STAR-ProBio

Sustainability Transition Assessment and Research of Bio-based Products

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Deliverable 9.1
Comprehensive overview of existing regulatory and voluntary frameworks on sustainability assessment

Version 1.0, 27/06/2018

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Abstract

The transition to a bioeconomy (BE) offers great chances with respect to a more sustainable economy, in which products are produced mostly from renewable resources in a socially, economically and environmentally acceptable way, overcoming typical problems caused by the economic development. Nevertheless, there are also high risks for people and the planet in line with the advancement of this development. These risks must be minimized today by policies in order to avoid an erroneous trend.

This deliverable seeks to show potential policy gaps with regard to the establishment of a sustainable BE and to develop recommendations to bridge these gaps based on STAR ProBio results. Therefore policies, strategies and legislative documents from EU member states and the European Union, potentially affecting or promoting sustainability assessment and certification were investigated. Furthermore, results of ongoing and finalized projects within the research area were incorporated in this task and a mapping of the SDGs with the results of the analysis of policy documents was conducted in order to assess links between the SDGs and sustainability requirements given in the policy documents of the analysed sample. Finally, at a workshop with project partners, sustainability risk levels, subjected to BE sectors, were developed.

The investigation showed, that currently, no coherent and comprehensive framework does exist for the EU BE. Instead, many different types of policies with different scope and degree of detail are available. There is a lack of measurable targets within the policies. Certification was found to be an accepted instrument for the assessment of sustainability. The focus of requirements included in the policy framework is on the environmental sustainability, while economic and social aspects are less represented. To address minimum sustainability requirements in certain sectors or markets, politics started to make use of established and proven criteria sets (e.g. FSC®/PEFC schemes, RED criteria).

Suggested citation

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Table of Contents

1 Introduction

1.1 Bioeconomy policies

The concept of the bioeconomy (BE) aims at "transforming life science knowledge into new, sustainable, eco-efficient and competitive products" (OECD 2009). It is focused on methods for the conversion of raw material into value added products (Louise Staffas, Mathias Gustavsson, Kes McCormick 2013).

Even though the BE concept is a relatively new economic development and field of research, a multitude of BE policies already exist on various levels all over the world, as illustrated in Figure 1. Within the European context, there are transnational strategies, strategies on member state level and region specific strategies (Greet Overbeek, Erik de Bakker, Volkert Beekman (LEI) et al. 2016). This variety highlights the overall attention towards the BE. Additionally, Figure 1 shows the different stages of the development of BE strategies. Clearly, most industrialised countries have dedicated BE strategies or at least BE related strategies. Besides strategies, there are furthermore roadmaps and action plans, describing and structuring progression towards the settled goals and targets on the way to a transition of the conventional, largely fossil resource based economy to a more sustainable BE. In this context there is also to mention the complex web of BE relevant laws, regulations and directives, which can have a general, far-reaching scope, but also range to rather specific ones associated to certain products, sectors or markets.

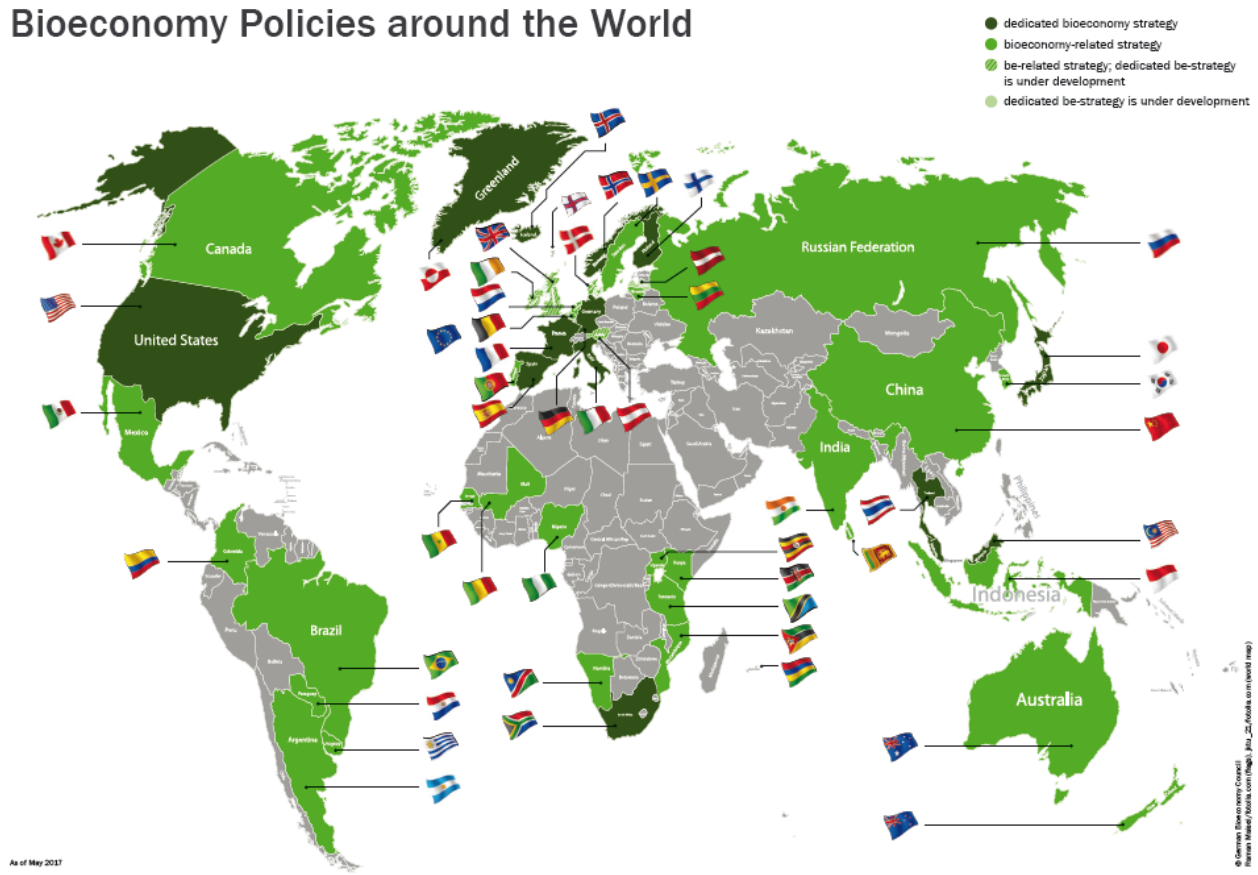


Figure 1: BE policies around the world (German Bioeconomy Council 2017)

The transition to a biobased economy offers great chances with respect to a more sustainable economy, in which products are produced mostly from renewable resources in a socially, economically and environmentally acceptable way, overcoming typical problems caused by the economic development (Bioeconomy Council 2018). Nevertheless, there are also high risks for people and the planet in line with the advancement of this development. These risks must be minimized today by policies in order to avoid an erroneous trend.

The manifold strategies and policies indicated in Figure 1 differ significantly with regards to their focus, priorities as well as their general intention. In general, international and national strategies demonstrate intent and commitment, but they are often short on detail (OECD 2018). Carus 2014 and OECD 2018 have structured different policies to provide more consistent overviews on BE policies.

Table 1 groups existing types of BE policies into three essential categories. According to Carus 2014, these can roughly be translated to supply-side, demand-side and a mixture of both (i.e. cross-cutting measures).

Table 1: Policy inputs for a bioeconomy framework (OECD 2018 based on Carus(2014)) (Note: R&D= Research and development; GHG=Greenhouse gas; ETS=Emission trading system)

Feedstock/technology push	Market pull	Cross-cutting
Local access to feedstock	Targets and quotas	Standards and norms
International access to feedstock	Mandates and bans	Certification
R&D subsidy	Public procurement	Skills and education
Pilot and demonstrator support	Labels and raising awareness	Regional clusters
Flagship financial support	Direct financial support for bio-based products	Public acceptance
Tax incentives for industrial R&D	Tax incentives for bio-based products	Knowledge-based capital
Improved investment conditions	Incentives related to GHG emissions (e.g. ETS)	
Technology clusters	Taxes on fossil carbon	
Governance and regulation	Removing fossil fuel subsidies	

As Table 1 shows, multiple policy inputs do exist on various levels to influence the BE policy framework and thus, shape the design of the development of the bioeoconomy.

With this deliverable, we seek to show potential policy gaps with regard to the establishment of a sustainable BE and to develop recommendations to bridge these gaps based on STAR-ProBio activities. The document is structured as follows: Section 1.2 provides a description of the context of the EU Sustainable Development Goals (SDGs) and their relevance for the BE, whereas section 1.3 explains the context and the embedding of the task within the STAR-ProBio project. The objectives and expected outcomes are described subsequently in section 1.4. Chapter 2 outlines the course of action to handle the task, the involvement of project partners and the applied approach. Chapter 3 describes the results, structured according to the approaches used. To end this deliverable, conclusions and recommendations are given in last chapter (Chapter 4).

1.2 The Sustainable Development Goals as a guideline for a bioeconomy framework?

The development of a BE is strongly determined by the surrounding policy framework. The achievement of the SDGs requires actions of businesses and perhaps even more importantly, of politics. For the consideration of sustainability aspects, the SDG framework not only provides guidance. One could even argue that future bioeconomies should be in compliance with the SDGs.

The development of a BE can be a step towards sustainable development. The SDGs set a framework for the implementation of sustainable development. BE is even seen in a key role to advance the SDGs (Bioeconomy Council 2018). UN countries committed themselves to implement the SDGs. The implementation is in the responsibility of the nations' governments and thus calls for appropriate policies to set the course towards the achievement of the targets set within the SDG framework.

The SDGs include a set of 17 main goals (Figure 2). Each of them is linked to specific targets and indicators as part of the sustainable development agenda, which was accepted by the countries of the UN in 2015 (United Nations 2018). Not only the fact that countries with entirely different developed economies follow the same set of goals makes this operation very ambitious. Also, the 15 year timeframe for the implementation of the goals is very challenging.

Figure 2: The United Nations sustainable development goals (SDGs) (United Nations 2018)

Fritsche et al. recently showed that the sustainable development goals and their related indicators are closely linked to the so called Global Sustainability Indicators[1] (GSI), which are the indicator set promoted by the Global Bioenergy Partnership (GBEP) (Fritsche et al. 2018). This was revealed by mapping the SDGs with the GSIs. The results showed a large overlap of the two frameworks, which lead the authors of the paper to the conclusion, that implementation of the GSIs on a national level definitely will support the implementation of the SDGs.

The implementation of sustainability standards[2] by companies can contribute to a more sustainable economy. The interrelation between the SDGs and sustainability standards was analysed by Ugarte et al. 2017. This work explained how businesses could contribute strongly

[1] This sustainability criteria set was considered in Deliverable 1.1 of the STAR ProBio project
[2] "Sustainability standards" is used synonymously to "sustainability certification schemes" in this context

to the 2030 Agenda for Sustainable Development and unlock new market opportunities by using credible voluntary sustainability standards to transform entire sectors and supply chains. Several examples of direct benefits for businesses using sustainability standards were given, in particular direct benefits for companies and small-scale producers. These benefits can range from efficiency gains through improved management practices, increased transparency and traceability throughout the whole supply chain to better quality relationships between suppliers and buyers (Ugarte et al. 2017).

For the above mentioned reasons, it seems appropriate to align studies like the one under consideration with the sustainable development goals framework, as a global overarching framework for sustainability. For the detection of potential gaps in BE policies, the SDGs could serve as a helpful framework as well.

According to the UN agenda for sustainable development, each government will have to decide how these "targets should be incorporated into national planning processes, policies and strategies". It is furthermore mentioned, that the link between ongoing economic, environmental and social processes and the sustainable development is to be recognized (United Nations 2015).

Given the relatively short implementation period of the SDGs on the country level, one should conclude that policies in this context already contain elements, which aim the fulfilment of the SDGs. Furthermore, topics derived from the SDG framework and from EU BE policies should have a large overlap and sustainability topics, which are addressed by the SDGs but not in the BE policy of the EU and it´s member states should be considered to be potential policy gaps. Therefore, the SDGs were used in the context of this task as a structure to identify policy gaps.

