SUST CERT 4 BIOBASED
SUSTAINABILITY CERTIFICATION FOR BIOBASED SYSTEMS

D4.2

Selection of biobased value chains for cost benefit analysis

WR-WECR

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ABBREVIATIONS

BCI	Better Cotton Initiative
CBA	Cost Benefit Analysis
EU	European Union
FSC	Forest Stewardship Council
GRS	Global Recycled Standard
ISCC	International Sustainability &Carbon Certification
PEFC	Programme for Endorsement of Forest Certification
RSB	Roundtable on Sustainable Biomaterials
TE	Textile Exchange

Executive Summary

This deliverable is the output of the Task 4.2, which is a part of Work package 4 “Cost and feasibility assessment” and aims to select three industrial biobased value chains for further in-depth evaluation of the costs and benefits of adoption of sustainability schemes and labels in these three chains (cost and benefit analysis (CBA) including internalization of externalities).

The three biobased value chains are selected based on the following information:

1. Close collaboration with WP 2, Task 2.1 – “Identifying most representative biobased value chains” Deliverable 2.1 (see Section 2.1).
2. Based on the information on applicable schemes/labels for the type of value chains from WP1 (Task 1.3 “Identifying and reviewing existing sustainability certification schemes and labels relevant to biobased value chains”) (see Section 2.2).
3. Considering additional value chain specific criteria identified in this document (see Section 2.3)

The outputs of 1 and 3 are used for value chain selection, while the output of 2 is used to select a suitable certification scheme to be analyzed in the context of CBA in the selected value chains.

Based on above-mentioned information, three promising sectors have been selected. These sectors are:

- textile
- chemical
- wood

Per sector one value chain will be selected for further analysis in Task 4.5. The examples of possible value chains per sector are provided in Section 3.1. This might be a textile value chain for clothing or a bio-plastic packaging value chains (e.g., sacks and bags of polymers of ethylene).

In addition, per sector suitable certification schemes are proposed for CBA.

The following certification schemes have been selected as promising schemes for further CBA analysis:

- Textile sector: Textile Exchange is the suggested certification standard with the GRS scheme and/or BCI. By including both GRS and BCI, both the sustainable production of virgin material and recycled content can be covered.
- Chemical sector: ISCC Plus certification is considered as market leader in certification of biobased chemicals and plastics. RSB Standard for Advanced Products and Better Biomass will also be considered due to data availability considerations.
- Wood Sector: FSC or PEFC that certify wood for any application. FSC And PEFC are leading schemes for wood and can be used to certify any wood products.

In this respect three different certification schemes will be considered to illustrate diverse aspects of such schemes. Each selected value chain will be coupled with a suitable certification scheme for this chain to perform CBA. The final selection of the value chains will largely depend on the data availability as without proper data it is not possible to carry out CBA. Data collection for the selected biobased value chains will take place in Task 4.4. Prior to this, in Task 4.3 a data collection template will be developed, which will be filled out with data in Task 4.4 for further CBA in Task 4.5. The details of these activities will be provided in Deliverables 4.3, 4.4 and 4.5 respectively based on the initial proposal of the project.

1. Introduction

Task 4.2 is a part of Work package 4 “Cost and feasibility assessment” and aims to select three industrial biobased value chains for further in-depth evaluation of the costs and benefits of adoption of sustainability schemes and labels in these three chains (cost and benefit analysis (CBA) including internalization of externalities).

Note that the purpose of the CBA on certification schemes in these three selected value chains is not the comparison of different certification schemes, but the illustration of different aspects that need to be considered when calculating costs and benefits (including the costs and benefits of internalized externalities) of different sustainability schemes in biobased value chains.

The report is structured as follows. Section 2 provides information on specific selection criteria based on Input from Task 2.1 and Task 1.3 and considering additional chain specific criteria for carrying out CBA. Section 3 provides an overview of the three promising value chains selected from different industrial sectors coupled with their suitable certification schemes for the CBA. This section also provides an overview of different possible examples of the value chains per sector. The report ends with an Outlook presented in Section 4, where the further steps of the study are discussed.

2. Selection Criteria for identification of bio-based value chains for cost-benefit analysis

The procedure of the selection of the value chains for further CBA is presented in Figure 1.

