examples of biomass valorisation emerging across Europe.

The process, organised within the WP3, started from day 1st with the kick-off meeting where partners discussed about key issues and criteria to identify and collect relevant practices.

Several actions were required to refine and stabilize the procedures behind the collection of the best practices, generating a constant interaction between project partners.

The cases identified by the project represent a useful source of information to communicate how several business models are contributing to valorise biomass streams for the Bio-Based Industry.

The practices will be made available and accessible on the ENABLING and EIP-AGRI websites as well as used for the upcoming project activities such as workshops, webinars and coaching services.

Figure 1: Enabling Logo

Table 1: List of Practice Abstracts

N. Pratice Abstract	Name of the practice	Biomass Source / Crop	Bio-based Product/material
PA1	Phone Bio-based cases from flax crop residuals	Flax	Bio-Plastic
PA2	Soil Nutrients from Wool	Wool	Soil Nutrients
PA3	Bio product from grape processing – the Polyphenols practice	Grape	Plyphenols
PA4	Bio product from grape processing – the enocyanine practice	Grape	Enocyanin
PA5	Bio product from grape processing – The natural tartaric acid practice	Grape	Natural Tartaric acid
PA6	Bio products from thistle	Thistle	Bio-Plastic Bio-oil Bio-lubricants Plant protection
PA7	Candle cubes from Apple wood – the product	Apple wood	Candles
PA8	Candle cubes from Apple wood – the process	Apple wood	Candles
PA9	Fish-tomato farm partnership	Fish farming residuals	Soil nutrients
PA10	Microfibrillated Cellulose from spruce	Spruce	Microfibrillated Cellulose
PA11	Biochar from agricultural waste	Straw, compost from biowaste and non industrial sewage sludge	Biochar

PA12	**Integrating rape-seed-oil for asphalt creation**	**Rapeseed oil**	**Bitumen**
PA13	**Bio-fertilisers from agri production**	**Manure**	**Bio-fertilizer**
PA14	**Animal bedding from Miscanthus**	**Miscanthus**	**Bedding**
PA15	**Biobased air and water drain systems**	**Corn Starch**	**Bio-plastic**
PA16	**Mitigation of phosphate surplus from pig manure**	**Manure**	**Bio-fertilizer**
PA17	**Local pellets from crop residuals**	**straw, hay, husks from cereals, legumes, grasses, dried crops or dry wood biomass**	**Pellets for litter for cattle, feed for cattle, fertilizer**
PA18	**Bioplastic Normandy - Cereals Biomass**	**Cereal waste from wheat, barley and corn**	**Packaging, technical parts, agriculture and horticulture products, cosmetic**
PA19	**Bioplastic Normandy - Sea-shells and Algae biomass**	**Seashell from scallops and Oyster**	**Packaging, technical parts, agriculture and horticulture products, cosmetic**
PA20	**Bioplastic Normandy - nut kernels and shells biomass**	**nut shells kernels (hazel-nut, almond, rice, olives)**	**Packaging, technical parts, agriculture and horticulture products, cosmetic**
PA21	**Fruit waste processing**	**coffee ground, cacao shells, apple pomace, grape seed**	**Packaging, technical parts, agriculture and horticulture products, cosmetic**
PA22	**Vegetal fibers biomass**	**Biomass from vegetal fi-bers (miscanthus, flax, hemp, wood, cork)**	**Packaging, technical parts, agriculture and horticulture products, cosmetic**
PA23	**Bio-rubber from Russian Dandelion**	**Russian Dandelion**	**Bio-rubber**
PA24	**Insulation materials from grass fibre**	**Meadow grass**	**Insulation material for wall, roof and floor cavi-ties**
PA25	**Thermoplastic from grass fibre**	**Meadow grass**	**Thermoplastic fiber**
PA26	**AgriChemWhey project**	**Whey**	**Polymer grade lactic acid**
PA27	**Bioplastic from feedstock-lignocellulosic biomass**	**Wheat straw, spent brew-ery grains and dried dis-tilled grains**	**Bioplastic ingredients, bi-oplastics and high-demand biochemicals like L+ and D- lactic acid, ethyl lactate**

Best Practice Sheets in the EIP-AGRI FORMAT

In the following pages are listed the short summaries of the Best practices. The Descriptions are presented both in English and the native language of the partner who has delivered them.

