



Promoting stakeholder engagement and public awareness
for a participative governance of the European bioeconomy



BioSTEP in a nutshell – overview and summary of project results

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Laura Griestop



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EXECUTIVE SUMMARY

The scientific achievements of a project need to be communicated in a structured and easily searchable way. Often, project Deliverables are listed on a website, one by one and in an order that is not self-explanatory for the uninformed reader. This report tackles this challenge by integrating all BioSTEP Deliverables into a tree, the so called BioSTEP Tree of Knowledge. This tree provides a comprehensive overview of the project's results. Each section has a heading that is simple and easy to understand. A short summary of each Deliverable as well as a link to the entire document is provided. The BioSTEP Tree of Knowledge is an interactive tool and can be accessed online.

Besides an introduction to and several exemplary screenshots of the BioSTEP Tree of Knowledge, this report also includes a comprehensive overview of BioSTEP results by presenting all executive summaries. Not presented in this report, but available on the BioSTEP website, are the evaluation reports of WP2 and WP3 in barrier-free language.

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1 Introduction

The approach to this Deliverable is two-fold: on the one hand it tries to increase the visibility of the project's results by giving a simpler overview of the individual reports and documents (BioSTEP Tree of Knowledge); on the other hands, it makes the information of selected evaluation reports available in a barrier-free format to increase accessibility (D2.2, D2.4, D3.3).¹

BioSTEP Tree of Knowledge

The scientific achievements of a project need to be communicated in a structured and easily searchable way. Often, project Deliverables are listed on a website, one by one and in an order that is not self-explanatory for the uninformed reader. This report tackles this challenge by integrating all BioSTEP Deliverables into a tree, the so-called BioSTEP Tree of Knowledge. This tree provides a comprehensive overview of the project's results:

- The trunk lays the basis for the further research within BioSTEP. It tackles questions such as: What is bioeconomy? What are its benefits and challenges? Do we need the involvement of different stakeholder groups and citizens in the development of bioeconomy strategies?
- The crown starts with analyses on public engagement in regional and national bioeconomy strategies and presents the results of a large stakeholder consultation.
- Towards the top of the crown are the conclusions drawn from the numerous engagement activities - guidelines for practitioners, a policy paper and recommendations for future research.

Each heading in the tree is simple and easy to understand. A short summary of each Deliverable as well as a link to the entire document is provided when clicking on it. The BioSTEP Tree of Knowledge is an interactive online tool and can be accessed here: <http://www.bio-step.eu/results/tree-of-knowledge/>. In the following, several screenshots show its set-up.

Each Deliverable has a comprehensive executive summary at its beginning. These executive summaries are presented in this report to provide an additional overview of BioSTEP's results and the logic of the project. All executive summaries in this report include hyperlinks to facilitate easier research in all results of the project.

Evaluation Reports

The [Convention on the Rights of Persons with Disabilities](#) (CRPD) was ratified by the United Nations General Assembly in 2006 and came into force in 2008. The European Union has signed the CRPD and recognizes that it is “essential that the Web is accessible in order to provide equal access and equal opportunity to persons with disabilities” ([European Union 2014](#)). To ensure web accessibility, the European Union adheres to the [Web Content Accessibility Guidelines 2.0](#). The evaluation reports of Work Package 2 and 3 have been made available along these Accessibility Guidelines:

- All non-text content has a text alternative.
- The document makes use of regular headings and subheadings, which provide structure and help to navigate through the document.
- Hyperlinks have been added to help users find the content referred to in the text.
- Cross links have been added to help users find the figure or table referred to in the text.

The reports [2.2](#), [2.4](#) and [3.3](#) are referred to as “evaluation reports”, because they build on earlier BioSTEP reports and draw conclusions from prior findings. They were selected for an additional accessibility check as they contain especially valuable information for the general public, namely information on the potential impacts of the bioeconomy, the necessity for public involvement and good practice guidelines for this involvement. In general, however, it has been paid attention that all BioSTEP Deliverables are designed in a very structured and comprehensive manner. The barrier-free evaluation reports can be accessed online under <http://www.bio-step.eu/results/>.

¹ These can be accessed online: <http://www.bio-step.eu/results/>

2 Examples of the BioSTEP Tree of Knowledge

The BioSTEP Tree of Knowledge is an interactive online tool and can be accessed here: <http://www.bio-step.eu/results/tree-of-knowledge/>