1.3 Motivation for this report and our contribution to the STAR-ProBio project

The STAR ProBio project (Sustainability Transition Assessment and Research of Bio-based Products) aims to promote a more efficient and harmonized policy framework needed to support the market pull of biobased products in Europe. To achieve this target, the project will develop a sustainability scheme blueprint, including standards, labels, certifications and assessment tools for biobased products. Thus, STAR ProBio generally considers a complete life cycle perspective and prioritizes the principles of a circular economy.

The activities reported in this deliverable build on results from previous activities of the project (e.g. a detailed gap assessment of the current sustainability certification and standardisation in the EU bio-based economy, results from a market assessment, etc.). Furthermore, it will transfer information from other projects, such as the STAR4BBI project (Standards and Regulations for the Bio-based Industry), BioSTEP (Promoting Stakeholder Engagement and Public Awareness for a Participative Governance of the European BE) and OpenBio (Opening bio-based markets via standards, labelling and procurement) to the STAR-ProBio consortium.

In a nutshell, this report shall identify both, potential gaps in existing BE policies and potential links between BE policies and STAR-ProBio products. This includes also potential indications regarding the research focus of other activities within STAR-ProBio.

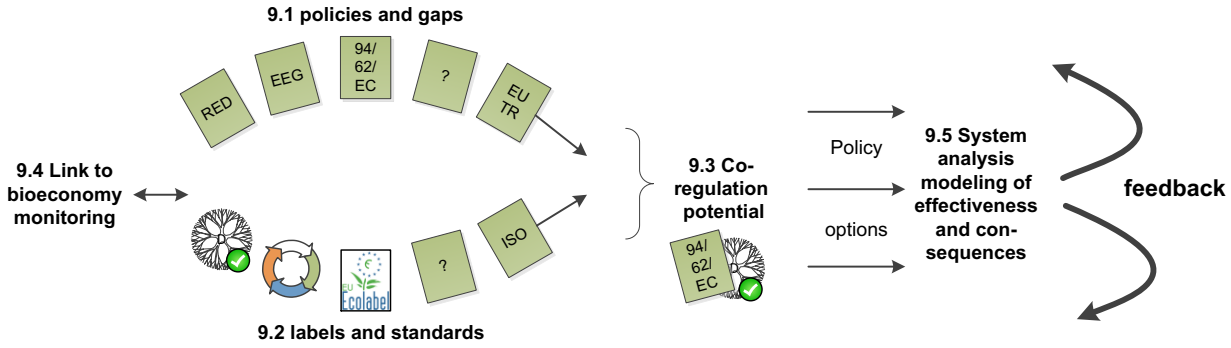


Figure 3: Positioning our activities (Task 9.1) within STAR-ProBio. (Labels, standards and policies in the figure just serve illustration purposes and do not have a specific meaning) (Source: own figure)

This task is seen as a starting point, setting the basis for further work in the WP 9. As illustrated in Figure 3, there are several connections and contact points among the different tasks in WP 9. To summarise, the analysis in this report will try to support the following research questions in STAR-ProBio WP9:

- The investigation of existing Ecolabels and the opportunities for the implementation of STAR-ProBio indicators, criteria and tools into labelling practises (T9.2)
- Identification of options to use Co-regulation mechanisms for the implementation of the STAR-ProBio blueprint (T9.3)
- Identification of connections and links between the STAR-ProBio sustainability assessment tools and BE monitoring activities on international and national levels (T9.4)

- Finally, T 9.5 will investigate the effectiveness and consequences of different BE policy options. This aspect will support the development of the design of the STAR-ProBio blueprint.

1.4 Objectives of the task

To support the work on the above mentioned research questions, the main objectives of the activities reported in these report were to:

- analyse existing policy frameworks on EU, EU member state level and regional levels affecting or promoting the use of sustainability assessment schemes for the BE,
- identify possible policy gaps and to develop a first set of recommendations to close these gaps with the results from the STAR-ProBio project.
- address options to stimulate the market uptake of bio-based products (e.g. green public procurement, voucher schemes for environmentally and/or socially superior products, etc.)

2 Methods

2.1 Working procedure and involvement of project partners

With the desktop research on policy documents, it was expected to generate a comprehensive matrix of the most relevant policies/strategies/regulations related to the assessment and certification of sustainability within the BE serving as overview and starting point for further analysis.

The identification of potential gaps in policies followed a threefold approach, where investigated policy documents were evaluated with the aim to deliver proper results and conclusions. Secondly, results of ongoing and finalized projects within the research area were incorporated in this task, particularly with regard to:

- Standards and Regulations for the Bio-based Industry (STAR4BBI)
- Promoting stakeholder engagement and public awareness for a participative governance of the European bioeconomy (BioStep)
- Opening bio-based markets via standards, labelling and procurement (open BIO)

As a third part, a mapping of the SDGs with the results of the analysis of policy documents was conducted in order to assess links between the SDGs and sustainability requirements given in the policy documents of the analysed sample. Besides, potential gaps should derived from the results of this analysis.

In a very initial step, as shown in Figure 5, policies, strategies and legislative documents, potentially affecting or promoting sustainability assessment and certification were investigated. The investigation was conducted using results of other projects, the input of the project partners and desktop research. Thereby, documents from EU member states and the European Union in its entirety were considered. This resulted in a matrix of 100 documents, which is given in Table 7 in the Annex.

Different types of policy documents were considered in the analysis. The differences were examined to underline that potential influences of policy documents on sustainability assessment and certification can be entirely different according to policy level corresponding to the respective policy document. For that reason, a description of the character of the considered documents is given in Table 2. These descriptions reflect our understanding of the type of the policy documents. Official definitions and definitions from literature were incorporated, as indicated.

Table 2: Classification of the types of policies considered in task 9.1

Type of policy document	Policy level	Description
Directive	EU	An EU directive sets legal requirements for the EU. The content of a directive needs to be implemented within the member states within a given period, by national legislation (European Commission 2018a).
Regulation	EU	A regulation consists of legal requirements to be transposed word for word into national legislation, so are instantly valid in the entire union (European Commission 2018a)
Ordinance	National	Binding legislative document on the national level of the EU member states
Strategy	EU/national/ regional/local	A strategy is detailed definition and statement of major goals, policies and actions including a description on how to achieve the goals. The achievement refers to an action plan, which can be part of or at least associated with a strategy (Greet Overbeek, Erik de Bakker, Volkert Beekman (LEI) et al. 2016)
Action plan	EU/national/ regional/local	An action plan is a document, which defines actions to be taken in order to achieve a previously defined goal (e.g. in a strategy). An action plan might therefore be part of or associated with a strategy.
Roadmap	EU/national/ regional/local	A roadmap focuses on the process to achieve a certain goal, splitting the actions to be taken and setting the development into a temporal context. Furthermore purpose and scope of new laws and policies are described in roadmaps as well as the monitoring on their impact, if intended (European Commission 2018b).
Other	EU/national/ regional/local	Further policy document types, which could not be assigned to one of the above defined categories (report, growth plan, policy, guidance, policy statement, EU Commission Decision)

To make the purpose of the analysed documents even more clear, Figure 4 below illustrates at which level they can be found and how they are related to each other. As can be seen from the figure, the SDGs are considered an overarching sustainability framework on a global scale. There are similarities between the SDGs and the EU directives, as both need to be implemented on national level, usually by national laws, to become effective. For this reason, policies should find themselves within the SDG framework. From this it follows, that potential gaps in policies could potentially be derived from a mapping of the SDGs and the policies or contents of the policies, respectively. Regardless of the geographical scale, also strategies, action plans and roadmaps can have a certain influence on politics, as they provoke or initiate policymaking (see also section 1.1). Following the rationale of Table 1 the different results of the STAR-ProBio project and especially the blueprint can be considered cross cutting tools or measures which could be implemented as supportive elements in a number of elements for market supply- and demand side oriented policies. Since the STAR-ProBio project mainly aims to develop criteria, indicators and tools for the sustainability assessment of bio-based products as well as a certification blueprint, the project results could contribute mainly on an operational policy level (red hatched area in Figure 4).

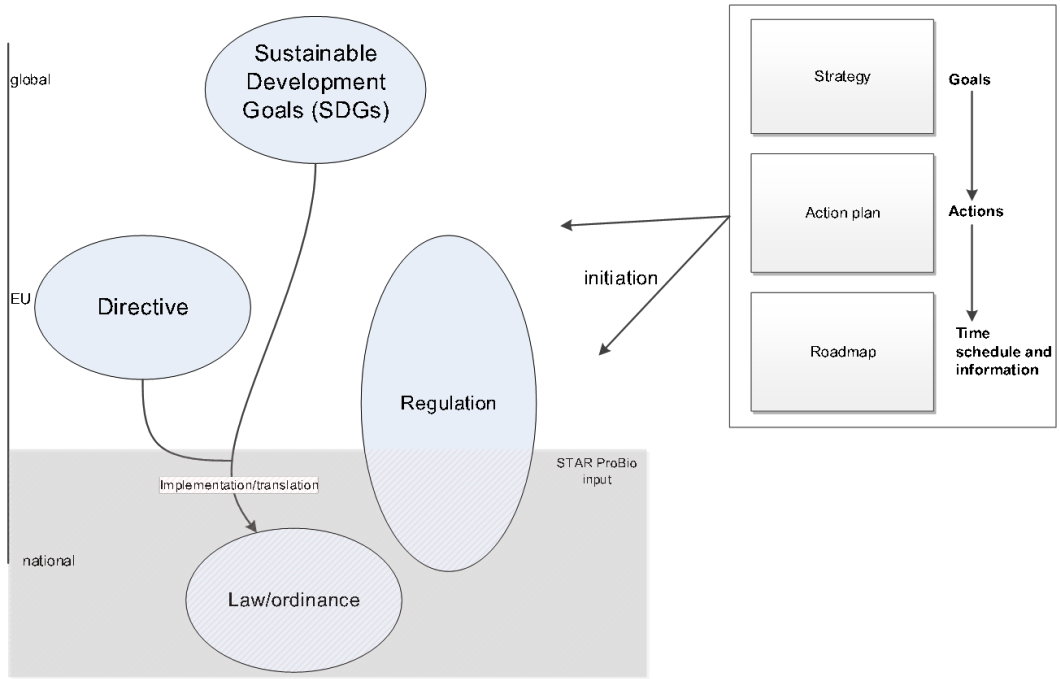


Figure 4: Considered types of policy documents, classification according to the level and relation to each other

Regarding BE strategies, which made 20 % of the analysed policy documents, one can differentiate between "top-down" and "bottom-up" approaches. "Top-down" approaches emanate from public authorities and are usually characterised by goals regarding the future role and structure of the BE. "Bottom-up" approaches are driven by industry, where the private sector plays an initiative and active role, while political activities are limited to funding. In addition, the biomass potential in a country influences the strategy. Countries with a high biomass potential tend to have utilization oriented goals, predominantly in agriculture and forestry, whereas countries with smaller potentials lean towards more technology and innovation oriented strategic goals. (Bioeconomy Council 2015) For the purpose of this task only "top-down strategies" were considered.

To make the in depth analysis feasible and to avoid an overload of unmanageable information, 50 promising documents were selected for an in depth analysis, applying the template introduced in the following. Targeting a representable sample, the documents were selected based on the following selection criteria:

- Expectable relevance for the project
- Reference to BE
- Reference to sustainability and sustainability assessment
- Balance between mandatory and voluntary character
- Consideration of policies on EU level and member state level
- In regard to major future challenges (e.g. Waste management and cascade use of resources)

Applying the selection criteria listed above, resulted in a final list of documents for further analysis. This selection was brought into agreement with the project partners, prior to any further steps

To ease the policy review, the number of policies for the in depth analysis was distributed among the five partners involved in the task. The review was done using a common template (the template is given in Figure 8). The template enabled a harmonized gathering of desired information and made the concentration of the results more efficient. The procedure applied to approach the task is illustrated in Figure 5.