Practice Abstract 1

Title: Phone Bio-based cases from flax crop residuals
Region/Country: Saskatchewan and Ontario, Canada

A Canadian based company is producing phone cases for smartphone devices that are biobased, 100% compostable, BPA, lead cadmium & phthalates free.
It makes use of a material called FlaxsticTM, a combination of non-food crop residuals such as flax shives and fibres, together with biopolymers.
The supply chain considers a close involvement and collaboration of different actors such as flax producers, logistics companies, the bio-based company for phone cases and final consumers.
The region of Saskatchewan is abundant in oilseed flax. The activity is fostering the creation of new market opportunities for these crop residuals, which are now turning into a new form of revenues and incomes for farmers.
The whole business model is also contributing to reduce the amount of plastic employed by consumers, alleviate the dependency from non-renewable fossil fuels and oil-based plastic while enhancing awareness on plant based solutions. The company benefits of a solid market share due to the uniqueness of the product/process. The practice promotes cooperation among similar stakeholders in the agri-food sector while encouraging research for a different use of the FlaxsticTM.

Practice Abstract 2

Title: Soil Nutrients from Wool
Region/Country: Piedmont, Italy

An “Interreg-europe” project has developed activities for the re-use of remaining coarse wool from sheep farming, which resulted unserviceable for further textile application. Wool residuals are converted into soil conditioner fertilizers using small-scale, local hydrolysis plants. Heated water treatments convert wool keratin into fertilizers. Sheep wool has elements beneficial to plants like azote and carbons; moreover, its capacity to absorb humidity is important to those soils less able to store water.
The activity fosters collaboration amongst several and different actors such as research centres, manufacturing companies, local farmers and companies producing organic fertilizers and soil/plant amendments.
The organic fertilizers produced from wool contributes to reuse a considerable amount of waste (200.000 tons of coarse wool generated in the EU every year). The process requires the establishment of small scale, local hydrolysis plants.
The practice is delivering a number of benefits and new opportunities for practitioners:

- Reduced transportation costs of both fertilizers and wool waste
- Better control of the coarse wool waste
- More integrated environmental management
- Elimination of transportation costs and environmental damages related to coarse disposal
- Production of fertilizers for the processing companies without supplement of dangerous chemicals

- Better management of the coarse produced by farmers, with the possibility of additional profit generation

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Practice Abstract 3

Title: Bio product from grape processing – the Polyphenols practice
Region: Emilia-Romagna, Italy

A winery and distillery company, located in the northern-east of Italy, turned to be an excellent example of biorefinery able to use its agricultural residues to produce a varied range of bio-based products.
Thanks to the total usage of biomass generated by grape processing (540,000 tons/year), the wine company has brought waste production close to zero (0.1% of the discarded materials).
In order to obtain the best valorization of organic residues, the owner has equipped the process with modern technologies able to extract natural antioxidants and oils from grapes seeds.
Polyphenols: is a natural antioxidants used in the pharmaceutical, nutraceutical, food and cosmetics industries. The oil obtained by the process, is recommended for its high content of polyunsaturated components, which are higher than all other vegetable oils.

The company counts numerous production partners including 30 wine cooperatives producing wine from 12,500 vine growers over an area of 35,000 hectares, equal to 7 million quintals of grapes produced every year.
A number of factors has contributed to trigger new market opportunities for this company:

- Consistent and steady availability of biomass
- Increasing requirements for biodegradability and environmental compatibility of products
- Activated agreements of partnership with other stakeholders (within the region or other regions and/or inter-sectorial)

Practice Abstract 4

Title: Bio product from grape processing – the enocyanine practice
Region: Emilia-Romagna, Italy

A winery and distillery company, located in the northern-east of Italy, turned to be an excellent example of biorefinery for the conversion of its agricultural and agro-industrial residues into a varied range of bio-based products.
Thanks to the total usage of biomass generated by grape processing (540,000 tons/year), the wine company has brought waste production close to zero (0.1% of the discarded materials).
In order to obtain the best valorization of organic residues, the owner has equipped the process with modern technologies able to extract enocyanine.
The substance, extracted by red grape skins, is a natural dye of the anthocyanin group, which main use is addressed toward the food sector falling under the code of E163.
The company counts numerous production partners including 30 wine cooperatives producing wine from 12,500 vine growers over an area of 35,000 hectares, equal to 7 million quintals of grapes produced every year.
In order to integrate a sustainable business model, the wine company has focused major efforts on:

- Identifying new technologies applied to by-products
- Applying new matrices

- Fostering collaboration with agro-industrial entities
- Adopting new techniques for bio products extractions/collection that allowed a better organisation of employees' roles and tasks hence improved productivity

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Practice Abstract 5

Title: Bio product from grape processing – the natural tartaric acid practice
Region: Emilia-Romagna, Italy

A winery and distillery company, located in the northern-east of Italy, turned to be an excellent example of biorefinery for the conversion of its agricultural and agro-industrial residues into a varied range of bio-based products.
Thanks to the total usage of biomass generated by grape processing (540,000 tons/year), the wine company has brought waste production close to zero (0.1% of the discarded materials).
In order to obtain the best valorization of organic residues, the owner has equipped the process with modern technologies able to extract natural tartaric acid from the sediments left by grape crushing and destemming.
Natual Tartaric Acid applies to a wide range of industrial sectors including food, pharmaceutical, chemical and the construction industry.