Figure 1: BioSTEP Tree of Knowledge

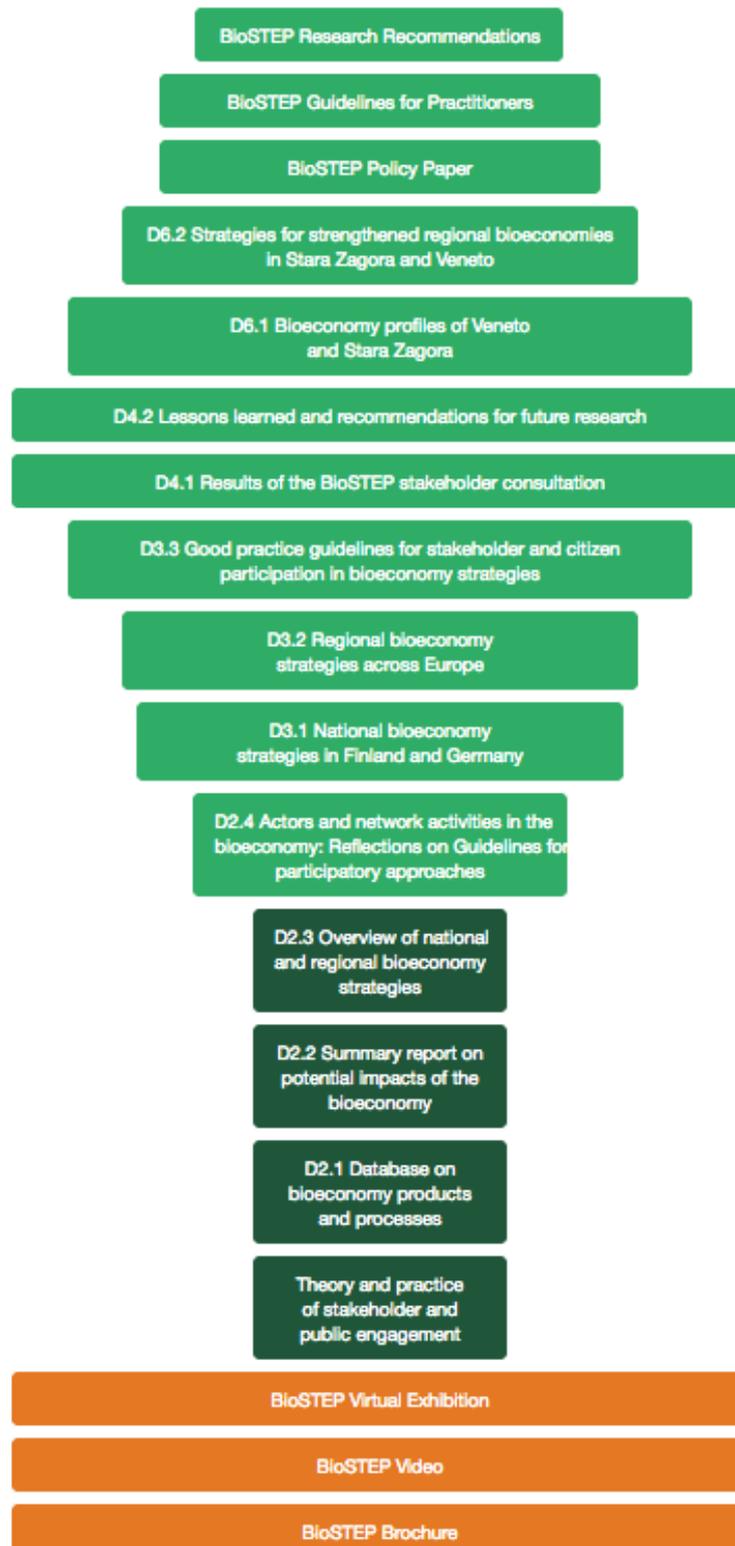


Figure 2: BioSTEP Tree of Knowledge – Focus on D. 4.2

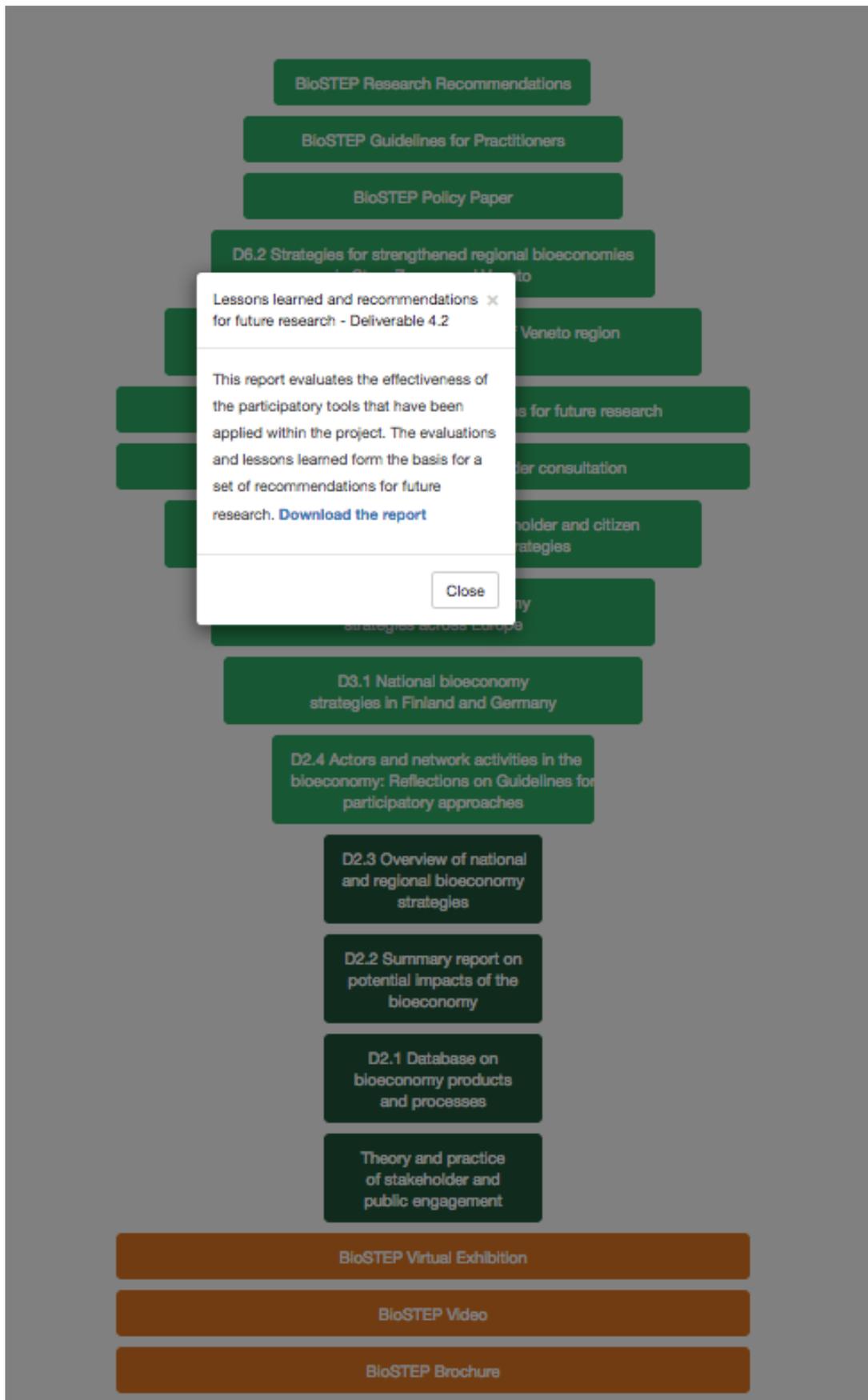
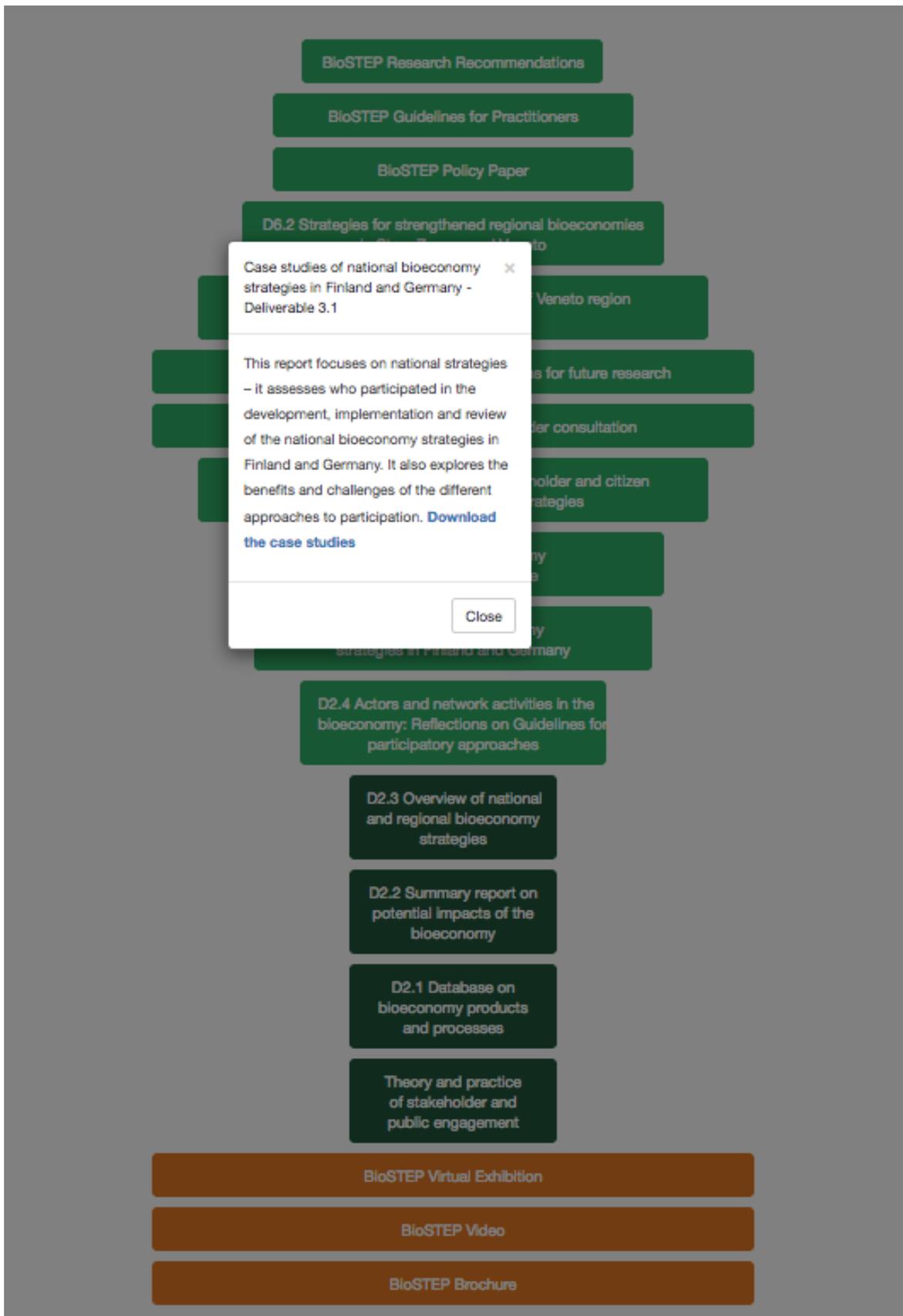