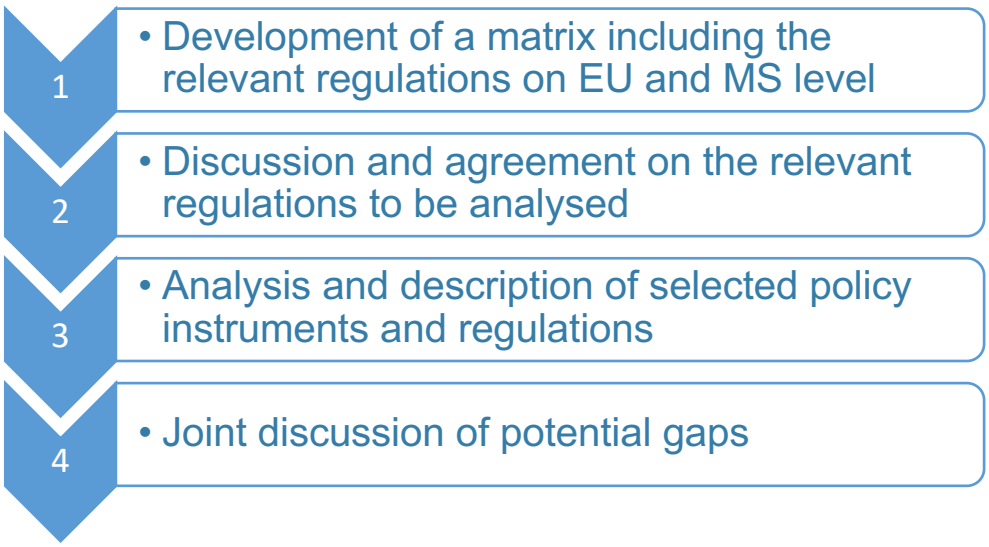


Figure 5: Procedure working steps for handling of the task

The policy review template is structured into three sections. By using the template, following information could be gathered from the policy documents:

General information on the document:

- Name/identification
- Origin
- Geographic relevance
- Obligatory character
- Document type
- Effective date

Scope and significance:

- Affected/promoted products or resources
- Affected BE sectors
- Precise objective
- Direct consequences on the industry
- Specific targets/goals
- Measurability of the targets/goals

Link to sustainability and sustainability certification:

- Addressing of sustainability dimensions
- Incorporation of sustainability requirements/criteria
- Explicit reference to sustainability certification or sustainability assessment
- Direct links to sustainability certification
- Suitability of certification for implementation of the policy/regulation/strategy

Completing the template required a simple transfer of information (first section in particular) on the one hand and competent estimations on the other hand. The entire template is included in the Annex (Figure 8) for further information.

2.2 Synthesis and evaluation of results

Once the policies/strategies/regulations had been reviewed, the information was brought together into a matrix, which has been subsequently extended to support the in-depth analysis of the policies under investigation.

To picture how sustainability issues and elements of sustainability assessment are covered among the policies included in the sample, the collected data was evaluated in terms of frequency of certain information.

2.3 Examination of policy elements within the Sustainable Development Goals framework

As described in 2.1, different kinds of information on policies have been gathered in a joint analysis of policies – among others, the incorporation of sustainability requirements or criteria[3] within the documents. Derived from that, an additional strategy for the identification of potential policy gaps and fields of actions was applied. This strategy takes the SDGs into account. To do so, sustainability requirements or criteria extracted from the analysed policy documents were listed in Table 6. A mapping against the SDGs was done by linking the identified sustainability requirements or criteria to the corresponding SDG target. This exercise led to a list with the matches between the sustainability requirements and criteria extracted from the policies and the targets of the SDGs. Additionally, the SDGs and targets with no matches were identified. These SDGs and their targets were not covered by the examined policies. They are a reference to potential gaps in the policies/strategies/regulations.

[3] The analysis of policy documents showed no clear definition and dissociation of criteria and requirements. Therefore both terms are used synonymously in this context.

2.4 Workshop

Based on the previous working steps described in sections 2.1 to 2.3, a workshop was organised on 17th of April 2018. The main goal of the workshop was to share the results with the involved partners and to have a discussion resulting in a consolidated set of conclusions. For this purpose, a web based workshop was held. The audience consisted of the project partners involved in the task, from which at least one representative took part in the discussion. 10 participants attended the workshop (the list of participants is given in the annex).

The workshop was structured as follows:

- Goal of the workshop
- Task 9.1 within WP 9
- Brief repetition on task objectives and approach
- Results (Policy analysis, Projects review, SDG mapping)
- Development of sustainability risk levels subject to BE sectors
- Joint discussion
- Presentation of deliverable outline
- Next steps

3 Results

3.1 Review of policies/strategies/regulations

Table 3 summarizes the frequency of key characteristics of the analysed policy documents, as emerged from the evaluation of the review sheets. It shall serve as an overview of the most important information which has been collected in the joint policy document review. In addition, the frequencies shall support continuative argumentations in line with the gap analysis and allow deriving first conclusions.

Table 3: Frequency of occurrence of different policy characteristics

no of analysed documents	50
policies with obligatory character, %	24
policies having direct influence on industry, %	22
policies having indirect influence on industry, %	25
policies having no influence on industry, %	54
specific targets/goals included, %	72
targets/goals measurable, %	50
included sustainability requirements/criteria, %	56
sustainability assessment/certification explicitly mentioned, %	72
direct links to certification, %	44
certification appropriate instrument for implementation of the policy, %	76

As shown in Table 3, there are targets or goals mentioned in 72 % of the analysed documents. However, only 50 % of these targets/goals were considered measureable or quantifiable in a suitable way. This can be interpreted as a sign of a lack of appropriate criteria and practical indicators, allowing tracking reduction targets, for instance.

A second observation, worth to point out, is the reference to sustainability assessment and sustainability certification within the documents analysed. As can be seen in Table 3, a high number of documents explicitly mentions sustainability certification/assessment. Furthermore, there were direct links to certification identified in 44 % of the documents. From these results, a certain acceptance of certification as an instrument for the assessment of sustainability can be concluded.

In about 50 % of the analysed policy documents, sustainability criteria were included (see Table 3). Figure 6 is a relevance cloud, showing the sustainability criteria referred to in the analysed

documents. Some of them appeared a number of times while others appeared only once. The font size of the words in the cloud indicates this frequency. The most numerous were associated with waste management, climate protection and protection of biodiversity. Generally, the environmental sustainability dimension is represented to a much higher degree, as can be seen by the low number of social and economic requirements or criteria in the cloud.

It is furthermore interesting to see from Figure 6, that besides single criteria, there are existing and established criteria sets used: FSC®/PEFC[4] requirements and the RED[5] criteria are both mentioned several times. This may indicate a trend towards established criteria sets used in a modular way to address minimum sustainability requirements for forest biomass and agricultural biomass, respectively.

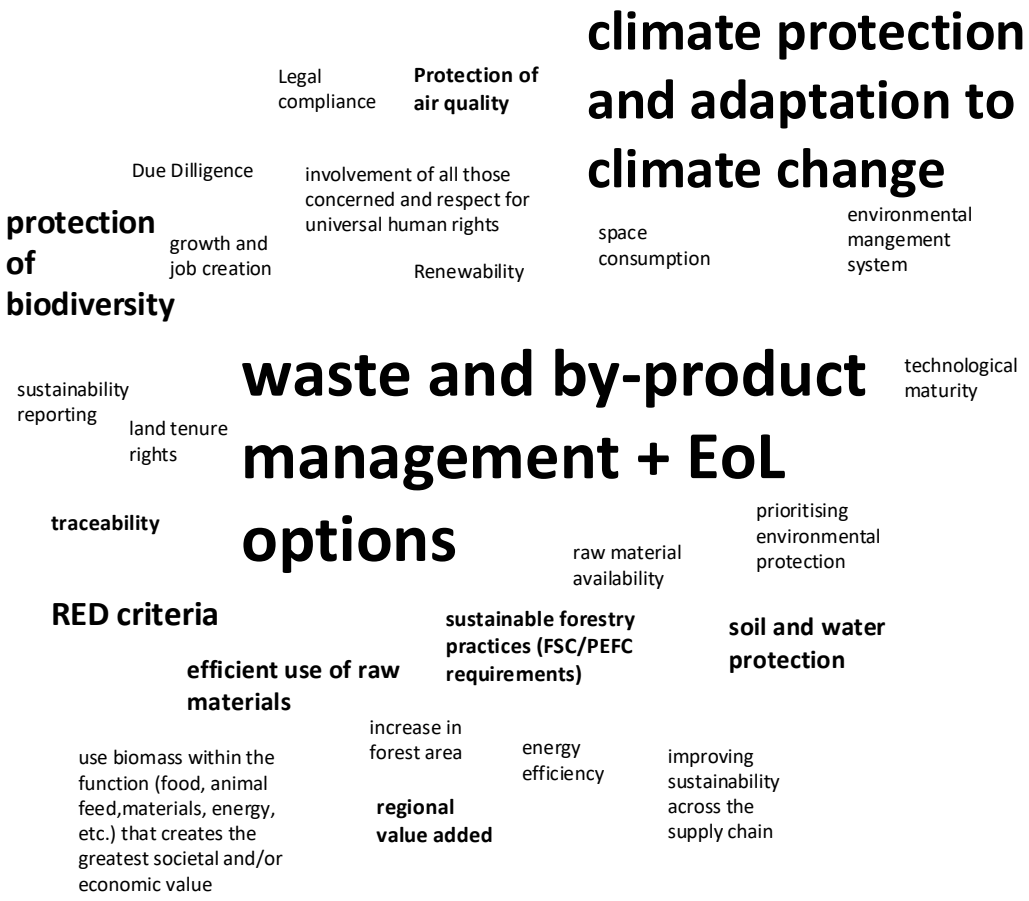


Figure 6: Sustainability criteria or requirements identified in the analysed policy documents arranged in a relevance cloud. The Font size varies according to the frequency criteria and requirements were mentioned (see annex for the frequencies, the cloud is based on)

The policy review has shown that the two sustainability certification schemes FSC® and PEFC, have become a benchmark for minimum sustainability requirements in the area of forestry and timber industry. The public procurement on the federal level in Germany, for instance, requires a FSC®/PEFC certification or similar for each procurement with a size of an order above 2000 euros (BMEL 2018). Furthermore, the forest strategy, published by the Federal Ministry of Food, Agriculture and Consumer Protection of Germany recommends FSC® and PEFC as a suitable

[4] Forest Stewardship Council® (FSC®); Programme for the endorsement of forest certification schemes (PEFC)
[5] Sustainability criteria given in the Renewable Energy Directive

certification for solid biomass as well as for timer products and even suggest to upgrade the schemes to decision making criterion for final customer (Schallenberg 2011). One more example is the Irish waste management policy, mentioning both, FSC® and PEFC as voluntary certifications to have a role to play in public procurement (Department of the Environment, Community and Local Government 2012).

These are good examples for the use of green public procurement as a tool for the market uptake of biobased products or more precisely in this case, an uptake of products with certain sustainability characteristics. It shows how public procurement can serve as starting point for an extensive shift from conventional to sustainable products. Since FSC® and PEFC can be seen as pioneer systems in the sustainability certification, it is not surprising, that these are among the first systems being used as a sustainability measure for the forest and timber sector. Green public procurement for further product groups could follow the lead. Sustainability certification systems for liquid biofuels have been benchmarked by WWF (Schlamann et al. 2013). However, benchmarking studies for sustainability schemes are rare and should be conducted for further BE sectors, in order to support the identification of the most suitable certifications serving as tool for public procurement, for instance. Besides, this would increase the overall understanding of certification schemes by providing information on included criteria and differences between schemes.

Table 4 summarises the results obtained from the joint analysis of the policy documents as a whole. The left columns show more general information, e.g. the policy document type, the effective date, the respective geographical region or the BE sector. The columns on the right hand side show more specific information in regard to sustainability assessment and certification. The influence of one policy on the industry has been assessed by providing a differentiation between direct, indirect and no influence. In this context, directly influencing policies are characterized by a certain level of obligation to fulfil sustainability requirements and punishment for not fulfilling those, respectively. Indirect influence means, that a voluntary implementation of sustainability principles or criteria will be rewarded. The column "certification appropriate instrument" reflects the valuation of the reviewers, whether the policy could be implemented via certification.

One main outcome of this attempt to estimate the influence of the current BE policy framework on the industry is, that the overall influence seems to be limited, as more than half of the analysed policies were considered to have no influence (see Table 3 and Table 4). An explanation for this might be, the mostly non-obligatory character (76 % of total) and the early stage (often laws and regulation are passed in order to fulfil targets set down in strategies, meaning that strategies may initiating policy making).