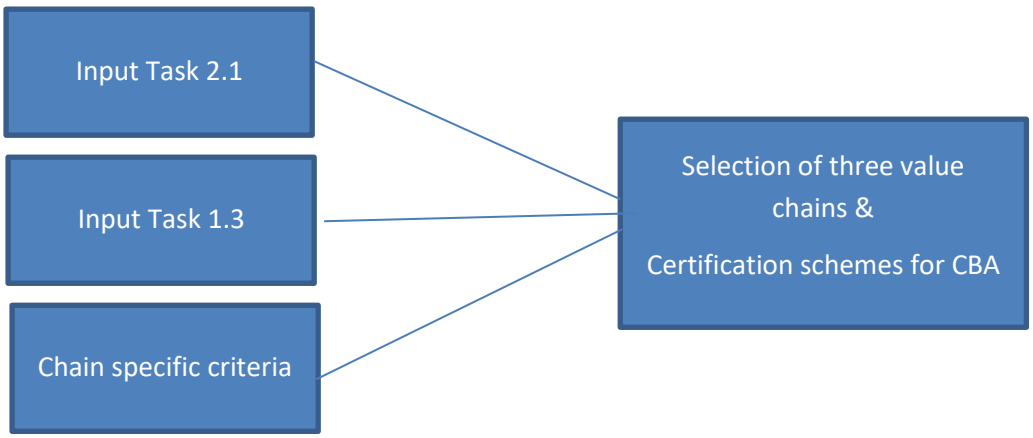

Figure 1: The procedure of the value chain selection

The three biobased value chains are selected based on the following information:

1. Close collaboration with Task 2.1 – “Identifying most representative biobased value chains”, where 18 specific value chains were selected according to some considerations, such as total/sold production of the product in the EU, to cover all the categories of biomass identified in Task 1.4, desk research and feedback from the partners (a detail information can be found in Deliverable 2.1 of the project).

2. Based on the information on applicable schemes/labels for the type of value chains from WP1 (Task 1.3 “Identifying and reviewing existing sustainability certification schemes and labels relevant to biobased value chains”).
3. Considering additional value chain specific criteria identified in this Task (see Section 2.3). These criteria will be used later in the project (in the tasks 4.3 and 4.4) to refine value chain selection to a product level (see Section 4 for explanation).

The outputs of 1 and 3 are used for value chain selection, while the output of 2 is used to select a suitable certification scheme to be analyzed in the context of CBA in the selected value chains. In this respect three different certification schemes will be considered to illustrate diverse aspects of such schemes. Each selected value chain will be coupled with a suitable certification scheme for this chain to perform CBA.

2.1 Identification of the most representative biobased value chains - Input from Task 2.1

The selection of the three value chains for further CBA has started by utilizing the input of the Task 2.1 “Identification of the most representative biobased value chains”. In order to identify the most representative biobased value chains, Task 2.1 has carried out the following steps (more detailed information on this can be found in Deliverable 2.1):

1. First selection of value chains: value chains should be from a specific biological resource to a specific biobased product
2. Analysis of the sectors and identification of the main product groups within each sector:
   - Three main groups are selected on the basis of literature (level of market coverage within the sector, current % of biobased products, promising future trends of that final product or intermediates, etc.).
3. Analysis of the different final products for each identified group and selection of the final product.
   - This is mainly done through the values provided by PRODCOM (either final quantity produced or sold in the EU) and by analysing the market of what is selling the most of each group selected (e.g., the paper that sells the most is the graph).
   - Feedback from the partners of the consortium were considered to define the final value chains.
4. To build the value chain, literature is used to assess the production process and finding the most representative value chain in the market from feedstock to intermediate and to the final product.
   - To identify intermediate products from which the final product can be derived (try to avoid repetition between the value chains of the same sector)
   - To choose the intermediate products values provided by PRODCOM are considered but also intermediate products with more prospects for being replace with biobased according to literature.
   - The 4 main biological resource categories (primary dedicated, primary residues, secondary residues, tertiary residues) have been considered to build the biobased value chain.

Based on above-mentioned criteria, in total 18 value chains in 6 sectors have been identified and analysed (see Annex 1. Identification of the most representative biobased value chains and Deliverable 2.1 for more details). The 6 sectors with 3 product groups identified in each sector are listed below:

1. Textile sector:
   a. Textile clothing
   b. Textile furniture
   c. Industrial textile
2. Plastic sector:
   a. Packaging
   b. Consumer goods
   c. Agriculture and horticulture
3. Chemical sector:
   a. Lubricants
   b. Solvents
   c. Adhesives
4. Pulp and paper sector:
   a. Packaging
   b. Sanitary
   c. Graphic paper
5. Construction sector:
   a. Interior construction
   b. Building envelope
   c. Floor
6. Woodworking sector:
   a. Carpentry pieces
   b. Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials, wickerwork and wickerwork (Option B)
   c. Manufacture of furniture

The selected 18 value chains have been ranked for their representativeness based on the three main criteria (environmental, technical and socioeconomic) and their 10 sub-criteria (see Deliverable 2.1 for further information).

2.2 Extraction from the catalogue of sustainability certification schemes and labels - Input from Task 1.3

Task 1.3 was devoted to Identification and review of existing sustainability certification schemes and labels relevant for the biobased value chains. This task has used a set of criteria for identification of relevant schemes and labels for the biobased value chains.