Figure 3: BioSTEP Tree of Knowledge – Focus on D. 3.1



3 Executive summaries of all BioSTEP Deliverables

Each BioSTEP Deliverable has a comprehensive executive summary at its beginning. These executive summaries are presented in this report to provide an additional overview of BioSTEP's results and the logic of the project. All executive summaries include hyperlinks to facilitate easier research in all results of the project.

3.1 Deliverable 2.1: Executive Summary – Database with information on existing bioeconomy products and processes

Deliverable 2.1 is a database that aims to make existing information on bioeconomy products and processes available to stakeholders and the public at large, as a resource in opening up broader public dialogues about the future of the bioeconomy. Rather than attempting to be complete about the whole plethora of products and processes in the bioeconomy, the database presents an overview – a taxonomy – of the main product categories, production processes and feedstocks in the bioeconomy as well as some salient sustainability impacts and governance issues.

We distinguish nine product categories (conventional biofuels, advanced biofuels, bioplastics, industrial parts, green chemical, lubricants, personal home and care, fibre products and food and feed additives) to cover the whole value pyramid and broad range of societal domains regarding the utility of bio-based products. The criteria for selecting examples of bio-based products within each of these nine product categories were to give a broad overview and show the richness of what bio-based products have been and are currently developed. The selected bio-based products thus seek to reflect a variety (without being exhaustive) in terms of the following parameters:

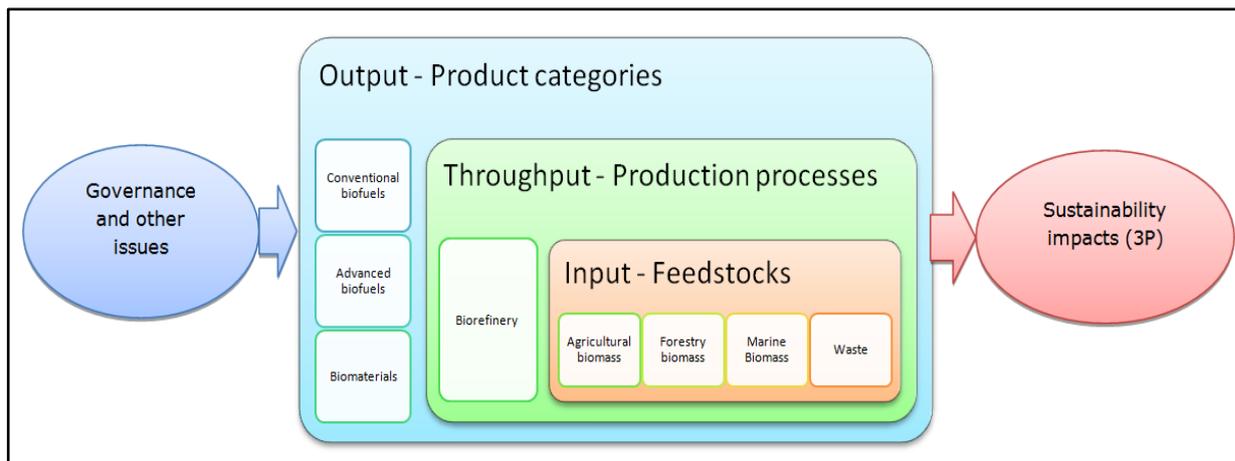
- 1) different (geographical origin) of feedstocks;
- 2) different scales of processing (both current and future estimates);
- 3) different added value of end products.

By clicking on the 'product examples'-link at the top of each product category, one will be led to a definition and clarification of the respective category and find examples that are currently on the market or are being developed (and some weblinks as main references). This overview suggests that at least the following three issues are key to more generic public dialogues and national and supranational levels:

- 1) the so-called food versus fuel discussion that emphasises indirect land use change and also includes food versus material and indirect water use change angles;
- 2) the comparative whole life cycle analysis of fossil versus biofuels and –materials;
- 3) the competition with and competitiveness of biofuels and –materials in relation to fossil equivalents.

It also suggests that key to more specific public dialogues at subnational, i.e. regional, dialogues is place and space of bio-refinery plants and clusters. Size matters to the public at large, and dialogues had better not be closed down by coining these concerns as NIMBY issues.

The hope is that this database serves to capture the basics of the bioeconomy at a glance, whereas **Deliverable 2.2** presents a more exhaustive story. Graphically this taxonomy of the bioeconomy may be represented like this:


Legend for the product factsheets:

Neutral impacts of bioeconomy products and processes

Negative impacts of bioeconomy products and processes

Positive impacts of bioeconomy products and processes

3.2 Deliverable 2.2: Executive Summary – Summary report on the social, economic and environmental impacts of the bioeconomy

The BioSTEP database reported in [Deliverable 2.1](#) aims to make existing information on bioeconomy products and processes available to stakeholders and the public at large as a resource in opening up broader public dialogues about the future of the bioeconomy. Rather than attempting to exhaustively list the whole plethora of products and processes in the bioeconomy, the database presents a taxonomy of the main product categories, production processes and types of feedstock in the bioeconomy as well as some salient sustainability impacts and governance issues.