The ones having direct influence (22 %) are with few exceptions directives and regulations. With regard to content, the policies with direct influence mostly tackle single and specific sustainability issues with high public interest (e.g. GMOs[6], (packaging) waste, illegal logging, food contact materials) in a reactive way.

Policies with indirect influence (25 %) are distributed among all kinds of policies, but with emphasis on strategies. In respect of the main content of these policies, one can declare a wider, more general scope and a more proactive character.

[6] Genetically modified organisms

Table 4: List of examined policies and results of the analysis of the several policy sheets. Legend: ✓ = Yes, X = No; Sustainability dimensions: Ec = Economic, En = Environmental, So = Social; BE sector: All = all selectable bioeconomy sectors (Bioenergy, Forestry, Construction, Food, Feed, Textiles, Chemicals and Plastics, Pharmacy & Materials/Products)

Policy title	Geographical relevance	Type of document	Obligatory	Effective date	Affected BE sectors	Focus	Influence on industry	Specific targets/goals	Targets/goals measureable	Addressed sustainability dimensions	Sustainability criteria incorporated	Certification explicitly mentioned	Direct links to certification	Certification appropriate instrument
2015 Circular Economy Strategy (Action Plan)	EU	Action plan	X	2015	All	Circular economy	no	X	X	En So	X	✓	X	X
A Bioeconomy Strategy for France	FR	Strategy	X	2016	Bioenergy, Forestry, Food, Chemicals and Plastics, Materials/ Products	Sustainable biobased economy	no	X	X	En	✓	✓	X	✓
A Circular Economy in the Netherlands by 2050	NL	Strategy	X	2016	All	Circular economy	indirect	✓	✓	En Ec So	X	✓	✓	✓
A Resource Opportunity - Waste Management Policy in Ireland	IR	Policy	X	2012	Bioenergy, Forestry, Construction, Textiles, Chemicals and Plastics, Materials/ Products	Resource-efficient waste management	no	✓	✓	En	✓	✓	✓	✓
Action Plan for the Environmental Sustainability	IT	Action plan	X	2006	All	Green public procurement	no	✓	✓	En	✓[7]	✓	✓	✓

[7] Incorporation of FSC®/PEFC certification scheme as a whole

of Consumption in the Public Administration Sector														
Action Plan on Renewable Raw Materials	AT	Action plan	X	2015	Forestry, Construction, Textiles, Chemicals and Plastics, Pharmacy, Materials/ Products	Renewable biomass and biobased products	no	✓	X	En Ec	✓	✓	X	✓
Bioeconomy Development in EU Regions Mapping of EU Member States' / Regions' Research and Innovation Plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014 -2020	EU	Report	X	2017	All	Research and innovation (R&I) on bioeconomy in EU-regions	no	X	X	En	X	X	X	X
Bioeconomy in Flanders	BE	Action plan	X	2014	All	Sustainable biobased economy	no	✓	X	En Ec So	✓	✓	X	✓
Bioeconomy in Italy	IT	Strategy	X	2016	All	Sustainable biobased economy	no	✓	✓	Ec So	X	✓	✓	X
Bioeconomy Regions in Europe	EU	Report	X	2017	All	Feedstock of biobased economy in EU-regions	no	X	X	En	X	X	X	X
Biorefineries Roadmap	DE	Roadmap	X	2012	Bioenergy, Forestry, Food, Feed, Chemicals and Plastics, Pharmacy, Materials/ Products	Biorefinery concepts	no	✓	X	X	✓	✓	X	✓
Building the Single Market for Green Products Facilitating better Information on the Environmental Performance of Products and Organisations	EU	Strategy	X	2013	All	Product Environmental Footprint (PEF) and Organisation Environmental Footprint (OEF)	no	✓	✓	En	✓	✓	✓	✓

Commission Decision of the EU Ecolabel for textile products (2014/350/EU)	EU	EU Commis-sion Decision	X	2014	Textiles, Materials/ Products	EU Ecolabel for textile products	indirect	X	X	En So	✓	✓	✓	✓
Commission Decision of the EU Ecolabel for wood-, cork- and bamboo-based floor coverings (2017/176)	EU	EU Commis-sion Decision	X	2017	Materials/ Products	EU Ecolabel for wood-, cork- and bamboo-based floor coverings	indirect	X	X	En So	✓	✓	✓	✓
Decree on Public Procurement of Wood Products	DE	Ordinance	✓	2011	Forestry, Construction, Materials/ Products	Wood products in public procurement	direct	✓	✓	En Ec So	✓	✓	✓	✓
Delivering our Green Potential	IR	Policy statement	X	2012	Bioenergy, Forestry, Food, Feed, Chemicals and Plastics, Pharmacy, Materials/ Products	Sustainable biobased economy	indirect	✓	✓	En	✓	X	X	✓
Directive 2008/56/EC on Marine Strategy Framework	EU	Directive	✓	2008	Food, Materials/ Products	Marine environment protection	no	X	X	En	✓	✓	X	X
Directive 2008/98/EC on waste	EU	Directive	✓	2008	All	Resource-efficient waste management	direct	✓	✓	En	✓	X	X	✓
Directive 2009/28/EC on Renewable Energy (RED)	EU	Directive	✓	2009	Bioenergy	Liquid biofules	direct	✓	✓	En	✓	✓	✓	✓
Directive 2015/1513/EU on indirect land use change	EU	Directive	✓	2015	Bioenergy	Liquid biofules	direct	✓	✓	En Ec So	✓	✓	✓	✓
Directive 94/62/EC on packaging and packaging waste	EU	Directive	✓	2015	Chemicals and Plastics, Materials/ Products	Packaging and packaging waste	direct	✓	✓	En	X	X	X	✓
Energy Transition for Green Growth Act	FR	Action plan	X	2016	Bioenergy	Sustainable biobased economy	no	✓	✓	En	X	✓	X	X
EU Forest Strategy	EU	Strategy	X	2013	All	Sustainable forest management	no	✓	X	En Ec So	✓	✓	✓	✓

EU Strategy for Plastics in the Circular Economy	EU	Strategy	X	2018	Chemicals and Plastics	Sustainable bio based and biodegradable plastics	no	✓	✓	En	✓	✓	✓	✓
Finnish Bioeconomy Strategy	FI	Strategy	X	2014	All with emphasis on Forestry	Sustainable biobased economy	indirect	✓	✓	En	X	X	X	X
Forest Strategy 2020	DE	Strategy	X	2011	Forestry	Sustainable forest management	no	✓	✓	En Ec So	✓	✓	✓	✓
Good Practice Guidance on the Sustainable Mobilisation of Wood in Europe	EU	Guidance	X	2010	Forestry	Sustainable forest management	no	✓	X	En Ec	X	X	X	X
Green Growth Commitment	PT	Strategy	X	2015	All	Sustainable biobased economy	indirect	✓	✓	En	✓	✓	✓	✓
Guidance on unfair Commercial Practices - Extract on Misleading Green Claims	EU	Guidance	X	2005	All	Green claims	direct	X	X	X	X	✓	✓	✓
Hoofdlijnennotitie Biobased Economy (BBE)	NL	Policy	X	2012	All	Sustainable biobased economy	no	X	X	En	✓	✓	✓	✓
Innovating for Sustainable Growth - A Bioeconomy for Europe (Bioeconomy Strategy)	EU	Strategy	X	2012	All	Renewable biomass and biobased products	no	✓	X	En Ec So	X	✓	✓	✓
National Action Plan for Green Public Procurement	FR	Action plan	X	2014	Bioenergy, Construction, Food, Textile, Chemicals and Plastics, Materials/ Products	Green public procurement	direct	✓	✓	X	X	X	X	✓
National Environmental Technology Innovation Strategy 2011-2020	HU	Strategy	X	2012	Bioenergy, Construction, Food, Feed	Sustainable biobased economy	indirect	✓	✓	En Ec So	X	✓	X	✓

National Policy Strategy on Bioeconomy	DE	Strategy	X	2014	All	Sustainable biobased economy	no	✓	✓	En Ec So	X	✓	✓	✓
National Programme for Waste Reduction	IT	Policy	✓	2017	Construction, Food, Feed	Resource-efficient waste management	no	✓	✓	En	✓	✓	X	X
National Strategy of Ecological Transition towards Sustainable Development 2015-2020	FR	Strategy	X	2014	All	Circular Economy	indirect	✓	✓	En	X	✓	X	✓
Plan for Growth for Water, Bio and Environmental Solutions	DK	Growth plan	X	2013	All	Sustainable biobased economy	indirect	✓	✓	En	✓	✓	X	✓
Promotion of Sustainable Mobilisation of Wood	EU	Strategy	X	2007	Bioenergy, Forestry	Sustainable forest management	indirect	✓	X	En	✓	✓	X	✓
Regulation (EC) No 1069/2009 on Animal by-products	EU	Regulation	✓	2009	Bioenergy, Food, Feed	Animal by-products	direct	X	X	En	X	X	X	X
Regulation (EC) No 1830/2003 on genetically modified organisms (GMO)	EU	Regulation	✓	2003	All	Genetically Modified Organisms (GMOs)	direct	X	X	En	X	X	X	✓
Regulation (EC) No 1935/2004 on Food Contact Materials	EU	Regulation	✓	2004	Food, Chemicals and Plastics, Materials/ Products	Food Contact Materials (FCMs)	direct	X	X	X	X	X	X	X
Regulation (EC) No 761/2001 on Eco-management and Audit Scheme (EMAS)	EU	Regulation	X	2001	All	Ecomanagement and Audit Scheme (EMAS)	indirect	X	X	En Ec So	✓	✓	✓	✓
Regulation (EU) No 995/2010 on European Timber (EUTR)	EU	Regulation	✓	2010	Bioenergy, Forestry, Constriction, Materials/ Products	Legal timber and timber products	direct	✓	X	En	✓	X	X	✓
Renewable Energy Republic of Hungary - National Renewable Energy Action Plan 2010 2020	HU	Action plan	X	2010	Bioenergy	Renewable energy	direct	✓	✓	En	✓	✓	✓	✓

Renewable Energy Sources Act (EEG)	DE	Ordinance	✓	2017	Bioenergy	Renewable energy	indirect	✓	✓	X	✓	✓	X	✓
Strategy for a Green Society	NL	Strategy	X	2013	All	Biobased economy and green chemistry	no	✓	X	En Ec So	X	X	X	✓
Swedish Research and Innovation Strategy for a Bio-based Economy	SE	Report	X	2012	Food, Textiles, Chemicals and Plastics, Pharmacy, Materials/Products	Sustainable biobased economy	no	✓	X	En	X	✓	✓	✓
The Spanish Bioeconomy Strategy 2030 Horizon	ES	Strategy	X	2016	Forestry, Food	Renewable biomass and biobased products	no	✓	✓	En So	X	✓	X	✓
Towards a Model of Circular Economy for Italy	IT	Report	X	2017	Forestry, Construction, Food, Chemicals and Plastics	Circular Economy	no	X	X	En So	✓	X	X	✓
UK Bionergy Strategy	UK	Strategy	X	2012	Bioenergy	Sustainable bioenergy	indirect	✓	X	En Ec So	✓	✓	✓	✓

Motivated by results and conclusions of this task, Table 5 was created as additional outcome. It is assumed that risks for sustainability, resulting from an increased growth of the BE will be different from one sector to another. Table 5 is therefore a first approach to quantify the risk and to compare BE sectors with each other in this regard. The purpose of the table is to serve as a tool to support any obvious decision making process. For instance, could it help to decide which BE sectors could profit most from the implementation of sustainability criteria, in terms of an increase in overall sustainability performance.

The definition of the BE sectors in Table 5 was done in the style of Adler et al. 2015, since there are different definitions on hand and no consensus on a generally accepted one has been reached so far. The content of the table is based on estimations of project partners involved in the task. Even though the table is based on estimations only, the level of robustness should be adequate for the targeted application due to the expertise and experience of the partners in the subject area. Practically, a template was circulated after the workshop. The recipients of the template were instructed to estimate the risks according their experience and expertise. The feedback was combined to the final table, as shown below.

Some interesting observations can be obtained from the table. One of the most important ones is, that global supply chains tend to be characterised by more and more serious sustainability risks.

