CEE2ACT

Empowering the Central and Eastern European Countries to Develop Bioeconomy Strategies and Action Plans

D5.1 Capacity building strategy and knowledge transfer programme

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PROJECT INFORMATION

Project Acronym	CEE2ACT
Project Title	Empowering the Central and Eastern European Countries to Develop Bioeconomy Strategies and Action Plans
Grant Number	101060280
Project Coordinator	María Beatriz Rosell, Geonardo maria.beatriz.rosell@geonardo.com
Project Duration	1 September 2022 - 31 August 2025

DELIVERABLE INFORMATION

Deliverable No.	**D5.1**
Dissemination Level	**PU**
Work Package	**5**
Task	**T5.1**
Lead Beneficiary	**WR**
Contributing beneficiary(is)	**RISE and all other CEE2ACT partners**
Due date of deliverable	**M12 – August 2023**
Actual submission date	**30 August 2023**

DOCUMENT HISTORY

Version	Date	Beneficiary	Author/Reviewer
1	12.12.2022	WR	n/a
2	11.05.2023	RISE	n/a
3	25.05.2023	WR	n/a
4	21.06.2023	RISE/WR	n/a
5	30.06.2023	CEE2ACT partners	Sent for general review
6	07.07.2023	RISE/WR	Adjustments
7	10.08.2023	LUKE/IUNG	Sent for QA review
8	23.08.2023	RISE/WR	Final adjustments
9	29.08.2023	RISE/WR	Final version

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EXECUTIVE SUMMARY

This report presents the process and outcomes of building a Knowledge Transfer (KT) for the CEE2ACT project. The KT strategy contributes to the overall aim of the Project to empower Central and Eastern European Countries within the European Union to develop circular bioeconomy roadmaps via a bottom-up governance model and the building of national bioeconomy hubs in 10 CEE countries and beyond.

Knowledge Transfer refers to the process of knowledge exchange, interaction on know-how and best practices on technology transfer, and building competencies of stakeholders. Next to the overall bottom-up governance model, CEE2ACT is characterised by the collaboration and exchange of knowledge between (seven) 'contributing countries' and (ten) 'target countries. Contributing countries are EU Member States represented in the consortium that have an existing, advanced circular bioeconomy strategy in place. KT is an integral part of any bioeconomy strategy and roadmap. Knowledge gaps and shortcomings are barriers to a successful implementation of a bioeconomy strategy (see Figure I). Therefore, the CEE2ACT KT strategy contributes to the establishment of the National Bioeconomy Hubs (WP3) and the development of Bioeconomy Roadmaps (WP6) as core deliverables of the Project.

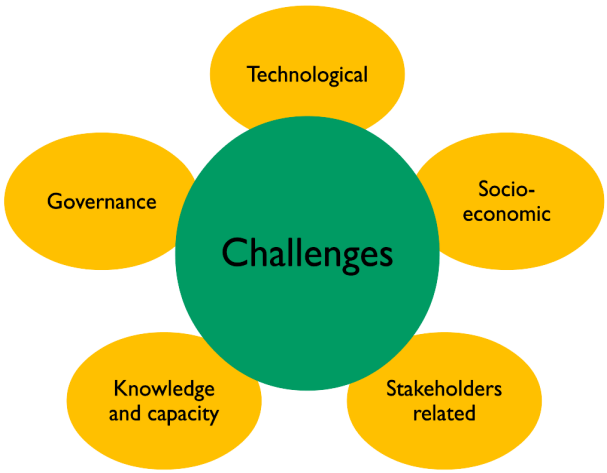

Figure I. Five main categories of present bioeconomy challenges due to knowledge gaps.

The KT strategy contains both generic and country specific items, creating an overarching approach as well as deep diving on the current state of the bioeconomy in the target countries (link to WP2 on baseline assessment) and opportunities that are context and priority driven, based on stakeholders' insights. KT priorities, according to CEE2ACT partners and consulted stakeholders, include:

- Knowledge and tools to promote collaboration.
- Bioeconomy example setting
- Creating a favourable legal context
- Know-how on funding & access to funding
- Technical knowledge on circular and biobased solutions

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The building of the KT strategy itself also followed a bottom-up approach, including the following steps and methods:

Figure II. Timeline of the Knowledge Transfer Strategy development and its implementation.