The criteria used for initial identification are the following:

1. Applicable to biological resources intended for industrial bio-based value chains or applicable to biobased materials and products
2. Geographical coverage at least EU or global
3. Full supply chain coverage - not focused on one stage of lifecycle
4. Principles and criteria concerning all sustainability dimensions (environmental, social and economic) and governance are included for certification schemes
5. Exclude schemes/labels specifically developed for food/feed and biofuel/bioenergy sector
6. Additional
   a. Focus on major biobased value chains (niche applications could be excluded)
   b. Have a mixture of different categories of biological resources

c. Focus on the ones that are prominent in market (exclude rarely used schemes/labels)
d. Exclude schemes labels specific to organic production and labelling of organic products
e. Exclude business to consumer specific schemes, labels

This has resulted in a long list of certification schemes. The list has been further shortened considering the most relevant schemes for industrial biobased systems and based on a coverage of different type of feedstock and sectors. This has resulted in the following selection:

- Biological feedstock:
  1. FSC - wood
  2. BCI - cotton
  3. RSPO - palm
  4. Bonsucro – sugarcane
- Biobased value chains:
  5. ISCC Plus (all products)
  6. RSB Advanced (all products)
  7. Better Biomass (all products)
  8. Textile Exchange (textile sector specific)
- Ecolabels
  9. EU Ecolabel
  10. Nordic Ecolabel
  11. Blue Angel

2.3 Value chain specific criteria

In addition to the inputs from Task2.1 and Task1.3, a set of value chain specific criteria have been identified. Although we provide the listing of these criteria below, they will be mainly used in the later stage of the project (in the Tasks 4.3-4.5) in refining the final value chain selection, while developing data collection template and collection of actual data for CBA. The following criteria are identified:

1. Data availability (as one of the most important criteria):
   - This is the most deterministic criteria as without proper data it is not possible to carry out CBA and will largely determine the final value chain selection. Hereby it is important to consider:
     - data availability in literature
     - possibility to collect additional data from value chain partners
     - possibility to extrapolate information
2. Value chain boundaries:
   - EU vs. Worldwide: The value chain selected should have its stages and activities to a larger extend in the EU with a final product being produced/consumed in the EU, while the biological resources used might come from the non-EU countries
   - Stages in the chain: The value chain must consist of at least 3 stages (e.g., biomass/raw material production, 1 or 2 intermediary products, final products)
   - Shorter value chains will be prioritized, so that the implementation of the learnings and outcomes will be feasible in the CBA
3. Sectors and products
   - The value chains will be selected per sector with a specific product in each
   - 3 products from 3 different sectors will be selected to ensure a diversity of the analysis
   - The most advanced sectors in terms of use of biobased certification will be given a priority
4. Scale of analysis

- Micro-level analysis: The analysis will be done on a value chain level by identifying 1-2 producers per value chain stage

5. Alignment with the sister projects (i.e., two other projects funded under HORIZON-CL6-2021-ZEROPOLLUTION-01-07 HARMONITOR and STAR4BBS)
   - The selected value chains and products for the analysis will be discussed with two sister projects to align the selection and to avoid the duplication of the exact same value chains/products

3. Suggestion for 3 promising biobased value chains coupled with their certification schemes for CBA

Based on the above-specified inputs and criteria, three biobased value chains were selected to focus on in the upcoming phases of the project. As specified above, data availability plays a key role in the final selection. At this stage the value chains cannot be specified up till specific product level as the data collection will start later in the project under the Tasks 4.3 and 4.4. The specific value chains investigated should stem from the same sectors in Deliverable 2.1. Hereby we suggest combining some sectors with similarities and/or shared raw materials and selecting one value chain for each combined sector (see Figure 2 below).