As can be seen from Table 5, there are some risks occurring repeatedly in different BE sectors. In accordance to the listed feedstock, the most frequently mentioned sustainability risks across all BE sectors were:

- Biodiversity loss
- Deforestation
- Land use change and indirect land use change
- Food price increase
- Illegal logging

Obviously, these risks are associated to biomass cultivation. From this, one first conclusion can be drawn: In sectors characterised by the existence of global supply chains, the estimated risks are more serious (high risk level), compared to supply chains, preferentially sourcing biomass resources within the EU. This can be explained by the assumed strong background policy framework, preventing most serious environmental threats due to biomass production. In addition, this implies one possibility for a meaningful application of certification systems, expanding European legislation beyond borders in so called co-regulations. Co-regulations will be analysed in depth later in this project as illustrated in Figure 7.

Secondly, as a consequence of the link between the major sustainability risks and the biomass cultivation, some of the risks are present in almost every BE sector and the differences between the sectors are moderate.

The lowest risk levels were assigned to sectors/value chains using waste and residue feedstock as well as sectors in which one can expect a local production of the resources. Due to the assumed strong background regulation, the risk for sustainability associated with agricultural production was estimated low.

Table 5: Table showing main sustainability risks for different BE sectors based on expert estimations. This reflection does not take policies already in existence into account.

Bioeconomy sector	Final product(s)/main technology pathway(s)	Main feedstock or feedstock group	Main sustainability risk(s)	Risk level / significance	Comments with respect to the geographical region
Bioenergy	Biofuels (focus on biodiesel, bioethanol and biomethane)	Oilseed crops	LUC and ILUC Deforestation Food price increase Biodiversity loss (by area increase and by intensification) Water quality (leaching nutrients)	high[8]	High risks for exporting countries, in particular south east Asia and some Latin-American countries There is a risk that biofuels contribute to the loss of native forests in the tropics, even though little percentage of vegetable oil ends up in biofuels Biofuels can be extremely damaging to a local rural community in a developing country
		Starch and sugar crops			
		Lignocellulosic energy crops	Deforestation Biodiversity loss (by increasing areas)	high[8]	
		Wastes and residues	?	low	
	Heat & power	Lignocellulosic energy crops	Deforestation Biodiversity loss (by increasing areas) Air quality (pollen and VOCs)	medium to high	
	Heat (small scale units)	Lignocellulosic energy crops			
Forestry	Buildings and industrial applications	Timber	Illegal logging causing deforestation Biodiversity loss Negative impacts on local communities (imported wood) Labour conditions	high	Risk is not equally high around the globe, there are hot spots, especially rainforests located in developing regions Saving own resources e.g. by importing cheaper feedstock from other countries
	Paper and board				

[8] Depending on the cultivation region.

Construction	Construction materials (e.g. concrete, plaster), fibreboards, thermal insulation	Timber	Illegal logging causing deforestation Biodiversity loss Non-certified import from other countries or poor certification processes Negative impacts on local communities (at least on imported wood)	low to medium[9]	Regarding timber, see forestry
		Fibre crops (hemp, flax)	Competition with food/feed production	low	Everywhere (fibres)[10]
Food & Feed	Plant-based food & feed	Grains Rice Oilseed crops Sugar crops	Biodiversity loss Soil erosion Decrease in soil and water quality (nutrients leaching) Impact of fertilisers and pesticides	high	Particularly in third party countries (e.g. outside EU), where feed is imported from Independent from the country or region
			LUC and ILUC causing deforestation Land use rights Higher food prices	low to high	
Textiles	Garments, fabric, carpets, geotextiles, etc.	Cotton	High input of energy, water and agrochemicals LUC and ILUC (cultivation) Labour conditions Chemicals use and leakage (production)	high	Risk depends much on the country of production. The major volume of textiles is produced in regions with high risks (Asia)
		Fibre crops (flax, hemp)	Competition with food/feed production	low	
		Wool	Competition with food/feed production Labour conditions	low	
Chemicals and Plastics	Bioplastics, packaging materials, bottles, bags, mulch film,	Starch and sugar crops Oilseed crops	EoL & reuse	high	Less depended on country/region
			Same as bioenergy	Same as bioenergy	Same as bioenergy

[9] It is low to medium, because the amount of feedstock used at the moment, but pressure on raw material will grow when demand of bio-construction products grow.

	biolubricants,				
Pharmacy	Medicine applications & pharmaceuticals	Plants Algae	Chemicals use and leakage (production)	medium	Everywhere
Materials/ Products	Cardboard, filters, cords	Fibre crops (hemp, flax)	Competition with food/feed production	low	Everywhere[10]
	Biocomposites	Lignocellulosic crops	Same as bioenergy	Same as bioenergy	Same as bioenergy

[10] Ecologically positive impact, but increasing production may lead to DLUC (the crops require relatively good soils) and changes in biodiversity.

3.2 Review of results of related projects

In this task relevant ongoing and ended research projects were considered with the aim to transfer relevant knowledge, information and conclusions. Initially, the following projects were identified as relevant for this task:

- Standards and Regulations for the Bio-based Industry (STAR4BBI)
- Promoting stakeholder engagement and public awareness for a participative governance of the European bioeconomy (BioStep)
- Opening bio-based markets via standards, labelling and procurement (Open-Bio)

3.2.1 Standards and Regulations for the Bio-based Industry (STAR4BBI)

STAR4BBI is an EU funded project aiming at establishing a coherent, well-coordinated and favourable regulatory and standards framework to support the development of a cutting-edge bio-based economy for Europe. The removal of barriers can provide a stable framework for investors and lead to growth of the BE in the EU.

The project adopted a bottom up approach, in which seven leading companies representing seven bio-based value chains were selected as case studies for identifying existing regulatory and standardisation hurdles as well as the future industry trends and innovations. Preliminary identified relevant hurdles that limit bio-based full deployment include: the lack of supportive legislative mechanism to support and regulate the uses of biomass for producing materials, the lack of a long term policy for bio-based products and the existence of overlapping certification and standardization schemes that could potentially mislead consumers.

As a result of a foresight analysis, the project also identified innovative promising technologies that can be potential drivers of change for the future of the European bio-based economy. They include CRISPR related techniques, valorisation of lignin into high valuable products and Furan-based chemistry from sugars for the production of FDCA.

3.2.2 Promoting stakeholder engagement and public awareness for a participative governance of the European bioeconomy (BioStep)

Sustainability is not a new concept. The assessment of sustainability however, can be quite complex, and the awareness of consumers regarding sustainability and sustainable products can be considered low. Moreover, most consumers do not know what the BE actually is. There is obviously a large knowledge gap in the field of biobased products and the sustainability assessment of biobased products, which is currently mostly often with certification and labels.

The BioSTEP project dealt with public engagement in the BE. It was found, that the involvement of the public society is only at the beginning. However, public and stakeholder engagement was found to be a crucial element of EU policy development, research and innovation (BioSTEP 2018). Within this project, different tools for public participation were developed and applied. These tools are named "education and information", dialogue", "co-production of knowledge" (BioSTEP 2018).

Since the addressing of options to stimulate the market uptake is one of the objectives of task 9.1, the results and conclusions of the BioSTEP project are very relevant for STAR-ProBio. Therefore, the public participation tools should be considered to be applied within STAR-ProBio with the aim to increase public awareness and market uptake. During the research, there have been more projects[11] identified, being similar to BioSTEP, but were not further investigated, due to time and scope of the task.

3.2.3 Opening bio-based markets via standards, labelling and procurement (open BIO)

The Open-Bio project investigated how the market uptake of biobased products can be increased through labelling, standardisation and procurement. The project recommended on legislation to reduce regulatory burdens, to simplify policies and to create a level playing field between different sectors. Moreover the project investigated the possibility to conceptualize an EU Ecolabel for different bio based product groups, aiming at an increase in consumer confidence and market uptake. In this context the project identified gaps in LCA based evidence on the lower environmental impact of some bio based products over non-bio based conventional alternatives. This is a precondition for developing additional EU Ecolabel product groups and criteria.

3.3 SDGs mapping

Table 6 provides an arrangement of SDGs and the criteria/requirements extracted from policy documents analysed. Each row is showing one of the SDGs, together with the relevant target, in case targets are addressed by one or more criteria/requirements.

This table reflects the expectations against sustainability in the European BE. As can be seen, there are three SDGs for which no link could be established. To evaluate this observation, one has to consider, that the SDGs have a global scope and the policy analysis was limited to European countries. Especially SDG 4, 5 and 10 (on quality education, gender equality, and reduced inequalities, respectively) have high global relevance. In many European countries however, there has already been progress towards the fulfilment of these SDGs. This might explain the lack of links between the policies analysed and the SDGs.

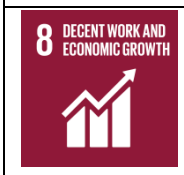
This assumption is supported by results of Campagnolo et al. 2018. In this study sustainability has been assessed based on the SDGs for different countries and for each of the three sustainability dimensions individually. The evaluation of social sustainability showed all European countries being close to fully socially sustainable, while African countries performed worst. However, for two reasons, we would still conclude a gap in the consideration of social sustainability criteria in the EU political framework. Firstly, many supply chains for biobased products are global supply chains (see Table 5), which makes the compliance with social standards equally important throughout the entire supply chain from biomass production stage to the end of life phase. Consequently, reference to social sustainability aspects in policies related to the EU BE is necessary. Secondly, the SDGs with reference to the social sustainability might be based on too weak indicators from a European perspective.

Figure 6 provides a relevance cloud of the criteria/requirements isolated from the policy documents and arranged in size according to the frequency they were mentioned. The cloud shows that there is a clear focus on the environmental sustainability dimension, meaning that social and economic criteria were rarely found and in a low frequency. As the SDG framework is intended to serve as a balanced framework, considering all three sustainability dimensions, the line up in Table 6 can support the initial observation that, social and economic criteria are underrepresented compared with the environmental ones in the policy document sample analysed.

Table 6: Links between the SDGs and sustainability requirements/criteria extracted from policies, which were analysed

Sustainable development goals and targets		**Sustainability requirements / criteria of examined policies**	
SDG	**Target**	**No.**	**Title of criterion/ requirement**
	1.4	7	Land tenure rights
	2.3	12	Use biomass within the function (food, animal feed, materials, energy, etc.) that creates the greatest societal and/or economic value
	2.4	10	Soil and water protection
	3.9	26	Restricted substance list; substitution of hazardous substances

[11] BIOWAYS aims at raising public awareness among the large public, BIOVoices aims at creating a platform of mutual learning and discussion involving the Quadruple Helix stakeholders in the bioeconomy field, BIOBRIDGES (that will start in summer) will create new opportunities bridging consumers' needs, BBP producers and Brand Owners.