The present report, [Deliverable 2.2](#), explains that the bioeconomy encompasses a broad range of activities, situated along a multitude of different value chains, each including suppliers, producers, distributors, and purchasers. It shows that the social, economic and environmental impacts of bioeconomy activities are thus not always limited to the place of production of a bio-based product (e.g. within a regional bioeconomy cluster), but can reach back to the location of biomass provision/production and may affect people, regions and countries in different ways.

Bio-based products and processes may entail (intended or unintended) impacts on human society and the environment. These impacts may occur along the entire value chain of bio-based products and might be linked to the production of biomass, to biorefinery (and related) processes, and to the actual characteristics and effects of the new, bio-based products. One single product or process can have several impacts, which are also influenced by factors, which are not related to the product or process.

The broad spectrum of identified bioeconomy impacts highlights that the involvement of different stakeholder groups and citizens in the development of strategies promoting a bio-based economy is crucial. Specifically, the following aspects reflect the urgency to develop a broad inclusion of both interested and affected stakeholders and citizens:

- Opportunities for stakeholder engagement and public engagement in the governance of the bioeconomy occur particularly at the regional level, where biorefinery activities materialise in concrete processing plants.
- Effects on rural development depend highly on whether the bioeconomy is 'mainstreamed' and a broad part of the population benefits from it.

- Interacting with a broad group of stakeholders and different ‘publics’ is critical to increase mutual understanding and address value conflicts that may be difficult to solve.
- Making better use of good practices: There is already evidence on the engagement of citizens and SMEs in waste management, which is significant for the use of waste-based resources.
- A broad cooperation between decision-makers, scientists, civil society and NGOs is necessary to ensure a holistic approach for an inclusive, sustainable and ambitious bioeconomy.

Key recommendations on how to manage the negative impacts of specific bio-based products include the promotion of standards that ensure the sustainable production of imported biomass and changes to the current policy framework.

3.3 Deliverable 2.3: Executive Summary – Review of bioeconomy strategies at regional and national levels

This report presents a list of national and regional bioeconomy strategies across Europe. National and regional bioeconomy strategies operate at different levels and vary in terms of their specific characteristics. Here, it is understood that national strategies are more closely related to bioeconomy policy-making, while regional strategies may be developed by bioeconomy clusters and tend to be shaped by several actors and networks in a specific region, often in less formal ways. In order to explore bioeconomy strategies at the regional level in Europe, BioSTEP has focused on the cases of 14 regional ‘bioeconomy clusters’ across 10 different countries:

1. Stara Zagora (Bulgaria)
2. Veneto Porto Marghera bio-refinery (Italy)
3. The Lombardy Green Chemistry cluster (Italy)
4. Norwich Research Park (UK)
5. York Biovale (UK)
6. North Rhine-Westphalia (Germany)
7. Saxony-Anhalt (Germany)
8. Northeast (Netherlands)
9. Biobased Delta (Netherlands)
10. Industries and Agro Resources (France)
11. Food+i La Rioja (Spain)
12. Satakunta (Finland)
13. Västra Götaland (Sweden)
14. Ghent Bioeconomy Valley (Belgium)

The results of our study suggest that initiatives for participative governance in the bioeconomy are rare and that involvement of civil society is only just starting. The examples of participative governance within national bioeconomy strategies are interesting because they indicate explicit strategies and guidelines that encourage public participation. These strategies are easy to trace and this also applies to the main actors that are involved.

At the level of regional bioeconomy strategies are less easy to trace because explicit strategies and guidelines are lacking or not publicly available. The activities aiming at participative governance at this level are limited both in number and in terms of their main objective, i.e. that of raising public awareness by providing information. Nevertheless, attempts and several intentions to move towards participative governance can be identified.

Several case studies that we assessed as being in a later phase of development did often not reveal much activities of public engagement. So, a later phase of cluster development cannot be related in a linear way to a higher level of participative governance. This is something to take into account for the further development of the national and regional case studies that will be developed in BioSTEP.

Interaction with a broad group of stakeholders and publics is critical to increase mutual understanding, also about value conflicts that may be difficult to solve. Therefore, it is important to consider participatory stakeholder dialogue methodology that can facilitate deliberative practices. We will return to these issues in

Deliverable 2.4 of BioSTEP. Here, we will also pay attention to tools that can open up debates with the publics and/or with Civil Society Organisations.

3.4 Deliverable 2.4: Executive Summary – Actors and network activities in the bioeconomy: Reflections on guidelines for participatory approaches

This report reflects on the actors and network activities in the bioeconomy domain that were identified in the BioSTEP report examining bioeconomy strategies at regional and national levels (**Deliverable 2.3**). Chapter 2 discusses these strategies and considers general guidelines for the further work in BioSTEP. Chapter 3 takes a closer look at the concept of public engagement. Chapter 4 reflects on the Technological Innovation Systems approach on which **Deliverable 2.3** was based. It is argued that this approach was useful for identifying the main actors and network activities in the bio-economy domain, but that it should be complemented or combined with participatory stakeholder dialogue methodologies. This chapter also points at some tools and an instructive framework (TranSTEP: <https://transtepapproach.wordpress.com/>) that could be helpful for opening up debates in the developing bioeconomy.

The following reflective questions on public engagement and guidelines are proposed for the further development of national and regional case studies in BioSTEP.

Reflective questions on public engagement

1. Who are the publics we are engaging with (i.e. what is our understanding of these publics)? If we categorise them, are we able to explain the relevance of such a categorisation in our work?
2. Based on which criteria (informed by a set of assumptions or context) are we selecting / inviting publics? Are we open to reassess these assumptions?
3. What are our motivations to engage with publics, within the remit of the project?
4. How are we engaging and how would we classify the different activities we are promoting in the participation spectrum?
5. What do we expect in terms of impact from our engagement activities (what are the changes we are hoping for)?

Guidelines for the case studies of BioSTEP

1. The workshops should pay attention to different innovations within the bioeconomy, e.g. not only sectors and issues of the 'old' bioeconomy should be covered, but also sectors featured by knowledge-based innovations related to bioeconomy applications with a high degree of added value. Prominent societal and political debates on specific issues should be recognized, but also other applications of the bioeconomy that have met less public opposition and are relatively un-known.
2. Given the observation that the involvement of other publics (e.g. civil society) in the bioeconomy has just started, the selection of interesting cases should also be guided by the existence of actors and networks that are willing to open up debates with the publics and/or with Civil Society Organisations (CSOs). This pragmatic criterion is particularly relevant for the workshops that focus on regional bioeconomy clusters.
3. Beyond the wider priority to facilitate dialogue as a goal in itself, public education dominated by one-way communication that focuses on the benefits of new technologies will not be enough to gain public support. Interaction with a broad group of stakeholders and publics, either by public dialogue and participation or public co-production of knowledge, is critical to increase mutual understanding and exploring the value conflicts that may be difficult to solve. In the wide range of available tools for participatory stakeholder dialogue the framework of TranSTEP (an integrated technology assessment 'roadmap' for examining options) could offer BioSTEP a helping hand.