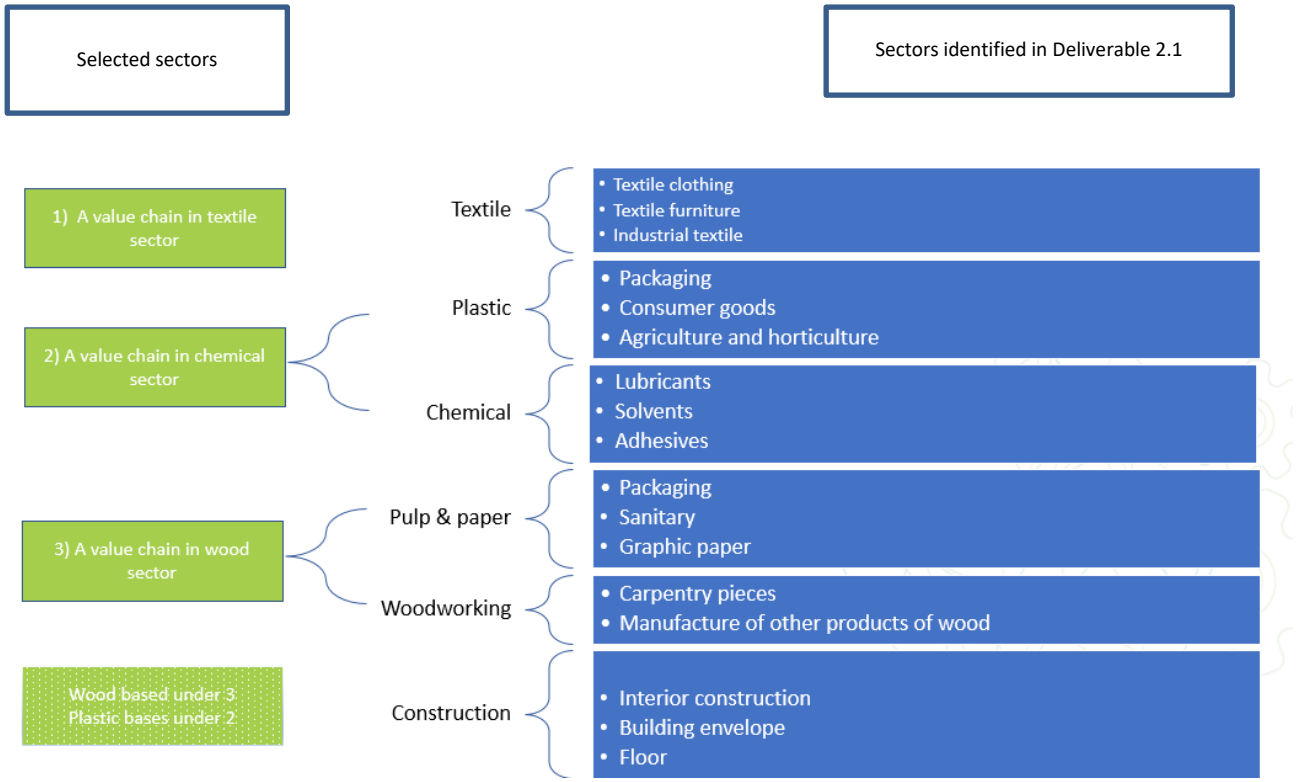

Figure 2: Selected 3 value chains/sectors

From Figure 2, it can be seen that Textile sector is not combined with any other sector. Plastic and Chemical sectors are proposed to be combined into a Chemical sector, while Pulp & Paper and Woodworking sectors are proposed to combine under Wood sector. The argumentation for this

stems from the similarities and shared raw materials between chemical and plastic sectors, where the plastics are derived from the chemicals sector. Similarly, wood sector covers both the pulp and paper sector and the woodworking sector, where the main raw material used is woody biomass. Combining these two sectors makes sense due to the high extent of overlap in the raw materials of these sectors. Regarding the Construction sector, this sector has been considered to be mostly covered as part of the Chemical or Wood sector. Arguably, this sector is too diverse to make meaningful extrapolations from a specific selected value chain. However, when the construction materials are wood based (e.g. floor) the value chain falls under the Wood sector, and when they are plastic based, the value chain falls under the Chemical sector. Combining these sectors would allow for a wider coverage of different value chains, while also allowing for flexibility at later stages of the project.

In conclusion, we will focus on the Textile, Chemical, and Wood sectors, where per sector one value chain will be selected for further analysis.

3.1 Examples of the value chains per sector

Below we present a few examples of the possible value chains per selected sector. The examples provide an idea on value chain stages per sector that need to be considered when selecting the final value chains for CBA in the later stage of the project.

3.1.1 *Textile sector value chain*

A common value chain stages of a textile sector are presented by Figure 3 below.

Figure 3: Value chain stages in a textile sector

In general textile value chains independent of the final product such as textiles used for clothing or textile used for home articles (e.g., table linen, bath and bed textiles) consist of a common value chain stages illustrated in Figure 3. These are:

Example of a textile value chain (e.g., clothing or home textile)

1. Raw material: The first step in the textile production chains starts from the production of the bio resources/raw material. These can involve a production of natural resources, such as cotton, wool, or silk, flax etc.
2. Fibre Production: The next step in the textile value chain is the production of fibres. This involves the extraction of the fibres from the above-mentioned raw materials.
3. Yarn Production: fibres are then spun into yarn, which is used to create fabrics. This can be done using various techniques, such as ring spinning, open-end spinning, or air-jet spinning.
4. Fabric Production: The yarn is then woven or knitted into fabric, which can be further processed through techniques such as dyeing, printing, or finishing.
5. Manufacturing: The fabric is then cut and sewn into garments or other textile products, such as bags or home textiles.
6. Distribution and Retail: Once the textile products are produced, they are distributed to either to industrial manufacturers for use in various industries or retailers and sold to consumers.

Recycled textile value chains

The above-mentioned textile chains assume the use of a virgin material as a raw material source. While this linear value chain is still the most prevalent one, recently, circular textile value chains, with textiles made using recycled materials are becoming increasingly popular. In this case the first two stages of the production value chain described above are replaced by collection of the textile waste and sorting it at the recycling facility, followed by processing it into fibres. All the remaining value chain stages are like the once described above.

3.1.2 *Chemical sector value chain*

A common value chain stages of a Chemical sector are presented by Figure 4 below. This sector comprises of plastic and chemical sector.

Figure 4: Value chain stages in a plastic sector

In general, chemical value chains (for plastic and chemicals) consist of a common value chain stages illustrated in Figure 4, where depending on the product type, intermediate stages (with 1-2 or more intermediate output products) may be present. Below we describe an example of a packaging value chain with it stages.