The company counts numerous production partners including 30 wine cooperatives producing wine from 12,500 vine growers over an area of 35,000 hectares, equal to 7 million quintals of grapes produced every year.
In order to integrate a sustainable business model, the wine company has focused major efforts on:

- Identifying new technologies applied to by-products
- Applying new matrices
- Fostering collaboration with agro-industrial entities
- Adopting new techniques for bio products extractions/collection that allowed a better organisation of employees' roles and tasks hence improved productivity

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Practice Abstract 6

Title: Bio products from thistle
Region: Sardinia, Italy

The green industrial requalification of a former petrochemical area in crisis led to the establishment of a bio refinery for the production of bio-based materials from thistle.
The raw material, extracted by thistle plant, is selected to create an innovative range of bio-products (bio-plastics, bio-lubricants, plant protection, additives for the rubber and plastics industries, food fragrances, proteins material for feed).
An important feature is the production of bio-extender oils that have been specifically designed for the tyre industry and are allocated to replace partially, or fully, those from fossil origin.
The bio-plasticizers, which are used in the flexible PVC industry, results as a valid and effective alternative to the more commonly used phthalate esters.
The thistle practice has revived strategic partnership amongst several actors such as thistle producers, cattle farmers, beekeepers, the bio-based companies and end users.

The activity is triggering positive benefits for local farmers, encouraging the development of new crops led by the new market opportunities offered by the thistle plant. In addition, business diversification and new forms of income have been created for those farmers involved in the business.
The cultivation of the thistle allows them to obtain a net profit of at least 245 euros per hectare thanks to the incentives of Measure number 10 of the PSR, Regional Rural Development Program.

Practice Abstract 7

Title: Candle cubes from apple wood – Product description
Region: Hasepngouw (Belgium)

The apple industry turned out to be a big opportunity for the region of Hasepngouw (Belgium). The high availability of wooden residues from apple trees, prompted a Belgian company to create new value added products out of this specific biomass.
About 800.000 apple trees (30.000 tons of wood) are stubbed in the region every year. Before of this practice, the generated biomass was kept underexploited or left beside on the field.
The candles and fire pit made out of wood chips and paraffin became a local alternative to the paraffin pots traditionally used by farmers.
The product is sold to practitioners and used as frost protection for the blossom in orchards (both open field and covered), with 8 hours-burning-time. Candles can also be used in gardens, with a burning time of 3 – 4 hours;
The practice follows a circular approach, with several benefits for practitioners:

1. Ashes turn into organic fertilizer for the orchard
2. The farmer does not have to collect the empty pots
3. Optimized logistics due to the cubic shape of the candles
4. The product is cheaper than the normally used pots (1500€ / night / ha instead of 2500€)
5. Producing no smoke makes them suitable for protected crop areas as, for example, Sherries
6. Smaller in size, farmers can drive over with tractors
7. Farmers can reuse their own wood as a source material
8. They contain only a limited amount of paraffin

Practice Abstract 8

Title: Candle cubes from apple wood – Process description
Region: Hasepngouw (Belgium)

The apple industry turned out to be a big opportunity for the region of Hasepngouw (Belgium). The high availability of wooden residues from apple trees, prompted a Belgian company to create new value added products out of this specific biomass.
The candles and fire pit made out of wood chips and paraffin became a local alternative to the paraffin pots traditionally used by farmers.
Instead of shredding the wood and processing it in the ground (cost factor), the processing company is taking care of the wood collection with farmers being payed for getting rid of their activity residuals (profit factor).
By focussing on two markets (professional and private), the processing company will have a better sales throughout the year. In years without frost, candles are sold to private customers where the product has a potential to be marketed towards the entire national territory and exported in foreign countries.
Potential for sales of cubes are very much higher when compared to the products developed and sold until now (smoked fleur de sell and wooden plates).

The practice offer market opportunities for potential producers of the cube packaging, which is still under Research. In fact, the product must be protected during transport and against rain and wet environments; and need to burn without smoke emissions.

Practice Abstract 9

Title: Fish-Tomato farm partnership
Region: Deinze, Belgium

A Belgian tomato grower has entered into a unique collaboration with a fish farm. The tomato farm supplies electricity, rain water and residual heat to fish nursery while receiving back filtered water as a reciprocal service. The water becomes an excellent product full of nutrients for the tomato crops, reducing the use of fertilizers with clear benefits for the farmer and the environment.
Both companies need large quantities of water for their productions. The tomato farm collects sufficient rainwater thanks to the large roof surface of the greenhouses and is able to supply part of it to the fishing farm.
The fishing farm water, soiled by feces and feed debris, but rich in nutrients, is drained regularly and mixed with fresh water.
Thanks to this concept, it is possible to have aquaculture without wasting water. In addition, the tomato farm is saving money on buying extra fertilizers.
Around 40-400 m^3 fishwater/day are channeled toward the tomato farm from March to October, which amounts to the 90% of the total water processed by the fishing farm.
The tomato farm counts a cost reduction of €22000/year in fertilizers while the fish farming has considerably reduced the amount of wastewater that had to be purified before being discharged into nature.
There is a 50% less distribution costs for the fishing farm and a fixed price for a part of the electricity provided by the tomato company.