			
			
	6.3	10 26	Soil and water protection Restricted substance list; substitution of hazardous substances
	6.4	10	Soil and water protection
	6.5	10	Soil and water protection
	6.6	10 15	Soil and water protection Prioritising environmental protection
	7.2	1 14	RED criteria Renewability
	7.3	27	Energy efficiency
	7.a	1 14 27	RED criteria Renewability Energy efficiency
	7.b	27	Energy efficiency
	8.1	20 23	Market potential Growth and job creation
	8.2	20 23	Market potential Growth and job creation
	8.3	20 23	Market potential Growth and job creation
	8.4	6	Efficient use of raw materials
	8.9	23	Growth and job creation
	8.b	23	Growth and job creation
	9.1	16 18 20	Improving sustainability across the supply chain Raw material availability Market potential
	9.2	16 20	Improving sustainability across the supply chain Market potential
	9.4	6 16	Efficient use of raw materials Improving sustainability across the supply chain
	9.b	19	Technological maturity
			
	11.3	17	Space consumption
	11.6	11 24	Air quality Waste and by-product management + EoL options (e.g. recyclability of end products)
	11.a	22	Regional value added
	12.1	2 21	Due dilligence Ecological product optimization

		28	Environmental mangement system
	12.2	1 6 28	RED criteria Efficient use of raw materials Environmental mangement system
	12.3	16 24 25	Improving sustainability across the supply chain Waste and by-product management + EoL options (e.g. recyclability of end products) Tolerable material input and output across all paths (III)
	12.4	10 11 15 21 24 26	Soil and water protection Air quality Prioritising environmental protection Ecological product optimization Waste and by-product management + EoL options (e.g. recyclability of end products) Restricted substance list; substitution of hazardous substances
	12.5	21 24	Ecological product optimization Waste and by-product management + EoL options (e.g. recyclability of end products)
	12.6	3 30	Traceability Sustainability reporting
	12.8	3	Traceability
	12.b	22	Regional value added
	13.1	5	Climate protection and adaptation to climate change
	13.2	1 5	RED criteria Climate protection and adaptation to climate change
	13.3	1 5	RED criteria Climate protection and adaptation to climate change
	13.a	5	Climate protection and adaptation to climate change
	13.b	1 5	RED criteria Climate protection and adaptation to climate change
	14.1	10	Soil and water protection
	14.2	10	Soil and water protection
	15.1	1 4 8 9 10 15	RED criteria Sustainable forestry practices (FSC®/PEFC requirements) Protection of biodiversity Increase in forest area Soil and water protection Prioritising environmental protection
	15.2	4 9 15 28	Sustainable forestry practices (FSC®/PEFC requirements) Increase in forest area Prioritising environmental protection Environmental mangement system
	15.3	10 15	Soil and water protection Prioritising environmental protection
	15.4	8 15	Protection of biodiversity Prioritising environmental protection
	15.5	1 8 15	RED criteria Protection of biodiversity Prioritising environmental protection
	15.6	15	Prioritising environmental protection

	15.7	15	Prioritising environmental protection
	15.8	15	Prioritising environmental protection
	15.9	1 8	RED criteria Protection of biodiversity
	15.a	1 8	RED criteria Protection of biodiversity
	15.b	1 4 8 9	RED criteria Sustainable forestry practices (FSC®/PEFC requirements) Protection of biodiversity Increase in forest area
	16.3	13 29	Involvement of all those concerned and respect for universal human rights Legal compliance
	16.10	13	Involvement of all those concerned and respect for universal human rights
	16.a	13	Involvement of all those concerned and respect for universal human rights
	16.b	13 29	Involvement of all those concerned and respect for universal human rights Legal compliance
	17.18	3	Traceability
	17.19	3	Traceability

3.4 Workshop results

In this section, only main relevant results and input from the participants will be described, while the slides can be found in the annex (5.4). Apart from minor modifications, the result of this task were presented in a similar way, as written down in this deliverable. In general, there has been consensus among the participants on the results. Some comments and proposals for optimization shall be mention in the following.

1.) Differentiation of influences of policies on the industry

The proposed extension of Table 4 aiming to differentiate between direct and indirect influences of the different policies (was not specified in the beginning) has been implemented already.

2.) Methodology to assess carbon accounting in the construction sector

During the workshop, weaknesses in methodologies for carbon accounting in the construction industry were mentioned as a gap in the political framework. In particular, the accounting of emissions associated with cement production is handled differently, depending on the country cement is imported from. As the potential environmental impact of the production of cement can be significant, the accounting methodology should be as robust as possible. Since resources are being traded between countries, harmonisation of GHG calculation methodologies is essential and should be advanced.

3.) Greater consideration of the end of life phase in policies

End of life options is one of the most repeated keyword in existing policies (see Figure 6), however those options focus mainly on biomass production and processing. A significant gap remains in the options for the end of life phase of products. In particular, end of life scenarios that include cascading, recycling, etc. are not adequately reflected in policies. EoL criteria are sporadically used (e.g. minimum recycled content in product, implemented waste management, intended cascade use). Furthermore, increased cascading use might require a greater cross compatibility among policies and recognition between certification systems.

4 Summary and conclusions

4.1 Summary

With this report we provide an overview of the policy framework which is currently relevant for the assessment of sustainability in the EU BE. The overview is a result a joint review of five partners of the STAR ProBio consortium, in which 50 policy documents have been analysed using a common review template. Based on this overview, gaps in the current policy frameworks have been identified. Furthermore a mapping of the SDGs with the sustainability requirements extracted from the policy documents has been conducted as a second part of the approach. Thirdly, results from nearby research projects have been transferred to complete the picture, particularly to address options to stimulate the market uptake of biobased products. In addition to the main outcomes, a sustainability risk table has been worked out, which highlights major sustainability risks in the different BE sectors by means of expert estimations. To reflect on the first results and to consider expert opinions, a project internal workshop was organised, in which initial results were discussed for optimisation.

As main results from the policy review itself, the following observations are summarised in the following:

- Currently, no coherent and comprehensive framework does exist for the EU BE. Instead, many different types of policies with different scope and degree of detail are available
- There is a lack of measurable targets within the policies
- Certification is an accepted instrument for the assessment of sustainability
- The focus of requirements included in the policy framework is on the environmental sustainability, while economic and social aspects are less represented
- To address minimum sustainability requirements in certain sectors or markets, politics started to make use of established and proven criteria sets (e.g. FSC®/PEFC schemes, RED criteria)

From the review of results from nearby research project the following options for stimulating the market uptake of biobased products seem to be promising:

- Green public procurement
- Public engagement, participation and raising of awareness

One of the specific objectives of this task is the identification of potential links between STAR-ProBio results and potential gaps from the analysis of the current regulatory framework. In that regard, it might be relevant to bring to mind that STAR-ProBio activities are focussing mainly on tools for sustainability certification in the BE context. For this reason, they might be suitable to support the development of a BE mainly on a process, product and company level (compare figure 4). As the analysis of the documents in this report has shown, manifold targets do exist for the development of a bioeconomy. Some of the documents analysed do even include sets of indicators and criteria, highlighting specific expectations and viewpoints regarding a sustainable development of the BE. The criteria, indicators, tools as well as the blueprint to be developed in STAR-ProBio can make a strong contribution supporting the actual implementation of the

different elements for the BE development. However, the tool of sustainability certification is associated with certain strengths but also with clear limitations and even a couple of risks. Effective sustainability certification activities are embedded in an effective and target oriented regulatory framework. Or, to phrase it differently, sustainability certification alone might not be the right tool to overcome problems arising from limitations in national legislation and governance (van Dam et al. 2008). Certification might be appropriate to ensure a safeguard for certain risks based on well-defined indicators. Examples being the exclusion of direct land use change effects from the conversion of land for the production of biofuel feedstock due to sustainability certification or the large scale gathering of GHG mitigation information for EU biofuels. However, the tool of sustainability certification can be only effective if the indicators, criteria, tools and methods are clearly defined and well interpreted for certification auditors and effective control and monitoring systems are in place (van Dam et al. 2008; Pro Forest 2006).

During an analysis of the current status in sustainability certification and standardisation (STAR-ProBio 2017), we have shown that numerous sustainability certification frameworks do exist in the BE. In general, this might be interpreted as a signal for a strong interest in the sustainable development of the BE. However, the wide range of existing labels and schemes might be increasingly confusing for consumers.

4.2 Conclusions

From the results described in Section 3 and summarised in the previous sub chapter above, conclusions have been drawn. These conclusions have been categorised into conclusions in terms of policy gaps to be closed by STAR ProBio outcomes and more general ones with reference to the advancement of the policy framework for a sustainable BE.

4.2.1 Closing policy gaps with STAR ProBio outcomes

Influence of political framework on industry

The direct influence of the policy framework on the industry in matters of sustainability assessment is limited. The results showed, that policies forcing companies to implement sustainability criteria (e.g. via certification) usually concern very specific sustainability issues and are applied in a business to business context mostly. Moreover, such policies are often a result of high public pressure (reactive trigger). Indirect influence of policies on the industry has found to be relatively small, too. In contrast, indirectly influencing policies will be more relevant in the business to consumer market. A high market penetration of sustainability certification seems therefore only be possible on the basis of a forcing legislation.

Missing level playing field

The preconditions for biobased products are not equal when considering the entire BE. Market distortions between different sectors, fossil based and biobased products, and different final uses of biomass (e.g. energetic use, material use) need to be avoided. To achieve a level playing field, minimum sustainability requirements valid for the entire BE shall be developed. As major environmental impacts are linked to the biomass cultivation, minimum requirements at this stage could be prioritized, possibly building up on the RED criteria.

Uptake of STAR-ProBio results

STAR-ProBio results can contribute significantly to address the various sustainability indicator and criteria from the analysed documents of the EU BE. Whenever, certification schemes, tools or labels are appropriate to support the practical implementation of sustainability requirements from EU or national legislation, STAR-ProBio indicators, criteria and tools could be used to enhance existing certification frameworks. Connections between Ecolabel activities and STAR-ProBio results will be further investigated in future STAR-ProBio activities. Also, the use of co-regulation frameworks to take up STAR-ProBio results seems to be a promising opportunity in that regard.

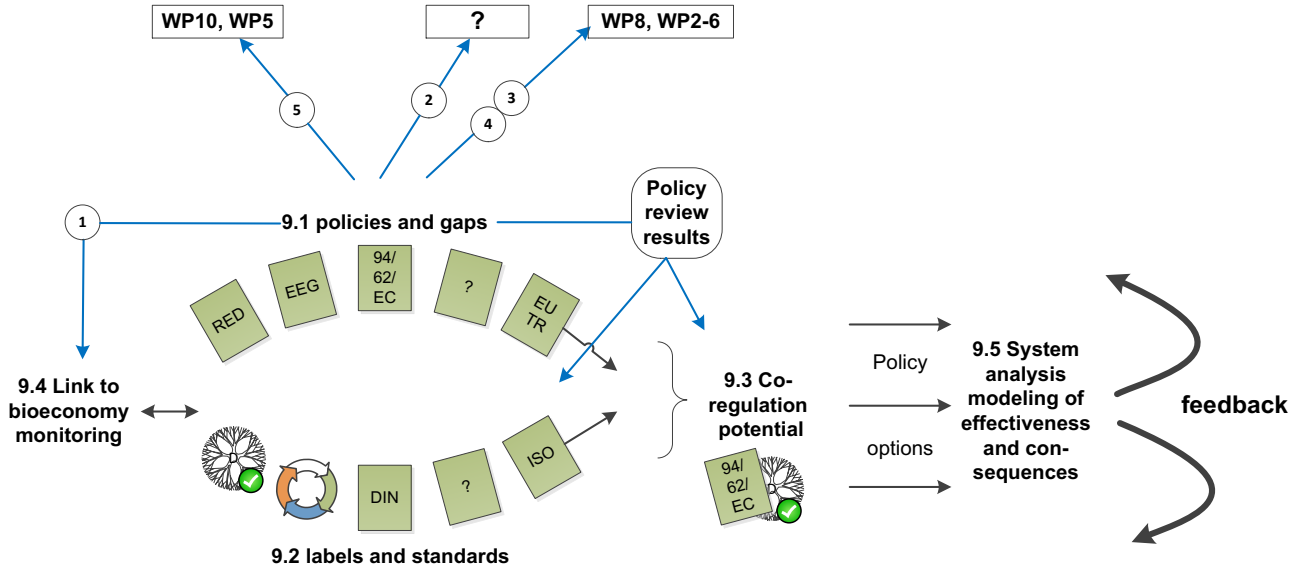


Figure 7: Illustration recipients potentially picking up the observations and conclusions made in task 9.1

4.2.2 Advancement of the BE policy framework

The consideration of the sustainability risk table showed, that there are a number of sustainability risks occurring in most BE sectors which are often linked to the biomass cultivation. Furthermore, global supply chains may differ significantly in terms of their sustainability risks compared to supply chains sourcing biomass within the EU. This might be explained by an appropriate background legislation in the EU. However, coming back to the above mentioned limitations of sustainability certification, the tool of certification is, by itself, not suitable to overcome limitations in case this regulatory background and good governance is lacking.

Resource base is not considered sufficiently

Sustainability criteria and requirements have been isolated from policy documents. Most of the policy documents analysed focus on the discussion of sustainability criteria at the processing level. In some cases more or less specific targets in terms of the exploitation of biobased products are being discussed. However, a clear link between targets/goals and the resource base (e.g. land availability, biomass potentials) is mostly missing. The establishment of a clear link to BE monitoring activities is a crucial and necessary step to steer the development of a sustainable BE policy framework. Moreover, the origin of biomass to be utilized in the future EU BE and the role of biomass imports needs to be reflected in the policy framework.

Meaningful application of existing assessment tools

The analysis of the political framework together with previous results of the project (in particular Task 1.1) showed, that in general all tools are available for sustainability assessment. What is missing is research supporting the meaningful application of existing schemes, criteria and indicators. Helpful in that regard can be benchmarking studies making differences of assessment schemes in terms of quality and content understandable for non-experts in the general public and decision makers in politics.