Example of a packaging value chains (e.g., sacks and bags of polymers of ethylene)

1. Raw materials or biomass production: The first stage involves the cultivation or extraction of renewable biomass sources that can be used to make biobased plastics. This can include crops such as corn, sugarcane, sugar beet.
2. Processing/ Conversion stage:
   a. Ethylene production: The second stage involves the production of biobased ethylene from renewable biomass sources.
   b. Polymerization: The biobased ethylene is then polymerized using a catalyst to form a plastic resin.
3. Manufacturing: The plastic resin is then processed into bags or sacks using various techniques such as heat sealing or sewing.
4. Distribution and consumption: The finished packaging products are distributed to retailers and consumers for use.

3.1.3 *Wood sector value chain*

A common value chain stages of a wood sector are presented by Figure 5 below. This sector comprises of woodworking and paper and pulp sector.

Figure 5: Value chain stages in a wood sector

Below we present 2 examples of value chains from this sector, where one is related to a carton packaging with its stages, while the second one presents an example of a wooden furniture value chains.

Example of a Carton Packaging value chains (e.g., from coniferous trees)

1. Raw materials: Carton packaging is made from various types of materials, including coniferous trees. The first step in the value chain is the sourcing of coniferous trees, which are typically harvested from forests or plantations.
2. Processing: The harvested coniferous trees are then processed into wood chips or pulp, which is the raw material for carton packaging. The processing may involve debarking, chipping, and pulping the trees to produce a high-quality pulp (e.g., mechanical wood pulp; semi-chemical wood pulp; pulps of fibrous cellulosic material other than wood)
3. Manufacturing: The pulp is then transported to a manufacturing facility, where it is converted into carton packaging. Once the carton packaging is formed, it is printed with graphics, text, and other information using printing presses.
4. Distribution: The finished carton packaging is then transported to distribution centres, warehouses, or directly to customers.

Example of a Wooden furniture value chains (e.g., residues sawn wood)

1. Raw materials: Manufacturing wooden furniture from residues of sawn wood is a sustainable way to utilize wood waste that would otherwise be discarded. The first step in the value chain is the sourcing of sawn wood residues, which are typically obtained from sawmills, lumber yards, or woodworking shops. The sawn wood residues can include sawdust, shavings, and scrap wood.
2. Processing: The sawn wood residues are then processed into usable raw materials for furniture manufacturing. The processing may involve chipping, shredding, or grinding the wood residues into small particles or fibres.
3. Manufacturing: The processed wood residues are then used as raw materials to manufacture wooden furniture.
4. Distribution: The finished wooden furniture is then transported to distribution centres, warehouses, or directly to customers.

3.2 Selection of certification schemes

To select the most relevant certification schemes for the sectors of interest, various aspects were considered. The selection was made based on impact criteria, that is, based on number of certifications per scheme as found on the open-sourced certificate database of the programme websites[1].

For every sector, we have selected multiple schemes to be able to compare and to collet feedback from more than one scheme per sector. Due to the vast number of existing selection scheme, we had to limit the selection to the most relevant ones for each sector of interest. The schemes were selected based on their market representation, number of certificates, and the completeness of the schemes. Data availability was also considered as a practical factor.

Based on description above and the input from Deliverable 1.3, the following certification schemes have been selected as promising schemes for further CBA analysis:

- Textile sector: Textile Exchange is the suggested certification standard with the GRS (Global Recycled Standard) scheme. GRS was selected here as a key standard, which includes social and environmental criteria for recycled content. BCI (Better Cotton Initiative) will also be considered for the textile sector. BCI is the world's leading sustainability initiative for cotton and since cotton is a major feedstock used in textile sector, BCI will also be taken into consideration here. By including both GRS and BCI, both the sustainable production of virgin material and recycled content can be covered.
- Chemical sector: ISCC Plus certification is considered as market leader in certification of biobased chemicals and plastics. RSB Standard for Advanced Products and Better Biomass will also be considered due to data availability considerations.
- Wood Sector: FSC or PEFC that certify wood for any application. FSC and PEFC are leading schemes for wood and can be used to certify any wood products.

The value chains selected, as well as the certification schemes most prevalent for these sectors, are described below in more detail.

3.2.1 *Textile sector*

Textile Exchange (TE) develops and manages a set of standards that provide the industry with a way to verify sustainability claims from the raw material to the final product. Textile Exchange is a global non-profit organization that works closely with all sectors of the textile supply chain. Textile Exchange identifies and shares best practices regarding farming, materials, processing, traceability, and product end-of-life to create positive impacts on water, soil, air, animals, and the human population created around the world by the textile industry. Textile Exchange expanded from a focus solely on organic cotton in 2010 to include a diverse preferred fibre and materials portfolio[2]. **Global Recycled Standard (GRS)**[3], which establishes requirements for third-party certification of recycled content, chain of custody, social and environmental management, and restrictions on the use of chemicals. The goal of GRS is to increase the use of recycled materials in products and reduce/eliminate damage caused by their production

BCI (Better Cotton Initiative)[4] is a non-profit, multi-stakeholder initiative aiming to promote