3.5 Deliverable 3.1: Executive Summary – Case studies of national bioeconomy strategies in Finland and Germany

This report assesses how organisational stakeholders and individual citizens have participated in the development, implementation and review of national policy-led bioeconomy strategies in Finland and Germany. It also explores the benefits and challenges of different approaches to participation, and draws out issues to inform the rest of WP3 and the BioSTEP project as a whole.

National government strategies play important roles in regulating, funding and facilitating information exchange and cooperation in relation to the bioeconomy. Participation can be categorised in terms of Ribeiro and Millar, 2015):

- Public education, whereby ‘experts’ provide others with information on the bioeconomy;
- Public dialogue, whereby ‘experts’ consult and set up forums for debate with others;
- Public co-production of knowledge, based on cooperation between a range of experts, citizens and interest groups.

Studies suggest that there are three main types of rationale for participatory approaches to governance, namely (Marries and Rose, 2010; Pallett, 2012; Ribeiro and Millar, 2015):

- Instrumental rationales (Rowe and Frewer, 2004), which see participation as a ‘tool’ for raising public awareness, strengthening public trust and reducing conflict, with a view to smoothing the way for emerging technologies or policies;
- Substantive rationales, based on a recognition of the limitations of expert knowledge (Rowe and Frewer, 2000), and the need to take account of lay knowledge and opinions in decision-making in order to ensure that new developments are accepted and embedded in society;
- Normative rationales, where broad-based participation is rooted in perceptions of what makes a ‘good society’ (Rowe and Frewer, 2000), which emphasises that people who are likely to be affected by decisions should have the freedom to define whether these decisions are in compliance or in conflict with their own perception of well-being (Sen, 1999).

The methodology included desk research, semi-structured interviews, data analysis and report writing. The following criteria were used to select the two national case studies:

- A strategy (a set of ideas and actions) was in place and was being implemented;
- There were indications that a range of stakeholders participated in strategy design and implementation, representing at least the worlds of policy, business and research and also with some participation from NGOs/CSOs and individual citizens;
- The case studies covered different aspects of the bioeconomy e.g. not only the ‘older’ bioeconomy (notably biofuels) but also the ‘newer’ bioeconomy i.e. refined biomaterials with a high(er) degree of added value (e.g. bio-plastics, lubricants, and personal care).

The Finnish case study focuses on the National Bioeconomy Strategy published in 2014. The strategy design process included consultation with a range of stakeholders and (particularly via social media and websites) also information for individual citizens. Implementation is led by national public bodies, but other stakeholders (especially from the fields of business and research) implement specific projects. Similarly, the Bioeconomy Panel (with participation from business, research and civil society) is consulted on the strategy’s implementation. Various activities aim to raise awareness of the bioeconomy among individual citizens and consumers. The strategy’s review is led by national public bodies, with input from the Bioeconomy Panel, as well as support from external evaluators.

The German case study examines participation in relation to the National Bioeconomy Research Strategy (2010) and the National Bioeconomy Policy Strategy (2014). The Research Strategy was developed by the national ministries, in consultation with the Bioeconomy Council representing business and research interests. National ministries and associated public bodies have also led on implementation, while

researchers, businesses and, to a lesser extent, CSOs/NGOs have been consulted on implementation, and researchers and businesses have received funding for projects. The strategy's review is led by national ministries, with inputs from external evaluators, and in consultation with the Bioeconomy Council.

Participation has been more broadly-based in relation to Germany's National Policy Strategy for the Bioeconomy. The design and implementation phases have involved consultation with CSOs/NGOs as well as with business and research interests, although CSOs/NGOs are still not represented on the Bioeconomy Council and so their participation is less active. Project funding has been allocated to researchers, businesses and, to a lesser extent, CSOs/NGOs. Individual citizens have been targeted by information campaigns and consumer-oriented activities funded by the strategy. As the Policy Strategy was adopted only in 2013, its review is in its early stages and is government-led, although there are plans to involve external evaluators and the Bioeconomy Council.

Interviewees in Finland and Germany noted the following rationales for participatory approaches to the bioeconomy:

- Instrumental: increasing public support for the bioeconomy; encouraging shifts in consumer behaviour; reducing implementation costs by resolving problems at an early stage; generating new ideas for businesses and researchers;
- Substantive: mobilising society-wide capacities to support structural change; building a better strategy by addressing blind spots and asking neglected questions;
- Normative: ensuring that various societal interests are taken into account and enabling a new consensus to be built; taking account of different views in relation to new technologies, which can have redistributive effects.

Interviewees in Finland and Germany also identified challenges associated with the participation of a range of organisational stakeholders in national bioeconomy strategies:

- Slower and more complicated decision-making;
- Difficulties in reaching consensus between different viewpoints and goals;
- Multiple policy strategies and processes can lead to overload for stakeholders;
- Participation can mean that new ideas are blocked;
- Concerns over the legitimacy of non-elected representatives;
- Co-funding requirements can limit the scope of some entities (e.g. SMEs and CSOs/NGOs) to obtain public funding;
- CSOs/NGOs feel that their views are not heard sufficiently and that their influence is limited.

Last, interviewees noted that more active citizen participation was hindered, in particular, by:

- The complex, abstract and controversial character of debates on the bioeconomy;
- The lack of knowledge and interest among citizens on the broad theme of the bioeconomy, despite interest in specific related issues.

Among the possible suggestions of ways for encouraging more active citizen participation were:

- A stronger focus on specific issues which directly affect citizens;
- Long-term communication campaigns (including use of social media) to engage with citizens about the range and complexity of the bioeconomy;
- Funding for projects which encourage public awareness;
- More discussion of sustainable development in the education system;
- Emphasis on the potential environmental benefits of the bioeconomy; and
- Genuine dialogue with citizens, aimed not only at informing but also at listening to and engaging with people's concerns.

3.6 Deliverable 3.2: Executive Summary – Case studies of regional bioeconomy strategies across Europe

This report provides a summary of issues raised in the four regional case studies: Scotland, South-West Netherlands, Saxony-Anhalt and Veneto. It examines the ways in which the bioeconomy has been defined in regional strategies and the ways in which those regional strategies have been initiated and implemented in the four regions. Each of the regions has a distinctive approach, specialising around the particular assets and strengths of the region and its core stakeholders. Typically, regional strategies have been developed by regional government or by stakeholder groups sponsored by those governments, and hence the main objectives have been to promote economic development through the application of developments in the bioeconomy. A primary driver of strategy development has been the need to respond to the requirements of the EU smart specialisation strategies.