Practice Abstract 10

Title: Microfibrillated Cellulose from spruce

Region: Sarpsborg, Norway

A Norwegian company has built the world's first commercial-scale production facility for Microfibrillated Cellulose (MFC). It has a capacity of processing 10.000 metric tonnes/year for deriving 10% paste (1000 metric tonnes dry matter).
The input material is derived from Norwegian spruce. The fiber improves rheology and stability, and has the capacity of enhancing structure in many different product formulations.

Thanks to a fibrillation process, the cellulose fibres are converted into a three dimensional network of micro-fibrils with an ultra-high surface area. These microfibrils are called MFC.

The fiber results a suitable material for the production of adhesives and sealants (performance enhancer), paint and coatings (improves rheology and stability), agricultural chemicals (performance enhancer for pesticides), personal care products (performance enhancer for skin creams and sprays), home care products (replaces surfactants in laundry soap), and construction (additive for cement).

The practice moves collaboration between spruce growers, the MFC producer and end users applying the material. This contribute to bring benefits for farmers given the increasing demand of spruce and the value creation of cellulose feedstock.

The establishment of a biorefinery with a new high-value product has contributed to create new direct jobs (57 Full-time equivalents by 2020) and indirect jobs throughout the entire value chain.

Practice Abstract 11

Title: Biochar from agricultural waste

Region: Burgenland, Steiermark, Niederösterreich, Austria

An Austrian company has developed a pyrolysis processes for the production of biochar from agricultural residues.

The biochar is made out of carbonized grain hulls. Straw, compost from biowaste and non industrial sewage sludge, residues of a biogas facility and mineral elements are added to create different product lines. All components are collected within a radius of 70 km and used to produce:

- Synthetic Terra Preta
- Black earth and synthetic chernozems (type of naturally occuring very fertile black earth)
- Synthetic terra preta (very fertile type of soil formed by human activity of the indigenous rainforest populace)
- Long term fertilizers for organic farming
- Gardening soils
- Soils for landscaping
- Feed coal enhancing animal growth and health
- Litter coal retaining odour of manure

Farmers are crucial actors for ensuring the circularity of the practice. They benefit of an economic advantage when selling residues as input material for the processing industry. This is transformed into a value added product for farming, cattle breeding and stock farming, which entails the following properties:

- Caching of nutrients in the "manure sponge"
- Nutrients plant-available on the field
- No leaching of manure nutrients into the groundwater
- Carbon storage in the field
- In case of long-term application simultaneously humus structure
- Better water storage capacity of the soil

Pracitce Abstract 12

Title: Integrating rape-seed-oil for asphalt creation
Region: Austria

It is expected that bitumen prices will continue to increase over the next few years, making alternative raw materials more competitive and with increasing market share for this product.
Renewable materials such as rapeseed oil are used to replace a small part of the bitumen for road maintenance binders. As a result, the innovative procedure has been used to create a repair asphalt mix that can be installed in cold conditions. Around one-third of this pioneering binder consists of biobased materials.
Rapeseed oil is one of the basic ingredients for the product, which is a typical agricultural product. The yield of 1m² of a rapeseed field equals to 1m² of road surface material.
Forecasts assume that about three percent of the bitumen could be replaced by rapeseed oil, which corresponds to about 15,000 tonnes of rapeseed oil in Austria and 100,000 tonnes in Germany, per year.
The product is also sold in small units (e.g. 10 kg buckets) in do-it-yourself-stores for home applications.
The integration of this product into the mixture of bitumen and aggregate binder fits the traditional process for asphalt manufacturing.

Practice Abstract 13

Title: Bio-fertilisers from agri production

Region: Plovdiv, Bulgaria

A new national regulation for waste management, together with financial insentives for agricultural waste management, has prompted a Bulgarian company to establish a biorifinery to convert residues into bio-based product.

The company is equipped with two thermofilic fermentors where animal manure and plant residues are processed. The digestate output (solid fraction of fermentation) is composted and offered as bio-based fertilizer for agricultural operations.

The rest of the derived material is used for energy production where the national Electric Company buys the energy produced by the plant.

Both techniques result as an alternative and better usage of resources in the Plovdiv area, where Agricultural waste is used for biogas and bio-fertilizers production instead of being dumped in dunghill.