[1] RSB Participating Operators Certification; Valid Certificates › ISCC System (iscc-system.org); Certificate holders | Better Biomass;: FSC Certificate Database
[2] Home Page - Textile Exchange
[3] https://www.intertek.com/assurance/textile-exchange/
[4] The world doesn't just need cotton, it needs Better Cotton.

sustainable cotton. It is the largest initiative for sustainable cotton in the world; Currently, over 20 per cent of the world's cotton is produced under the Better Cotton Standard. The Better Cotton Standard system follows seven guiding principles, related to crop protection, water, soil health, biodiversity, fibre quality, decent work, and effective management system. The system and the seven criteria have been evaluated against ISEAL's Codes of Good Practise. The goal of these seven guiding principles is for farmers to produce cotton in a way that is more sustainable for the farmers, their communities, as well as the environment [1].

3.2.2 *Chemical sector*

ISCC is a globally applicable sustainability certification system and covers all sustainable feedstocks, including agricultural and forestry biomass, circular and bio-based materials and renewables[2].

The ISCC Plus certification is for all markets and sectors not regulated by the RED II[3], such as the food, feed or energy markets and for diverse industrial applications. Under ISCC PLUS, all types of agricultural and forestry raw materials, waste and residues, non-bio renewables and recycled carbon materials and fuels are covered. Some of the most commonly certified biobased products under the ISCC Plus scheme include:

- Bioplastics
- Mixed plastic wastes
- Chemicals and technical applications
- Agricultural raw materials used in food and feed
- Biofuel markets outside the EU (examples: Japan and California)

RSB Advanced Products

RSB (Roundtable on Sustainable Biomaterials) is a multi-stakeholder organisation supporting the development of sustainable bioeconomy. The RSB Global Advanced Products certification is a RSB certification, which enables the certification of a variety non-energy products from bio-based feedstock, recycled carbon, and production systems that process e.g. bio-based feedstock or non-bio-based end-of-life products.

Better Biomass

Better Biomass is a certification system for solid, gaseous and liquid biomass used in energy, fuels, and biobased products. The Better Biomass certificate [4] is used to demonstrate that the biomass produced, traded, processed, or used by organisations meets the underlying sustainability criteria. This criterion covers aspects related to nature, society and the environment.

3.2.3 *Wood sector*

The Forest Stewardship Council (FSC) sets the standard for responsible forest stewardship. FSC publish 10 Rules for Responsible Forest Management as its core principles. These include ensuring compliance with applicable laws, avoiding or mitigating negative environmental impacts, and maintaining conservation values. Forests are inspected and certified against the stringent principles of Forest Stewardship. They are measured against a range of environmental, social and economic considerations. In addition, the FSC system includes a certified chain of custody that tracks materials through the supply chain to the labelling of the finished product. One of the key aspects of FSC is its

[1] Defining 'Better': the Better Cotton Principles and Criteria
[2] https://www.iscc-system.org/certificates/all-certificates/
[3] Renewable Energy – Recast to 2030 (RED II) (europa.eu)
[4] Better Biomass | Sustainble biomass certification for bioenergy and biobased products

commitment to local consultation. This ensures the livelihoods and social welfare of local people is adequately protected and enhanced[1].

For the scope of this project, we will consider FSC 100% and FSC recycled labels. The FSC Recycled label refers to products stemming from recycled materials, whereas FSC 100% represents products whose material comes entirely from FSC-certified forests. The FSC Mix label is not considered as its only difference is that the material is a mix of certified and non-certified material in the same product.

The Programme for the Endorsement of Forest Certification (PEFC) is an international, non-profit, non-governmental organization which promotes sustainable forest management through independent third-party certification. It is considered the certification system of choice for small forest owners. PEFC chain of custody certification enables companies to demonstrate their sustainable sourcing of forest and tree-based products to their customers. It also provides the companies with a variety of advantages that help the environment, people, and their business, such as access to new markets and compliance with legislation[2].

[1] https://www.acopia.co.uk/
[2] https://www.pefc.org/

4. Conclusion and Outlook

The aim of this Task was a selection of three industrial biobased value chains for a further in-depth analysis of the costs and benefits related to the adoption of sustainability schemes and labels in these three chains (CBA including internalization of externalities). Based on a number of criteria and outputs of the Tasks 2.1 and 1.3, three promising sectors have been selected, where per sector one value chain will be selected for further analysis. In addition, per sector suitable certification schemes are proposed for CBA. Figure 6 provides and overview of the selected sectors and possible certification schemes.