Whilst all of the strategies have been led to some degree by regional government of some form, most have also sought to develop more inclusive stakeholder groups to develop and implement the strategies. These groups vary in their level of formalisation, but generally seek to bring together representatives from business, government and research/education. These groups have not tended to involve other stakeholders from civic society and the wider public, but have primarily drawn together those organisations with direct involvement in economic development in the bioeconomy.

A specific focus has been to identify the level of engagement with the wider public across the four case studies. Despite there being different rationales for engagement with the public, the main emphasis has been placed on an instrumental rationale – improving levels of trust through the provision of information – with a lesser normative objective of addressing the ethical right of the public to be involved in decision-making. There has been no real attempt to involve the public in contributing lay knowledge to better understand how the bioeconomy may be implemented. A general issue with these case studies has been the focus on the commercial exploitation of life sciences technologies, led by public agencies with a very limited experience of constructive engagement with the wider public.

The final section of the report examines examples of stakeholder engagement in the broader sense and draws out good practice examples. These predominantly focus on engagement of business and research communities.

3.7 Deliverable 3.3: Executive Summary – Good practice guidelines for stakeholder and citizen participation in bioeconomy strategies

The BioSTEP project (bio-step.eu) aims to promote participative governance in Europe's emerging bioeconomy, by bringing together and making available existing information, exploring existing forms of participation in bioeconomy strategies, engaging with organisational stakeholders and with citizens, and experimenting with new forms of participative decision-making in relation to the bioeconomy.

This document has been developed as part of Work Package 3, which has examined current participatory practices, involving both stakeholders and citizens, in bioeconomy strategies in six case studies, namely:

- Two case studies at national level (Finland and Germany);
- Four case studies at regional level (Bio-based Delta in the Netherlands, Saxony-Anhalt in Germany, Scotland in the United Kingdom, and the Veneto in Italy).
- Key documentary sources include international and national practice-based literature on stakeholder and public engagement, as well as other BioSTEP publications.

Two earlier reports ([Charles et al., 2016](#); [Davies et al., 2016](#)) provide a detailed overview of participation in these six case studies of national and regional bioeconomy strategies. Building on this work, as well as on a review of existing research on stakeholder and citizen engagement in the bioeconomy, this document sets

out guidance and suggestions for designing and undertaking engagement with stakeholders and citizens in relation to national and regional bioeconomy strategies.

This guidance document begins by providing a definition of stakeholder and citizen engagement and differentiating between three main approaches, namely: (i) the provision of education and information, (ii) practices aimed at facilitating dialogue and consulting other organisations and individuals, and (iii) mechanisms focused on more intense forms of cooperation leading to the co-production of knowledge (Section 2).

Different rationales for engaging with stakeholder organisations and citizens are then explored, with a view to demonstrating the importance of participatory processes in relation to bioeconomy strategies (Section 3). These rationales include: (i) achieving pragmatic goals, notably to create new business or research opportunities, (ii) mobilising a range of viewpoints to inform and improve decision-making, and (iii) ensuring that all people affected have the democratic right and ability to voice their views and interests.

Although there are sound reasons for broader participation in bioeconomy strategies, the BioSTEP case studies have demonstrated that such practices face a range of challenges and obstacles, whether they are focused on stakeholders or on citizens (Section 4). It is often the case, for example, that participation is seen as potentially helpful in principle but that key stakeholders have a number of other, more pressing priorities, and are constrained by limited resources and time.

The guidance document then considers how participation should be designed and implemented, and introduces a series of principles underpinning good practice in stakeholder and citizen engagement, drawn from the six BioSTEP case studies and the wider literature (Section 5). These principles include: (i) design and prepare engagement activities carefully, (ii) ensure transparency, integrity and respect for all perspectives, (iii) ensure that engagement makes a difference, (iv) review and evaluate engagement to improve practice, (v) tailor engagement to the national/regional bioeconomy, (vi) engage people on what matters to them, and (vii) learn from other sectors and countries.

With a view to illustrating different methods for engaging with organisational stakeholders on bioeconomy strategies, the guidance document then sets out a series of examples of good practice engagement, drawn from the six case studies, which take the form either of dialogue/consultation or the co-production of knowledge (and not to education/information provision) (Section 6). These include: (i) bioeconomy councils and forums, (ii) consultations with stakeholders, (ii) hybrid organisations (such as clusters and innovation centres), (iv) business-led cooperation and engagement, and (v) policy funding for collaborative projects.

Further examples are provided of good practice engagement involving individual citizens (Section 7). The types of activities found in the six case studies related solely to education/information provision and to dialogue/consultation (with no examples found of co-production of knowledge with citizens). The examples include: (i) public communication and information campaigns, (ii) support for education and training, (iii) measures targeting consumers, (iv) formal public consultation and dialogue, and (v) open-ended citizen participation.

The document concludes by suggesting how this guidance could be used by policy-makers and other stakeholders who are leading bioeconomy strategies.

Annex 1 provides information on further resources for designing and managing engagement activities in relation to the bioeconomy, while Annex 2 sets out further information on the six case studies, as well as an outline of the research methodology used.

3.8 Deliverable 4.1: Executive Summary – Results of the BioSTEP stakeholder consultation

The main aim of the [BioSTEP stakeholder consultation](#) was to provide insights on existing (policy) challenges for the European bioeconomy and potential (policy) measures to address them. The results inform the design of three policy workshops, which BioSTEP will organise in 2016. The outcome of this process will be a list of targeted policy recommendations for the (further) development of balanced and informed bioeconomy strategies at the regional, national and European levels.

During the period of 30 October to 22 December 2015, more than 180 stakeholders from a broad spectrum responded to the BioSTEP consultation. The two largest stakeholder groups involved in the consultation were universities/research centres and government representatives, accounting for roughly half of the stakeholders. The about 30 respondents from industry and SMEs are regarded as a satisfactory contribution of the private sector to the BioSTEP survey.

Section 1 of the consultation addressed “Benefits and challenges of the bioeconomy”. The strongest stakeholder agreement on **perceived benefits** was indicated for “managing natural resources sustainably”, thus placing the importance of the bioeconomy in a wider societal context. This fact is also underlined by the strong agreement with the benefits “Supporting investment in new infrastructures” and “Supporting investment in knowledge, innovation and skills”. The contribution of the bioeconomy to “reducing dependence on non-renewable resources” and to “mitigating and adapting to climate change” was seen more critically. This may be due to the on-going discussion on the GHG impacts of biomass production and use and the inherent limitations of biomass availability.

With respect to **challenges of the bioeconomy** stakeholders highlighted the importance of “sustainability assurance”, “policy coherence”, “appropriate financing”, and “participative dialogue with the public and bioeconomy stakeholders”. The latter challenge is directly addressed by the EU-funded project BioSTEP with its overall aim to promote a public dialogue on the goals of the bioeconomy and the steps needed to move towards a sustainable economy and way of life. On the other hand, stakeholders expressed limited concerns in the areas “specialist personnel”, “transparent intra-governmental communication”, and “data availability”.