A coherent framework for the growing EU BE is needed

To proactively address the challenges associated with the sustainability risks identified and the implementation of the SDGs as an umbrella approach for a sustainable EU BE, a more coherent and consistent policy framework for the EU BE development is necessary. Even though, various strategies and targets do exist on EU and national levels for the EU BE development, it has become obvious, that the challenges regarding a sustainable development of complex international value chains for bio-based products cannot be developed sufficiently by isolated approaches. Instead, a more consistent framework addressing both, challenges from supply (e.g. the sustainable resource base) and demand side are needed. (Carus 2014; OECD 2018)

Public should be more involved in the development of the bioeconomy

From the analysis of related research projects it emerged, that public engagement is a very important element of the EU BE policy development. In addition, there is a knowledge gap in the society on BE, biobased products and their sustainability benefits (Bioways Project 2018). As the involvement of the public in the BE development is in an early stage, existing tools for public participation should be applied more often. This will increase public awareness and acceptance towards biobased products. Moreover, doing so will influence market uptake in a positive way

5 Annex

5.1 Policy document review template

Policy/regulation/strategy item		
Name (and short name etc., if applicable)		
Origin (institution)		
Geographical relevance		
Type of document		
Obligatory character		
Effective date		
Additional information, comments		
Scope and significance		
	yes/no	specification
Products or resources being promoted or affected		
Which bioeconomy sectors are affected?12		
Objective of the policy/regulation/strategy		
Are there any direct consequences of the policy/regulation/strategy on the industry?		
Are there any specific targets/development goals? (If yes, please specify)		
Are specific targets/development goals measureable? (quantitative, qualitative)		
Additional information, comments		
Link to sustainability and sustainability certification		
	yes/no	specification
Is there any sustainability topic or sustainability dimension addressed in particular?		
Are there sustainability requirements or criteria incorporated?		

12 Please assign one or more of the following: Bioenergy, Forestry, Construction, Food, Feed, Textiles, Chemicals and Plastics, Pharmacy, Materials/Products

Is sustainability certification or other kinds of sustainability assessment explicitly mentioned?		
Are there any direct links to sustainability certification?		
Could certification be an instrument for implementation of the policy/regulation/strategy? If yes, please describe in detail.		
Additional information, comments		

Figure 8: Template enabling a harmonized review of the selected policies/regulations/strategies

5.2 Initial selection of bioeconomy related policy documents

Table 7: Initial list of bioeconomy related policy documents

Policy document	origin
2009/28/EC Renewable energy directive	EU
2010/995/EC - European Timber Regulation	EU
Decree on public procurement of wood products	DE
Innovating for sustainable growth - A bioeconomy for Europe	EU
National Policy Strategy on Bioeconomy	DE
Swedish Research and Innovation Strategy for a Bio-based Economy	SE
Finnish Bioeconomy Strategy	FI
National Research Strategy on Bioeconomy 2030	DE
National strategy of ecological transition towards sustainable development 2015-2020	FR
Energy Transition for Green Growth Act	FR
The new Face of Industry in France	FR
Action plan on the use of renewable resources for material and energy production	DE
Action plan on renewable energies	DE
Forestry strategy 2020	DE
UK Bionergy Strategy	UK
UK Strategy for Agricultural Technologies	UK
Research, Technology and Innovation Strategy for Biobased Industries in Austria	AT
Policy Paper on Bioeconomy	AT
Bioeconomy in Flanders	BE
Plan for Growth for Water, Bio and Environmental Solutions	DK
Growth Plan for Food	DK
Delivering our Green Potential	IR
Deloping the Green Economy in Ireland	IR
National Industrial Biotechnology Development Programme	LT
Groene Groei: voor een sterke, duurzame economie	NL
Groene Groei - Van Biomassa naar Business	NL
Framework memorandum in the Biobased Economy	NL
Green Deal Program	NL

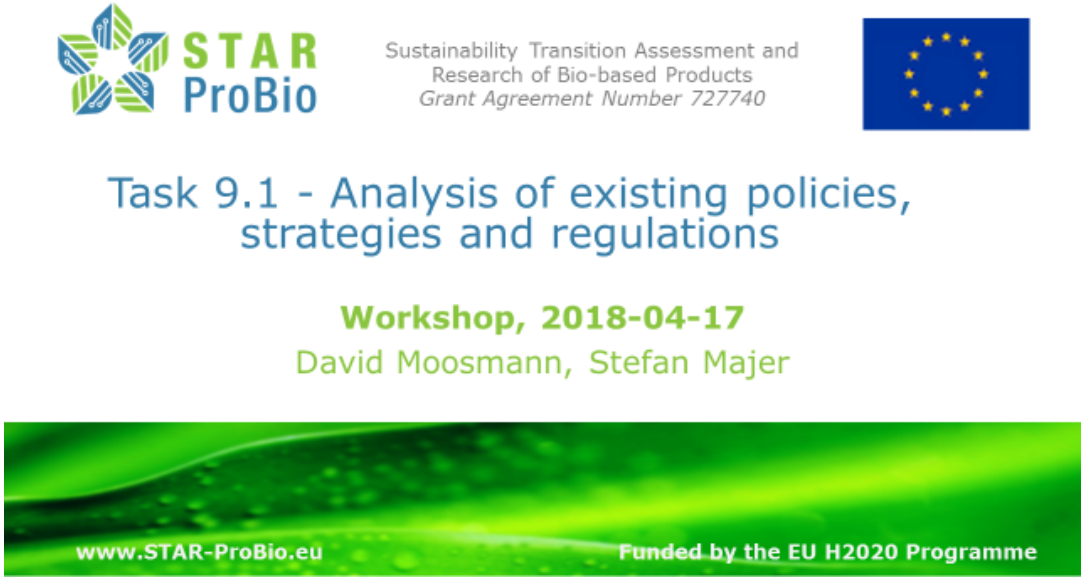
Action Plan on Renewable raw materials	AT
The Spanish Bioeconomy Strategy 2030 Horizon	ES
Bioeconomy in Italy	IT
Strategy for a green society	NL
Slovenia's Smart Specialisation Strategy	SI
Green Growth Commitment	PT
National Environmental Technology Innovation Strategy 2011-2020	HU
EU Forest Strategy	EU
Europe 2020 A strategy for smart, sustainable and inclusive growth	EU
A policy framework for climate and energy in the period from 2020 to 2030	EU
Renewable Energy Sources Act	DE
A Bioeconomy Strategy for France	FR
Marine Strategy Framework Directive	EU
National Biomass Action Plan for Germany	DE
Biorefineries Roadmap	DE
Good practice guidance on the sustainable mobilisation of wood in Europe	World
European Energy Security Strategy	EU
A Circular Economy in the Netherlands by 2050	NL
Development Plan on the Promotion of Biomass and Bioenergy Use for 2007–2013	EE
RENEWABLE ENERGY REPUBLIC OF HUNGARY NATIONAL RENEWABLE ENERGY ACTION PLAN 2010 2020	HU
A Resource Opportunity Waste Management Policy in Ireland	IR
Green Electricity Act	AT
Czech republic bioeconomy initiative	CZ
The Rural Development Programme of the Republic of Slovenia for the period 2014–2010	SI
National waste plan	FR
SusChem France Roadmap 2010	FR
Industrial Decarbonisation & Energy Efficiency Roadmaps to 2050	UK
Council Regulation (EC) No 834/2007 on organic production and labelling of organic products	EU
REGULATION (EC) No 648/2004 on detergents	EU
COMMISSION DECISION establishing the ecological criteria for the award of the EU Ecolabel for textile products (2014/350/EU)	EU
Circular Economy Package	EU
Environmental Annex to the Stability Law	IT
Environmental minimum criteria - Green public procurement National Action Plan	IT
National programme for waste reduction	IT
New Products: made from nature	DE
Quality check- Sustainability standard project	DE
National Action plan for substance recovery from renewable raw material	DE
Rural Development Programme of Mainland Finland	FI
Single Market strategy	EU
Promotion of sustainable mobilisation of wood	EU
Energy Union	EU
Program Biobased Economy (BBE)	NL
Biorenewables Business Platform (BBP)	NL
Platform Agro-Paper Chemistry	NL
Bio based Business accelerator	NL
Dutch Biorefinery Cluster	NL
TEAGASC: The agriculture and food development authority	IR
Eco-Electricity act	AT
Action plan for increasing resource efficiency	AT
Strategy of Agriculture	SI
French Chemical industry road map	FR
Action plan for wood processing industries	FR

DIRECTIVE 2009/30/EC amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions	EU
COMMISSION REGULATION (EU) No 1307/2014 on defining the criteria and geographic ranges of highly biodiverse grassland relating to the quality of petrol and diesel fuels	EU
DIRECTIVE 2009/147/EC on the conservation of wild birds	EU
REGULATION (EC) No 761/2001 allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS)	EU
DIRECTIVE 2008/98/EC on waste	EU
REGULATION (EC) No 1830/2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms	EU
REGULATION (EC) NO 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin	EU
COMMISSION REGULATION (EC) No 178/2006 to establish Annex I listing the food and feed products to which maximum levels for pesticide residues apply	EU
COMMISSION REGULATION (EC) No 260/2008 establishing Annex VII listing active substance/product combinations covered by a derogation as regards post harvest treatments with a fumigant	EU
REGULATION (EC) No 1069/2009 Animal byproducts Regulation	EU
Building the Single Market for Green Products Facilitating better information on the environmental performance of products and organisations	EU
Guidance on unfair commercial practices-extract on misleading green claims	EU
Food Contact Materials Regulation (Regulation (EC) No 1935/2004)	EU
Packaging and Packaging Waste Directive (94/62)	EU
EU Strategy for Plastics in the Circular Economy	EU
2015 Circular Economy Strategy (Action Plan)	EU
COMMISSION DECISION establishing the ecological criteria for the award of the EU Ecolabel for wood-, cork- and bamboo-based floor coverings	EU
Bioeconomy development in EU regions Mapping of EU Member States' / regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014 - 2020	EU
Bioeconomy regions in Europe	MS
Towards a model of circular economy for Italy (Available in Italian)	IT

5.3 List of workshop participants

Participant	Organisation
Sjors van Iersel	SQ Consult
Simone Wurster	TU Berlin
Sergio Ugarte	SQ Consult
Janucz Golaszewski	UWM
Stefan Majer	DBFZ
David Moosmann	DBFZ
Deniz Koca	CEC
Doreen Fedrigo-Fazio	ECOS
Glen Wilson	ECOS
Almona Tani	Unitelma

5.4 Workshop slides

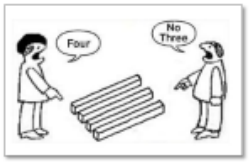


OUTLINE

- Goal of the workshop
- Task 9.1 within WP 9
- Brief repetition on task objectives and approach
- Results (Policy analysis, Projects review, SDG mapping)
- Development of sustainability risk levels subject to bioeconomy sectors
- Joint discussion
- Presentation of deliverable outline
- Next steps

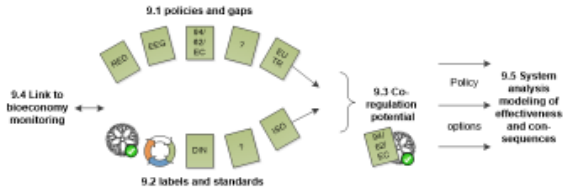
Goal of today´s workshop

- Common understanding of the task and the connection to WP9 tasks
- Presentation of intermediate results of task 9.1
- Discussion of expectations regarding T9.1 results
- Discussion of next steps towards D9.1 finalisation



Source: Joy Ruff, 2016

Positioning of Task 9.1 within WP 9



- Issues to be discussed:
  1. Role of case studies
  2. Which are the most important links between the tasks?
  3. Which results are crucial for downstream tasks, 9.3 and 9.5 in particular?
  4. …?

Task 9.1 - Objectives

1) **Analysis of existing policy frameworks** on EU and MS level affecting or promoting the use of sustainability assessment schemes for the BBE.

2) To **identify possible regulatory gaps** and to **develop a first set of recommendations** to close these gaps with the results from the STAR-ProBio project.

3) Address **options to stimulate the market uptake** of bio-based products (e.g. green public procurement, voucher schemes for environmentally and/or socially superior products, etc.).