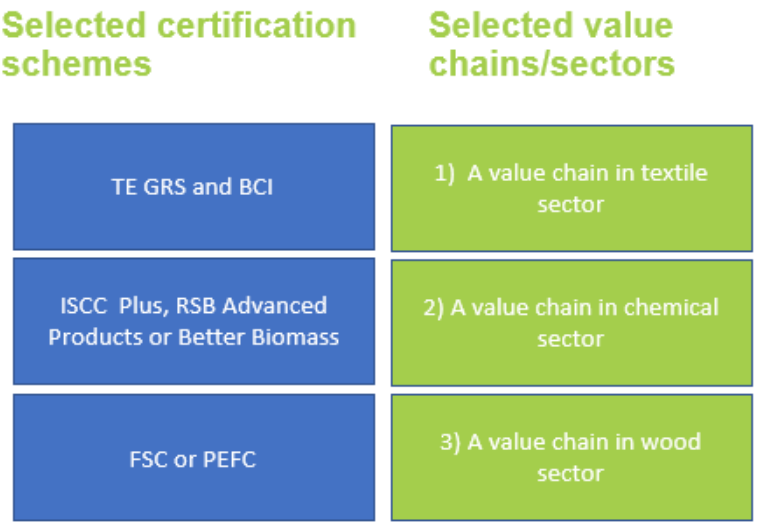

Figure 6: Selected certification schemes and value chains for further analysis

The final selection of the value chains will largely depend on the data availability as without proper data it is not possible to carry out CBA. The value chains will be selected from the three sectors provided in Section 3.1. Next to the data availability, several chain specific criteria described under Section 2.3 will be applied to refine the selection.

The next steps of the study are

1. Development of the data collection template (Task 4.3), where the identified costs and benefits indicators to carry out CBA for the certification schemes (output of the Task 4.1) will be mapped with possible value chains. In other words, a data search will be performed to retrieve a quantifiable information for CBA on vale chains described in section 3. The template will be developed with the needs of the specific value chains in mind and will draw from the experience of Control Union (CU) with other templates that derive data from certified companies, with additional questions relevant to add to the CBA. The data search will start from desk study and will be enriched with additional interviews from chains partners. Where possible, estimated data will be used.
2. In parallel to the activity above, value chain actors (e.g. producers of raw material, processors, manufacturers, retailers) involved in a production of a specific biobased product to be certified will be identified. The products and value chain actors will be selected from the pool of options for value chain provided in Section 3, for which the network of certified companies under CU will be used where possible, combined with the network of interest of this project.

3. The development of the data templates will be done for the three chains in a sequential way to achieve continuous integration of the learnings and thus in improvements. The development of the first data collection template will be tailored to one of the certification schemes for which sufficient input from the existing literature is available. The best-in-class scheme will be considered for the third assessment.
4. Collection of data for the selected biobased value chain will take place in Task 4.4. In this task the template developed in Task 4.3 will be filled for further CBA in Task 4.5. The details of these activities will be provided in Deliverable 4.3 and Deliverable 4.4 based on the initial proposal of the project.

Annex 1. Identification of the most representative biobased value chains

Output of Deliverable 2.1

Value chains of the textile sector			
Chain stages	**Textile clothing**	**Textile furniture**	**Industrial textile**
Final product	T-shirts, singlets and vests, knitted or crocheted (14.14.30.00)	Table linen of flax (excluding knitted or crocheted) (13.92.13.55)	Textile wicks, conveyor belts or belting (including reinforced with metal or other material) (13.96.16.50)
Intermediary product 2 (Fabrics)	Pile fabrics, terry fabrics knitted or crocheted (13.91.11)	Woven fabrics of flax, containing >= 85 % by weight of flax (13.20.13.30)	Woven fabrics of combed wool or combed fine animal hair; woven fabrics of coarse animal hair (13.20.12.60)
Intermediary product 1 (Yarns)	Yarn of combed cotton, n.p.r.s., for knitted fabrics and hosiery (13.10.61.53)	Flax yarn, n.p.r.s. (13.10.71.10)	Yarn of combed wool or fine animal hair, n.p.r.s. (13.10.50.10)
Raw material	Cotton, carded or combed (13.10.25.00) (Primary dedicated)	Other vegetable textile fibres, processed but not spun (13.10.29.00)	Greasy wool not carded or combed (including fleece-washed wool) (primary dedicated) (10.11.41.-00)

Value chains of the plastic sector			
Chain stages	**Packaging**	**Consumer goods**	**Agriculture & horticulture**
Final product	Sacks and bags of polymers of ethylene (including cones) (22.22.11.00)	Tableware and kitchenware of plastic (22.29.23.20)	Mulch film

Intermediary product 2	Polyethylene having a specific gravity < 0,94, in primary forms (excluding linear) (20.16.10.39)	PLA (20.16.40.90)	PHA (20.16.40.90)
Intermediary product 1	Ethylene (20.14.11.30)	Lactic acid	Organic acid
Raw material	Raw cane and beet sugar in solid form, not containing added flavouring or colouring matter (primary dedicated) (10.81.11.00)	Maize (primary dedicated)	Organic Waste (food waste) (Tertiary residues and wastes)