Section 2 of the consultation addressed “Potential social and environmental impacts of the bioeconomy”. Stakeholders attributed utmost importance to potential negative social impacts of the bioeconomy on food security. This is fully in line with concerns raised globally on the impacts of increased biomass, bioenergy and biomaterial production. Strong concerns also exist with respect to effective participation and the distribution of revenues created. Social impacts on employment and labour rights, land tenure, health and overall ethical implications raise lower, but still considerable concerns. These topics are usually regarded as less critical in Europe whereas they often trigger major concerns in developing countries. Changes in landscape aesthetics are attributed lowest importance. Finally, several stakeholders stated that all (social) impacts were highly dependent on the type of feedstock with residues and wastes usually having lower potential impact than energy crops grown on agricultural land.

Stakeholders regarded all presented potential **environmental impacts** as “important”. Highest concern was attributed to impacts on resource use (land use efficiency, energy efficiency). This is in line with key findings under perceived benefits of the bioeconomy with respect to “managing natural resources sustainably”. Environmental impacts on climate change, water, soil and biodiversity were regarded as “important” in average whereas stakeholders attributed slightly lower importance to air pollution and CO₂eq emissions due to indirect land use change. The latter may result from ongoing controversies regarding the reliability of methodologies to assess indirect land use change impacts.

Section 3 of the consultation concerned the evaluation of specific “topics/measures” to address a number of challenges faced by the European bioeconomy. With respect to the **challenge “ensuring sustainability”**, stakeholders underlined the importance of monitoring sustainability performance and incentives to improve sustainability performance. Both measures focus on assistance offered to bioeconomy market players to improve performance rather than on strict regulatory interventions. Such measures would facilitate initial market development with the aim to benefit from “learning by doing” towards continuously improved sustainability performance.

Mandatory sustainability certification was attributed higher importance than voluntary sustainability certification. As voluntary agreements often do not live up to their promises, mandatory measures are regarded as necessary to ensure “minimum” sustainability performance. The low importance attributed to limitations on production volumes is interesting in the light of the recent cap introduced for food based biofuels implemented in the framework of the revision of the EU Renewable Energy Directive (RED) – “ILUC Directive”.

Stakeholders attributed highest importance within the **challenge “ensuring policy coherence”** to integrating bioeconomy strategies into agricultural, environmental, energy, regional, climate and industrial

policies. A holistic policy approach integrating several sectors is needed to ensure the success of the European bioeconomy. This holistic policy shall be supported by comprehensive EU Research & Innovations strategies and funding programmes (e.g. Horizon 2020), specific policies promoting the availability of raw materials, and the development of appropriate regulations for the bioeconomy.

Stakeholders attributed slightly lower importance to the development of standards, the adaptation of regional smart specialisation strategies, and the harmonisation of certification and labelling schemes. Finally, stakeholders see public procurement and indicative or binding targets as less appropriate to ensure policy coherence within the European bioeconomy.

With respect to the **challenge “improving intra-governmental communication”**, highest importance was given to establishing multi-level working group(s) made up of central/regional/local government department representatives. Regular inter-departmental meetings, high level working group(s) made up of central government department representatives and the development of better mechanisms for inter-departmental communication were regarded less important. Stakeholders highlighted the importance of agreeing on common targets and the clear identification of a leading department (focal point). Furthermore, as some biomass used in the EU is sourced from non-EU countries, inter-government communication with these countries is important as well.

With respect to the **challenge “promoting a participative dialogue”**, stakeholders attributed high importance to dedicated working group(s) made up of public sector representatives and bioeconomy stakeholders, grant or loan-based financing schemes for public-private initiatives as well as local and regional workshops. Specific stakeholder contributions further highlighted the importance of public-private collaboration to promote and support the market introduction of innovative bioenergy solutions and business models.

Stakeholders underlined the importance of establishing networks of best practice bioeconomy regions in Europe and organising best practice workshops for information sharing within the **challenge “sharing best practice”**.

With respect to the **challenge “ensuring appropriate financing”**, stakeholders attributed highest (and almost equal) importance to building investor confidence in the bioeconomy, promoting public private partnerships, public funding for demonstration projects and funding from national programmes for the bioeconomy. The establishment of a stable, long-term and supportive policy and regulatory framework encompassing policy coherence between different sectors involved and effective sustainability assurance is generally seen as crucial pre-requisite for investor confidence in the bioeconomy. Stakeholders indicated lower relevance for green public procurement and ensuring competitive feedstock costs.

With respect to the **challenge “ensuring appropriate data availability”**, stakeholders attributed highest importance to establishing national Knowledge Exchange Networks to promote information sharing between bioeconomy actors and information resource websites. On the other hand, stakeholders indicated lower relevance with regard to industry fora, unified mailing services, ontologies, taxonomies and Semantic Web or RSS feeds on bioeconomy topics.

Stakeholders highlighted the importance of increased funding for bioeconomy research within the **challenge “ensuring sufficient specialist personnel”**. The education of specialist personnel can also be supported by international exchange programmes for students and entrepreneurs, national (and/or regional) industry skills policies and training programmes, individual grants for specialist education as well as additional funding for educational/training bodies. Stakeholders indicated slightly lower relevance for public information and awareness efforts, clearer vocational and academic qualification pathways and grants to businesses to improve workers' specialist skills.

3.9 Deliverable 4.2: Executive Summary – Engaging stakeholders and citizens in the bioeconomy: Lessons learned from BioSTEP and recommendations for future research

Stakeholder and public engagement are key elements of EU policy development, as well as of responsible research and innovation. Over a period of three years, BioSTEP has designed and implemented a wide range of citizen and stakeholder engagement activities regarding the development of Europe's bioeconomy. These covered different modes of participation, ranging from education and information activities to intensive stakeholder dialogues and the co-creation of regional bioeconomy roadmaps.

BioSTEP experimented with different participatory tools including workshops, living lab activities, and exhibitions that aimed to facilitate stakeholder and public engagement in the bioeconomy. The lessons learned from these activities include the following:

- **Education and information:** BioSTEP's exhibition "Bioeconomy in Everyday Life" turned out to be a highly effective public engagement tool – particularly for interested members of the public that have no expert knowledge on the bioeconomy. Future exhibitions (or similar formats) should provide more background information on the bioeconomy concept, and provide specific information regarding the sustainability of bio-based products and processes. Out of all the social media venues used to promote the project (including Facebook and LinkedIn), Twitter was the most effective tool to reach the interested public.
- **Dialogue:** A key feature of effective stakeholder dialogues is the involvement of participants throughout the entire duration of the respective project/initiative. BioSTEP has shown that an initial broad online survey can be an effective tool to start engaging with stakeholders at a very early stage. Engagement activities should be tailored to the national/regional context and consider the respective "culture of participation." Activities and events should be relevant to current policy discussions. Mobilisation of individual businesses, NGOs/CSOs and citizens turned out to be difficult in BioSTEP; targeted outreach efforts, including direct personal invitations and financial compensation for participation may be necessary in future projects.
- **Co-production of knowledge:** The living lab approach as applied in BioSTEP can facilitate co-creation in the context of regional strategy development. However, the approach proved relatively time-consuming and limited in its ability to engage entrepreneurs. Its success depends on the commitment and participation of the respective regional authorities, as they are key stakeholders when it comes to strategy implementation.