The practice stimulates synergies amongst several operators such as farmers [producers of crops and livestock], processing industry (CHP), special logistics companies, municipality, local and regional entities/companies.

Farmers providing silage and animal manure to the processing industry. A specials logistics is required to transport and store these parts: they are stored in steel tanks and kept under controlled temperature. Meanwhile, appropriate logistics and storage facilities are required to manage dangerous residues.

A licensed company collects the manure, after contracts between companies and farmers.

Practice Abstract 14

Title: Animal bedding from Miscanthus
Region: Devon, South East England

A British company produces horse and small animal bedding created from "Miscanthus", which is alternatively grown for energy crops over a 15-year period, with the first harvest taking place 3 years after sowing.
The crop is harvested by the processing industry using conventional forage harvesting equipment which turns the Miscanthus into chips. These are transported to the processing site in silage trailers, where they are tipped up and dried, dust is extracted and the chips are then packed into bags to be distributed.
The practice triggers direct economic benefits. There is an increased revenue for each bale sold for £6.05 or £218.00 per pallet of 36 bales whereas conventional bedding is £7.00 per bale or £252.00 per pallet of 36 bales. Representing savings for users.
This still represents an increase in income for farmers as the contracted price for miscanthus grown for energy in the UK is circa £70/tonne at 16% moisture. This in turn means that there is an opportunity cost for farmers to bag and extract dust of £148.
The crop yields up to 14tonnes/hectare, which at £70/t results in an income of up to £980/Ha for energy production, or up to £3052/Ha for bedding.
The processing of the crop is the same throughout up to delivery to the plant where it is dried, dust is extracted and it is bagged. It is a niche product and, as such, returns are higher for all parties involved.
Additional benefits include:
Comfort for Animal - Users report that horses can get up easily and do not damage limbs
Saves Labour – It needs less frequent changes of bedding
Technical - The product lasts longer than traditional bedding
Consistent – "bale to bale" The Material comes all from the same producer

Practice Abstract 15

Title: Biobased air and water drain systems
Region: The Netherlands, Germany and Brasil

Current practices often make use of plastic pipes (PE) for draining and/or aerating tree roots. A new solution made with biodegradable components allows draining water and aerating air in the soil surrounding the roots of (young) trees.
The product is fabricated out of corn starch and bioplastic (Cradonyl) and therefore 100% biobased. Thanks to the biobased composition and degradable characteristics, the pipes will be fully composted after a few years and therefore do not need to be removed from the soil after their functional lifetime.
Due to higher production costs (raw material is more expensive and process energy costs are higher) of the biodegradable components, the selling price is 1,5 times higher compared to a conventional PE system. The added value of using the biodegradable products lies in eliminating waste-removal costs (labour costs for removing pipes and recycling/disposal costs).
The biobased granulate fully fits in current production processes (injection moulding techniques) for hard plastics (HDPE/LDPE). The components of the aerating and water draining systems are biodegradable and will be fully composted after the product function lifetime, creating a zero-waste product and a reduction in waste-collection labour.

Practice Abstract 16

Title: Mitigation of phosphate surplus from pig manure
Region: Son, the Netherlands (North-Brabant)

For Dutch farmers, valuing pig manure is a major issue, since intensive livestock has caused a significant phosphate surplus in Dutch agriculture.
A local company has started operations wherein pig manure is collected from 70 farmers and mono-digested together with unborn manure, collected from slaughterhouses. The digestion process produces renewable gas for approx. 1,700 households. The digestate is separated in two streams. The phosphate rich stream is dried with waste heat and palletized into an organic phosphate turning into a rich fertilizer product, which is exported to low-phosphate regions in Europe. The other stream is processed in an on-site waste water treatment plant, resulting into clean water that is discharged to local surface water.
For 70 intensive pig livestock farmers, the practice offers a solution to process their manure surplus (required by Dutch law) into organic phosphate rich fertilizer pellets, which are transported to low-phosphate regions (closing the phosphate mineral loop).
The process is an example of closing the loop on economic and ecological sustainability for urgent challenges in the (national) agricultural sector. Through chain collaboration and high dedicated technology, this business model enables to create a stable economic opportunity out of (former) waste streams like pig manure, animal by-products and food residues.