Value chains of the chemical sector			
Chain stages	**Lubricants**	**Solvent**	**Adhesives**
Final product	Lubricating preparations not containing petroleum oil or bituminous mineral oils, excluding the ones used for treatment of textiles, leather, hides, foreskins, or other materials (20.59.41.79)	Solvent for cleaning (20.14.23.38)	Adhesives based on natural polymers (20.52.10.10)
Intermediary product 2	Polyoxy-ethylene oletate	Butane-1,4-diol or tetramethylene glycol (1,4-butanediol) having a bio-based carbon content of 100 % by mass	-
Intermediary product 1	Industrial oleic acid (20.14.31.30)	Succinic acid	Tall oil resin (20.14.71.30)
Raw material	Vegetable oils (primary dedicated or tertiary residues) (10.41.25.10 / 10.41.57.00)	Maize crop (primary dedicated)	Tall oil (secondary residue)

Value chain of the pulp and paper sector			
Chain stages	**Packaging**	**Sanitary**	**Graphic paper**

Final product	Cartons, boxes and cases of corrugated paper (17.21.13.00)	Napkins (17.22.12.30)	Paper for graphic purpose (17.23.14.00)
Intermediary product 2	Corrugated paper and paperboard in rolls or sheets + coated (or not) with Microfibrillated Cellulose (MFC) (17.12.11.00)	Cellulose wadding for household or sanitary purposes, in rolls of a width > 36 cm or in rectangular (including square sheets) with at least one side > 36 cm in an unfolded state (17.12.20.30)	-
Intermediary product 1	Mechanical wood pulp; semi-chemical wood pulp; pulps of fibrous cellulosic material other than wood (17.11.14.00)	Mechanical wood pulp; semi-chemical wood pulp; pulps of fibrous cellulosic material other than wood (17.11.14.00)	Mechanical wood pulp; semi-chemical wood pulp; pulps of fibrous cellulosic material other than wood (17.11.14.00)
Raw material	Coniferous (primary dedicated)	Bagasse sugar cane fibre (secondary residue)	Recycled paper (tertiary res idue or wastes)

Value chain of the construction sector			
Chain stages	**Interior construction**	**Building envelop**	**Floor**
Final product	Carpentry of wood: windows frames (16.23.19.00)	Prefabricated buildings of wood (16.23.20.00)	Doors and their frames and thresholds, subflooring of wood (16.23.11.50)
Intermediary product 2	Particle board of wood (16.21.12.00)	Oriented strand board (OSB), (16.21.13.16)	Fibreboard (excluding medium density fibreboard {MDF}), of wood or other ligneous materials, whether or not bonded with resins or other organic substances,

			of a density exceeding 0,8 g/cm³ (16.21.15.43)
Intermediary product 1	Coniferous wood continuously shaped (including strips and friezes for parquet flooring, not assembled) (16.10.21.10)	Non wood in chips or particles (16.10.25.05)	Non wood in chips or particles (16.10.25.05)
Raw material	Coniferous (primary dedicated)	Wheat Straw (primary residue)	Hemp (primary dedicated)

Value chain of the woodworking sector			
Chain stages	**Carpentry pieces**	**Manufacture articles**	**Furniture**
Final product	Cases, boxes, crates, drums and similar packings of wood (excluding cable drums) (16.24.13.20)	Wooden frames for paintings, photographs, mirrors or similar objects (16.29.14.20)	Wooden bedroom furniture (excluding builders' fittings for cupboards to be built into walls, mattress supports, lamps and lighting fittings, floor standing mirrors, seats) (31.09.12.30)
Intermediary product 2			Medium density fibreboard (MDF), of wood or other ligneous materials, whether or not bonded with resins or other organic substances, of a thickness exceeding 9 mm (16.21.15.29)
Intermediary product 1	Other plywood, veneered panels and similar laminated wood, of coniferous wood (16.21.16.00)	Particle board and similar board of ligneous materials (16.21.14.50)	Pine wood (Pinus sylvestris L.) sawn or chipped lengthwise, sliced or peeled, of a thickness > 6 mm (16.10.11.36)

Raw material	Residues from sawn wood (secondary residues)	Ligneous materials (wheat straw) (primary residues) + wood (primary dedicated)	Residues from sawn wood (-) (secondary residues)	

About SUSTCERT4BIOBASED

SUSTCERT4BIOBASED is an EU funded (Horizon Europe) project aiming at defining and promoting the adoption of effective and robust sustainability certification schemes and business-to-business labels for industrial biobased systems to support tracing the sustainability (environmental, social, economic) of biobased products along the value chains and trades within the EU and globally for responsible production and consumption. This objective is realised by the development of a monitoring system, mapping of the current situation in global trade flows of biological resources and biobased products, and feasibility assessment from the adoption of certification schemes and labels considering actual economic as well as internalized environmental and social costs and benefits. The results of the project are leveraged to provide recommendations to four key target groups: policy makers, sustainability system community, industrial biobased value chain actors, and regional bioeconomy stakeholders. These ambitions are addressed by a strong, well-balanced and multi-disciplinary consortium comprised of 5 complementary partners. SUSTCERT4BIOBASED thereby supports the development of harmonized system requirements, continuous improvement of sustainability certification schemes and labels and contributes towards establishing a circular, climate-neutral and sustainable biobased industry.

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