New, innovative instruments for stakeholder engagement are necessary in the bioeconomy field, particularly regarding involvement of NGOs/CSOs and citizens. Building on these lessons learned, [this report](#) presents a set of recommendations for future effective stakeholder and public engagement in the bioeconomy, aiming to maximise the impact of EU Research & Innovation. BioSTEP's research recommendations focus on five distinct topics:

1. **Integrating priorities of civil society into bioeconomy research agendas**
2. **Developing and testing models for co-creation in the bioeconomy**
3. **Communicating complex topics of the bioeconomy to the general public**
4. **Analysing the regional transition to the bioeconomy**
5. **Ensuring responsible research and inclusive innovation in the bioeconomy**

The lessons learned and the research recommendations go beyond the bioeconomy and can be applied to other topics where effective stakeholder and public engagement can improve EU policy development, research and innovation.

3.10 Deliverable 5.4: Executive Summary – Report on BioSTEP's communication and promotion activities

[The report](#) gives an overview of BioSTEP's dissemination and promotion activities. It starts with the media presence of the project. During the three years of the project, different international and national media reported about BioSTEP. Project partners fuelled this interest with articles and announcement on their own institution websites. Regular news updates on the BioSTEP website and a newsletter with main results supported the dissemination activities of all partners. Initiated to promote stakeholder engagement and

public awareness for a participative governance of the European bioeconomy, BioSTEP organised and participated in numerous events. These events included regular policy and validation workshops, but also exhibitions and interactive Living Labs.

The cooperation with other relevant EU projects was an integral part of the activities. The consortium stayed in close contact with and promoted the activities of projects such as CommBeBiz, BioLinX, BIOWAYS or InnProBio. The social media activities of the project attracted the interest of now more than 700 followers on Twitter. Last but definitely not least, the most valuable results of the project were outlined in policy papers and guidelines to facilitate their uptake by practitioners.

3.11 Deliverable 6.1: Executive Summary – Regional bioeconomy profiles including socio-economic and environmental impacts: two case studies

As businesses demand environmental responsibility from suppliers and as policy makers evaluate more complex scenarios, it is increasingly important to address environmental issues related to socio-economic development: the bioeconomy is one of these proposed development trajectories.

Since there are many interpretations of the term bioeconomy, Chapter 2 constitutes a comparative analysis drawing on the most recent academic literature, which lays out a field or range of possible (and sometimes conflicting) bioeconomy development trajectories. Feedback gained from interactions with stakeholders in the context of BioSTEP's "living lab" activities indicates a strong preference for interpretations involving an "agro-eco" focus on resources, as opposed to an industrial focus on biotechnology. Hence, [this report](#) emphasizes overall reduction of impacts across the life cycle in agriculture as well as related fields for which there is sufficient data, including aquaculture, forestry, etc.

The analysis looks at opportunities to structure supply chains according to the principles of organic agriculture and production, and thus delves into e.g. purchasing trends of organic products compared with the conventional ones in food production but also value-added products where applicable. For the Veneto region of Italy, we were able to carry out the research in the form of statistical analysis due to the availability of data and better access to stakeholders – the Stara Zagora region of Bulgaria is examined in broader terms of its bioeconomy and potential.

The data-based approach applied to the Veneto region is outlined in Chapter 3: it involves combining lifecycle assessment (LCA) with the "input-output method for environmental analysis," an approach to determining environmental impacts throughout economic supply chains using data on transactions among different economic sectors. We compared such transactions among roughly 2000 companies deemed "organic" to those of the Veneto region's economy as a whole, in order to extrapolate the actual size of the bioeconomy at the regional level.

For the Stara Zagora region of Bulgaria, similar economic and environmental data is available only at the national level – we analyse the role of organic/alternative resource production in the country's total production. As the Veneto region in Italy, Stara Zagora is a candidate for the implementation of BioSTEP's "living lab" activities, in which business and policy planning are conducted via open, participative approaches.

The overall aim of this approach is to develop a tool with which environmental and socio-economic ex-ante and ex-post assessments of (regional) plans and programmes can support stakeholders and policy makers in the two case study regions, and in other interested regions in following similar approaches. These regions expect to develop their bioeconomies and correlating interconnections with other strategies and policies such as, e.g., Smart Specialisation Strategies and the wider circular economy.

The Veneto region is now ready to transfer such knowledge into new legislative and economic instruments conceived through the fruitful interaction with stakeholders during an economic and a political living lab that have been animated in the last year by the Italian partners of the BioSTEP project. An analogous process will be repeated in Bulgaria.

3.12 Deliverable 6.2: Executive Summary – Strategies for strengthened regional bioeconomies in Stara Zagora and Veneto

Building on the outcomes of BioSTEP's 'living labs' activities, [this report](#) sets out roadmaps for the further development of the bioeconomy in two European regions: Stara Zagora in central-southern Bulgaria and Veneto in north-eastern Italy. For each region, the roadmaps outlined in this report examine the climatic and natural conditions, the sectors relevant for the bioeconomy, as well as the existing national and regional institutional and policy context. The roadmaps were developed in the context of two regional stakeholder processes and outline explicit actions that could support the further development of the regional bioeconomies.

In Stara Zagora, activities promoting the bioeconomy address the following issues:

- converting raw materials and waste products from the agricultural and industrial sectors into consumer goods;
- producing energy from renewable resources and reducing reliance on exhaustible sources;
- diversifying the range of food products grown in the region and improving their nutritional value and health effects;
- reducing pollution from waste products by increasing their recovery potential and recycling;
- conserving natural resources and reducing the adverse impacts of climate change.

In Veneto, activities promoting the bioeconomy address the following issues:

- conducting environmental impact assessments, as current practices do not internalise negative externalities or take a holistic approach;
- establishing a “bio Veneto” quality mark that would brand locally produced bioeconomy products;
- creating a hemp product chain network.

The roadmaps build on and contribute to the Smart Specialisation Strategies (S3) of Stara Zagora and the Veneto region, respectively. Both already include a focus on bio-based activities. Further-more, the measures outlined reflect on the lessons learned from BioSTEP and take into account concepts and tools for participative governance of the bioeconomy. They suggest various forms of participation that facilitate participatory design and implementation of the identified actions.

The two roadmaps conclude by suggesting further steps towards implementing the actions. Stara Zagora's roadmap document is open to being upgraded and enhanced. After the adoption of the actions outlined in the document, stakeholders are planning to develop a programme for priority implementation of the proposed biotechnological solutions. The actions set out for the Veneto region are not part of a comprehensive strategy document, but take the form of an action plan, which will be promoted by the participants of the Veneto living lab. The plan focuses on local actions organised through a cascade system of stakeholders that will be able to renew and grow automatically.