Practice Abstract 17

Title: Local pellets
Region: Vysocina, The Czech Republic

After processing the primary agricultural production, farmers need to deal with large amount of surpluses and remnants such as straw, hay, husks from cereals, legumes, grasses, dried crops or dry wood biomass (wood chips and shavings).
A company in the region of Vysocina has developed a technology to produce high quality pellets using local feedstock.
The practice highlights a circular business approach where the input material (residuals) provided by farmers is transformed into a product that can be used as litter for cattle, feed for cattle, fertilizer or fuel.
The plant is able to process approximately 1000 t/year in one work shift. The ratio of pellets to fuel / feed / litter is approximately 20/60/20%.
Farmers and other biomass producers can buy their own pellet processing line or use the company service to have the pellets directly processed.
Thanks to this practice, there is a reduction of unused waste from agricultural primary production (0-100%), and an increase in storage capacity by 15-30% compared to bulk sources or parcels. Farmers can benefit of higher revenues and efficiency of farming as they can use litter for cattle and small animals paying 20-25% less than the commonly used one. The product has significantly higher water absorption rate, with lower costs for replacement and storage.

Practice Abstract 18

Title: Bioplastic Normandy - Cereals Biomass
Region: Normandy, France

Prompted by the need to diversify the sources of biomass for their production, a French company started new production lines working with original bio sources. The aim was to create a high performance and biobased compounds sold to the packaging industry to develop products for several sectors.
The innovation lies on the use of different kind of biomass by-products as fillers in polymers in order to produce packaging.
Biomass from cereal waste such as wheat, barley and corn, result as a suitable input for primary injection moulding processes in the production of rigid secondary packaging, regular consumption goods, technical parts, agriculture and horticulture products, cosmetic.
The feedstock needs to be grinded, dried and sieved before being used by the plastic industry.

Benefit for farmers is to be able to recover biomass by-products or wastes in a new market. A cost item can thus become a profit item for them. These examples show good opportunities for farmers to find innovative end-of-life to their wastes and to support the production of environmentally efficient products. Regarding the use of by-products as fillers, the company has a direct buying contract with farmers or cooperatives. For the use as raw material for polymer production, farmers have direct contracts with biopolymers manufacturers.

Practice Abstract 19

Title: Bioplastic Normandy - Seashells and Algae biomass
Region: Normandy, France

Prompted by the need to diversify the sources of biomass for their production, a French company started new production lines working with original bio sources. The aim was to create a high performance and biobased compounds sold to the packaging industry to develop products for several sectors.
The innovation lies on the use of different kind of biomass by-products as fillers in polymers in order to produce packaging.

Biomass from aquatic coproducts (scallops, oysters, algae) result as a suitable input for primary injection moulding processes in the production of rigid secondary packaging, regular consumption goods, technical parts, agriculture and horticulture products, cosmetic.
The raw material needs to be crushed into a powder before being used by the plastic industry.

Benefit for farmers is to be able to recover biomass by-products or wastes in a new market. A cost item can thus become a profit item for them. These examples show good opportunities for farmers to find innovative end-of-life to their wastes and to support the production of environmentally efficient products. Regarding the use of by-products as fillers, The company has direct buying contract with farmers or cooperatives. For the use as raw material for polymer production, farmers have direct contracts with biopolymers manufacturers.

Practice Abstract 20

Title : Bioplastic Normandy - nut kernels and shells biomass
Region : Normandy, France

Prompted by the need to diversify the sources of biomass for their production, a French company started new production lines working with original bio sources. The aim was to create a high performance and biobased compounds sold to the packaging industry to develop products for several sectors.
The innovation lies on the use of different kind of biomass by-products as fillers in polymers in order to produce packaging.

Biomass from nut shells kernels (hazelnut, almond, rice, olives) result as a suitable input for primary injection moulding processes in the production of rigid secondary packaging, regular consumption goods, technical parts, agriculture and horticulture products, cosmetic.
The raw material needs to be crushed into a powder before being used by the plastic industry.

Benefit for farmers is to be able to recover biomass by-products or wastes in a new market. A cost item can thus become a profit item for them. These examples show good opportunities for farmers to find innovative end-of-life to their wastes and to support the production of environmentally efficient products. Regarding the use of by-products as fillers, the Company has direct buying contract with farmers or cooperatives. For the use as raw material for polymer production, farmers have direct contracts with biopolymers manufacturers.

Practice Abstract 21
Title: Fruit Waste processing
Region : Normandy, France

Prompted by the need to diversify the sources of biomass for their production, a French company started new production lines working with original bio sources. The aim was to create a high performance and biobased compounds sold to the packaging industry to develop products for several sectors.

The innovation lies on the use of different kind of biomass by-products as fillers in polymers in order to produce packaging.

Biomass from processing of fruits (coffee ground, cacao shells, apple pomace, grape seed) result as a suitable input for primary injection moulding processes in the production of rigid secondary packaging, regular consumption goods, technical parts, agriculture and horticulture products, cosmetic.
The raw material needs to be crushed into a powder before being used by the plastic industry.

Benefit for producers is to be able to recover biomass by-products or wastes in a new market. A cost item can thus become a profit item for them. These examples show good opportunities for farmers to find innovative end-of-life to their wastes and to support the production of environmentally efficient products. Regarding the use of by-products as fillers, the Company has direct buying contract with producers. For the use as raw material for polymer production, farmers have direct contracts with biopolymers manufacturers.