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Approach

- Screening & analysis of policy documents
- Consideration of results from relevant projects
- Mapping of policies and sustainable development goals (SDGs)

Source: DBFZ (2018)

Source: United Nations (2018)

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Results – joint review of policies

Analysed sample of policy documents:

		Regulation (EC) No 761/2001 on Eco-management and Audit Scheme (EMAS)
Directive 2009/28/EC on Renewable Energy (RED)	Bioeconomy in Italy	Directive 2008/98/EC on waste
Directive 2015/1513/EU on indirect land use change	Strategy for a Green Society	Regulation (EC) No 1830/2003 on genetically modified organisms
Regulation (EU) No 995/2010 on European Timber (EUTR)	Green Growth Commitment	Regulation (EC) No 1069/2009 on Animal by-products
Decree on Public Procurement of Wood Products	National Environmental Technology Innovation Strategy 2011-2020	Building the Single Market for Green Products Facilitating better Information on the Environmental Performance of Products and Organisations
Innovating for Sustainable Growth - A Bioeconomy for Europe (Bioeconomy Strategy)	EU Forest Strategy	Guidance on unfair Commercial Practices - Extract on Misleading Green Claims
National Policy Strategy on Bioeconomy	Renewable Energy Sources Act (EEG)	Regulation (EC) No 1935/2004 on Food Contact Materials
Swedish Research and Innovation Strategy for a Bio-based Economy	A Bioeconomy Strategy for France	Directive 94/62/EC on packaging and packaging waste
Finnish Bioeconomy Strategy	Biorefineries Roadmap	
National Strategy of Ecological Transition towards Sustainable Development 2015-2020	Good Practice Guidance on the Sustainable Mobilisation of Wood in Europe	EU Strategy for Plastics in the Circular Economy
Energy Transition for Green Growth Act	Renewable Energy Republic of Hungary - National Renewable Energy Action Plan 2010 2020	2015 Circular Economy Strategy (Action Plan)
Forestry Strategy 2020	A Resource Opportunity - Waste Management Policy in Ireland	Commission Decision of the EU Ecolabel for wood-, cork- and bamboo-based floor coverings (2017/176)
UK Bionergy Strategy	National Action Plan for Green Public Procurement	Bioeconomy Development in EU Regions Mapping of EU Member States' / Regions' Research and Innovation Plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014 -2020
Bioeconomy in Flanders	Commission Decision of the EU Ecolabel for textile products (2014/350/EU)	Bioeconomy Regions in Europe
Plan for Growth for Water, Bio and Environmental Solutions	Action Plan for the Environmental Sustainability of Consumption in the Public Administration Sector	Towards a Model of Circular Economy for Italy
Delivering our Green Potential	National Programme for Waste Reduction	Directive 2008/56/EC on Marine Strategy Framework
Action Plan on Renewable Raw Materials	Promotion of Sustainable Mobilisation of Wood	A Circular Economy in the Netherlands by 2050
The Spanish Bioeconomy Strategy 2030 Horizon	Hoofdlijnennotitie Biobased Economy (BBE)	

Results – joint review of policies

The Evaluation of the review sheets resulted in a table combining collected information

Policy title	Geographical relevance	Type of document	Obligatory	Effective date	Affected BE sectors	Focus	Direct consequences	Specific targets/goals	Targets/goals measureable	Addressed sustainability dimensions	Sustainability criteria incorporated	Certification explicitly mentioned	Direct links to certification	Certification appropriate implementation instrument ?
A Bioeconomy Strategy for France	FR	Strategy	X	2016	Bioenergy, Forestry, Food, Chemicals and Plastics, Materials/ Products	Sustainable biobased economy	X	X	X	En	✓	✓	X	✓
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Results – joint review of policies

- Two main observations:
  - Sustainability certification has become an accepted instrument for sustainability assessment
  - Comparatively low no. of policies with measureable goals/targets

No of analysed documents	50
obligatory character, %	24
direct consequences on industry, %	42
specific targets/goals included, %	72
targets/goals measureble, %	50
included sustainability requirements/criteria, %	56
sustainability assessment/certification explicitly mentioned, %	72
direct links to certification, %	44
certification appropriate instrument for implementation of the policy, %	76

Results – joint review of policies

- Sustainability requirements/criteria found in analysed policy documents
  - Cloud shows the relevance of the criteria and requirements found in the analysed documents (according to the frequency)
  - Clear focus on environmental sustainability
  - besides single criteria, criteria frameworks/sets seem to be more and more recognized in certain areas → minimum sustainability requirements for certain BE sectors

Source: DBFZ (2018)

Results – project review

- Public and stakeholder engagement was found to be a crucial element of EU policy development, research and innovation
- Involvement of public society is only at the beginning
- BioSTEP developed and applied tools for public participation („Education and information", „Dialogue", „Co-production of knowledge"), which could be picked up
- Public knowledge gap on sustainability in general, labels, bioeconomy

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Results – project review

- Open BIO recommended on legislation to reduce regulatiory burdens, simplify policies and create a level playing field between different sectors
- Integration of bioenergy and biobased products in policies with the goal of creating a level playing field
- To be completed

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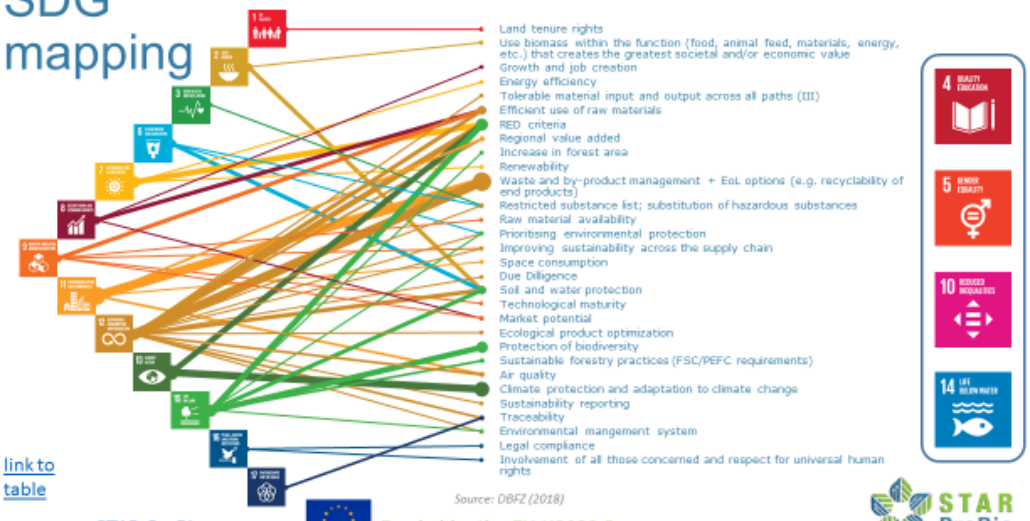
SDG mapping



link to table

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SDG mapping

- Link between requirements/criteria and SDG no. 4,5,10,14 could not be established
- The focus on environmental sustainability observed in the relevance cloud could be confirmed/precised by the SDG mapping → less covered SDGs mostly to increase social sustainability

Main observations

1. Market uptake could be supported by a detailed assessment of sustainability criteria for all BE sectors
2. Certification can be suitable to implement quantifiable targets/indicators
3. Resource base is not addressed appropriately
4. Public should be involved in the development of a sustainable BE
5. Level playing field (harmonised min. criteria)

1. Market uptake could be supported by a detailed assessment of minimum sustainability criteria for all BE sectors

- Policy review showed, that for few BE sectors minimum requirements are recognized (e.g. FSC/PEFC (forestry, timber industry), RED criteria (biomass production)
- Establishment of minimum criteria in further sectors should be evaluated
- Making use of existing frameworks/schemes

➢ Support of public procurement activities as well as market uptake

2. Certification can be suitable to implement quantifiable targets/criteria

- Evaluation of policy review showed, that targets/goals in policies are often not measureable
- EU biofuel policy showed, that certification can be used as tool to implement quantifiable targets
- Also, there are links to monitoring

➢ For the development of a sustainable BE, the applicability and usefulness of quantifiable criteria for the different sectors should be further evaluated

3. Resource base is not addressed appropriately within analysed BE policy documents

- Most of the documents analysed focus on a discussion of sustainability criteria on a product/process level. In some cases, specific targets (e.g. GHG reduction over time, share of biobased content, etc.) are beeing discussed.
- What seems to be missing is in most cases a link between goals/targest of the BBE (or ist sectors) and the sustainable resource base (e.g. land availability, biomass potentials, etc.).

➢ The establishment of a clear link to BE monitoring activities is an important and necessary step to steer the development of a sustianable BE policy framework.

4. Public should be involved in the development of a sustainable BE

- Knowledge gap in society on bioeconomy, sustainability, labels
- Application of BioSTEP results (tools for public participation) should be taken into account

➢ increase public awareness and acceptance

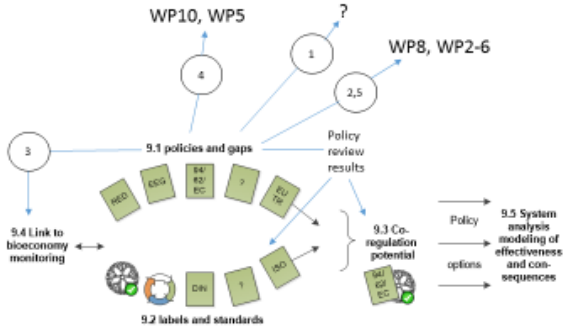
➢ increase market uptake of biobased products

5. Level playing field is needed

- Between BE sectors, fossil based and biobased products and different biomass uses (energetic, material) market distortions need to be avoided

➢ Minimum sustainability requirements, valid for the entire BE shall be developed, at least for biomass production

Where could recommendations be picked up?



1: Establishment of minimum criteria in further sectors should be evaluated
2: Applicability and usefulness of quantifiable criteria for the different sectors
3: Ressource base is not addressed apropreately
4: Application of BioSTEP results (tools for public participation) should be taken into account
5: Level playing field is needed

Potential sustainability risks in BE sectors

Risk distribution among sectors? Risks for society, economy, environment?

Bioeconomy sector	Main potential sustainability risk	Risk level / significance	Risk associated to specific sustainability dimensions	Comments with respect to the geographical region
Bioenergy	deforestation	Medium – high (depending on the cultivation region)		
Forestry	Illegal logging	High	Environmental, (economic?)	Risk is not equally high around the globe, there are hot spots
Construction				
Food	Biodiversity, soil and water quality	High		High, independent of the country or region
Feed	Biodiversity, soil and water quality			
Textiles	Working conditions, water quality	High	Social and environmental	The major volume of textiles is produced in regions (asia) with high risks
Chemicals and Plastics				
Pharmacy				
Materials/Products				

Discussion

- Open issues or comments?
- Direct and indirect influence of policies (Sergio)
- Assessment of EoL indications (link to T9.2)

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Outline D 9.1

1. Introduction

1.1 Placing of Task 9.1 within the WP 9

1.2 Objectives and expected outcomes of the task

1.3 Sustainable development and bioeconomy

2. Methods

2.1 Working procedure and involvement of project partners

2.2 Synthesis and evaluation of results

2.3 Examination of policy elements within the Sustainable Development Goals framework

2.4 Workshop

3. Results

3.1 Review of policies/strategies/regulations

3.2 Review of results of related projects

3.3 SDGs mapping

3.4 Workshop

4 Conclusion and recommendations

5 Literature

Annex

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Next steps

- Incorporation of workshop results in D9.1 draft
- Circulation of D9.1 draft beginning of may
- Review and input by partners
- Change in timeline:

Month	4	5	6	7	8	9	10	11	12	13	14	Partner				
	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	DBFZ	TUB	SQ	UNITELMA	ECOS
Assessment of regulatory framework																
Development of matrix collecting including the relevant regulations on EU and MS level												X				
Selection and description of relevant EU and MS policies and regulations												X	X	X	X	X
Synthesis of results and preparation of workshop/webinar												X				
Development of recommendations												X	X	X	X	X
Internal workshop/webinar to develop recommendations												X	X	X	X	X
D9.1 draft												X	X	X	X	X
D9.1 submission												X				

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Thank you for your attention!

Do you have any comments/questions?

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Work Programme BB-01-2016: Sustainability schemes for the bio-based economy

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