Practice Abstract 22
Title : Vegetal fibers biomass
Region: Normandy, France

Prompted by the need to diversify the sources of biomass for their production, a French company started new production lines working with original bio sources. The aim was to create a high performance and biobased compounds sold to the packaging industry to develop products for several sectors.
The innovation lies on the use of different kind of biomass by-products as fillers in polymers in order to produce packaging.

Biomass from vegetal fibers (miscanthus, flax, hemp, wood, cork) result as a suitable input for primary injection moulding processes in the production of rigid secondary packaging, regular consumption goods, technical parts, agriculture and horticulture products, cosmetic.
The raw material needs to be crushed into a powder before being used by the plastic industry.

Benefit for producers is to be able to recover biomass by-products or wastes in a new market. A cost item can thus become a profit item for them. These examples show good opportunities for farmers to find innovative end-of-life to their wastes and to support the production of environmentally efficient products. Regarding the use of by-products as fillers, The company has direct buying contract with producers. For the use as raw material for polymer production, farmers have direct contracts with biopolymers manufacturers.

Practice Abstract 23

Title: Bio-rubber from Russian Dandelion
Region: Europe and USA

Russian dandelion (*Taraxacum kok-saghyz*) proofed to be a suitable replacement for natural rubber in the production of high-quality rubber products such as tyres.
When compared to natural rubber, Russian Dandelion has a much greater geographical distribution, it is easier to cultivate and delivers rubber faster.
Residues from the production process can also be valorised for inulin production or be further used for feed, food, biogas, or bioethanol production.

The integration of Russian dandelion for rubber production is expected to lead to a higher independence from tropical production sites while creating new opportunities for farmers in lower latitudes, especially for marginal areas that cannot be used for producing other crops. Some of the benefits include:

- New income source due to strong demand of large amounts of rubber
- Easy to cultivate and to harvest
- Faster production of rubber
- Short life cycle (6-8 months), allowing up to two harvests per year

The EU project "Drive4EU", has calculated an average costs 45 EUR to produce 1 ton of fresh Dandelion roots, including land, seeds, machines, fertilisers, plant protection, personnel etc, at a time span of 10 years. This cost is estimated to decrease at 31 EUR per ton in a time span of 25 year.

Practice Abstract 24

Title: Insulation materials from grass fibre
Region: Odenwald, Germany

A German company has developed an innovative grass fibre blow-in insulation material for wall, roof and floor cavities, made of 100% renewable natural cellulose from meadow grass. The goal is to substitute conventional insulation material based on crude oil and to use raw materials as efficiently as possible.

The grass is grown by local farmers and has the potential to be sold internationally.

Farmers benefit of increasing profits from the sale of meadow grass as the processing company offers long-term contracts for the biomass suppliers. With growing demand of the grass fibre and other grass-based products, grass prices may rise and provide a secure income for farmers. Grass is easy to cultivate, with low input of labour, machines, and fertiliser and allowing several harvests per year. The cultivation of grass will not lead to a depletion of soils, as biomass residues from the production process are returned to the field as fertiliser.

The grass fibre can be fully recycled without generating waste products or waste water. The necessary energy and heat are provided by the affiliated biogas plant, which works with the by-products and residues of the biomass.

The water required for the separation of the grass fibres is reconditioned and reused in the process.

Practice Abstract 25

Title: Thermoplastic from grass fibre
Region: Odenwald, Germany

A German company has developed an innovative fibre-reinforced thermoplastic for injection moulding and extrusion. The input material (granules) contain up to 75% cellulose from meadow grass. Grass as a raw material and recycling material (plastics, biomass) are used to produce the fibre and other bio-based products. The goal is to substitute conventional thermoplastic based on crude oil and to use raw materials as efficiently as possible.

Farmers that cultivate the grass regional benefit of increasing profits from the sale of meadow grass as the processing company offers long-term contracts for the biomass suppliers. With growing demand of the grass

fibre and other grass-based products, grass prices may rise and provide a secure income for farmers. Grass is easy to cultivate, with low input of labour, machines, and fertiliser and allowing several harvests per year. The cultivation of grass will not lead to a depletion of soils, as biomass residues from the production process are returned to the field as fertiliser.

The grass fibre can be fully recycled without generating waste products or waste water. The necessary energy and heat are provided by the affiliated biogas plant, which works with the by-products and residues of the biomass.

The water required for the separation of the grass fibres is reconditioned and reused in the process.

Practice Abstract 26

Title: AgriChemWhey project
Region: County Tipperary, Cork, Waterford, Kilkenny, Carlow and Dublin, Ireland

The practice originates from the AgriChemWhey project, started due to the lack of effective and reliable disposal routes for the dairy processing side streams such as whey permeate and delactosed whey permeate.
With the industry expanding rapidly in Ireland, it was essential to take steps towards waste reduction and waste valorisation, with approximately 1.5 billion litres of whey produced annually.
The final output of the process is a “polymer grade lactic acid” from whey permeate and delactosed permeate for bioplastics production as well as conversion of fermentation residues to minerals for human consumption and biofertilisers.
The project aims at developing multiple products that have already established commercial value such as L-Lactic acid, Polylactic acid (PLA) and minerals for human nutrition and biofertilisers.
Connecting dairy sector with biobased products sector will expand the dairy farming in Ireland and secure the future for dairy farming families through an increase in incomes and protection against income volatility due to the volatility in milk prices.
The practice is also drawing a circular process given by fertiliser production from fermentation waste streams, which has potential to supply high value and low cost fertilisers to farmers.

Practice Abstract 27

Title: Bioplastic from feedstock-lignocellulosic biomass
Region: Dundalk, Ireland

An Irish company, located in the region of Dundalk, is committed to reduce the cost of bioplastic production by applying end-end innovative technologies.
Thanks to innovative pre-treatment and process technologies, the company uses 2nd generation diary (lactose whey) and agriculture feedstocks (wheat straw, spent brewery grains and dried distilled grains) to produce bioplastic ingredients, bioplastics and high-demand biochemicals like L+ and D- lactic acid, ethyl lactate, polylactic acid, lactates and PHA.
The technology can be used on wide variety of feedstock and be applied for agriculture residues like wheat strew or installed in bio-ethanol, dairy and brewing facilities to valorise side streams to optically pure lactic acid and bioplastics.
Flexibility to use agricultural and brewery waste as well as dairy by-products will avoid the challenges associated with feedstock availability and price volatility.
People from all sectors will have access to bioplastics due to their affordable price. Partnership with sectors using high amounts of disposable plastics (e.g. hospitals) will reduce the use of petroleum-based plastic, which will have big impact on carbon foot print reduction.

In order to achieve a successful business model, the company has collaborated and acquired companies with innovative technologies and optimised them to the target process and product. This business model has reduced the technology development costs and it has the capacity for replication in other European regions.

5 Annexes

Annex 1: Template for the Enabling's practices

Format for best practice collection	
Defining the Background context: **Why have you developed this practice/process?** **What have been the reasons that prompted, led or encouraged the realisation of the business model, process or activity?**	
Short summary of the practice: **Description of the process, activity or business model.**	
Region(s) involved	
List the main actors involved and what activities they cover, or have covered, in the practice or business model.	
In what phase is the innovation? (What is the Technology Readiness Level? See Figure 2 in the handbook).	
What is innovative in the process? **How has it been developed?**	
What is the expected or final outcomes of the activity?	
What is the benefit for the famers involved in the value chain? How is this value created?	
What is the benefit/added value for the bio-based product companies involved in the value chain? How is this value created?	
What is the benefit/added value for other practioners or end-users involved in the value chain (retail, logistics, service markets, consumers)? How is this value created?	
Identify and describe other factors that have made possible, or can make possible, a successful realisation of the practice/activity.	

Annex 2: Practice Abstract Template

Practice "abstract" 40:	*Several practice abstracts may be needed for one project, depending on the size of the project and the number of outcomes/recommendations which are ready for practice.*
Short title in English (0-150 characters)	
Short summary for practitioners in english on the (final or expected) outcomes (1000-1500 characters, word count – no spaces). *Do not complete if the summary below is completed in English* This summary should at least contain the following information: − Main **results/outcomes** of the activity (expected or final) − The **main practical recommendation(s)**: what would be the main added value/benefit/opportunities to the end-user if the generated knowledge is implemented? How can the practitioner make use of the results? This summary should be as interesting as possible for farmers/end-users, using a direct and easy understandable language and pointing out entrepreneurial elements which are particularly relevant for practitioners (e.g. related to cost, productivity etc). Research oriented aspects which do not help the understanding of the practice itself should be avoided.	
Short title in native language (0-150 characters)	
Short summary for practitioners in native language (*can be the language of the coordinator / one of the partners - otherwise in English*) (1000-1500 characters, word count – no spaces). This summary should at least contain the following information: − Main **results/outcomes** of the activity (expected or final) − The **main practical recommendation(s)**: what would be the main added value/benefit/opportunities to the end-user if the generated knowledge is implemented? How can the practitioner make use of the results? This summary should be as interesting as possible for farmers/end-users, using a direct and easy understandable language and pointing out entrepreneurial elements which are particularly relevant for practitioners (e.g. related to cost, productivity etc). Research oriented aspects which do not help the understanding of the practice itself should be avoided.	

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