Current Bioeconomy Roadmaps and practices have been analysed on knowledge transfer practices and how these can be made relevant for CEE target countries. Experiences from Member States represented by the CEE2ACT consortium partners (including Austria, Belgium, Finland, Germany, Spain, Sweden and The Netherlands) have been collected and summarised. KT Stakeholders were identified by utilising the stakeholder mapping exercise performed with the CEE2ACT target country lead partners of the National Bioeconomy.

Then, through a series of 1-on-1 conversations with the target country lead partners, KT needs and elements were identified specifically for the target countries (Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, Serbia, Slovakia, Slovenia). Complementary to country-specific KT needs and elements, a set of general findings were identified conforming to a shared experience, including bioeconomy general knowledge and capacity, technological, governance, socio-economic and specific to certain stakeholders' knowledge challenges. Following, to validate these KT elements and needs, target country lead partners conducted an External Outreach with other bioeconomy stakeholders in their respective countries through a series of 2-6 interviews per target country. The findings informed the fine-tuning of the KT strategy and will serve as a guide for the partners to address the NBH KT and capacity building efforts.

To conclude, the KT strategy offers a 'Menu Approach' for the consecutive KT activities in the following years of the project. The main aim is to allow room for both target country-specific - and general regional KT elements and needs. The Menu offers a variety of KT 'dishes' as well as a 'Chef's Recommendation' to integrate into the NBH 2nd workshop series, the forthcoming Online Training Programme, a site visit to Wageningen University & Research, and two webinars facilitating matchmaking and peer-to-peer learning and sharing of experiences. The KT Strategy also establishes the foundation for the progress tracking and evaluation of its implementation.

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1. Introduction

CEE2ACT is empowering countries in Central and Eastern Europe (CEE) (Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, Serbia, Slovakia and Slovenia) and beyond (the Baltic states) – also referred to as the CEE2ACT target countries – to develop circular bioeconomy strategies and action plans through knowledge transfer and innovative governance models. The project will enable sustainability and resilience to achieve better informed decision-making processes, societal engagement and innovation via building on the practices of experienced countries with circular bioeconomy strategies (Austria, Germany, The Netherlands, Belgium, Spain, Finland, Sweden), also referred to as the contributing countries.

Knowledge transfer and inspiration in creative formats that address the motivations, needs and knowledge gaps of each CEE2ACT target country will be realised through the CEE2ACT National Bioeconomy Hubs (NBHs). A participatory, non-political, bottom-up approach will be applied throughout the project activities, tackling specific knowledge gaps and shortcomings of the top-down conventional approach. This will build closer interconnections between actors across public institutions, private sector, industry, energy, small & medium enterprises (SMEs), feedstock providers (e.g., waste, side streams, farmers, foresters, fishermen), academia and research, non-governmental organisations (NGOs), and civil society organisations (CSOs) in the target countries.

To achieve this, a parallel baseline assessment (socio-economic and environmental aspects) and stakeholder engagement activities were implemented to ensure the proper involvement and active participation of all relevant stakeholders. Digital solutions for sustainable governance will be created and tools to exchange know-how and best practices, building the capacities of the stakeholders to develop bioeconomy strategies. The findings will be synthesized in an analytical framework, which will result in National-level Roadmaps for the Bioeconomy Strategies in targeted CEE2ACT countries, boosting societal engagement and ownership in the countries' transition towards a circular bioeconomy.

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1.1 Aim of the CEE2ACT Knowledge Transfer and Capacity Building Strategy

The objective of the CEE2ACT Knowledge Transfer and Capacity Building Strategy activities is *to enable knowledge exchange and interaction on know-how and best practices on technology transfer, and building the capacities of the stakeholders, in a gender-inclusive manner, to develop bioeconomy strategies and action plans* (CEE2ACT, 2022). More specific objectives include:

- *Optimise the involvement and collaboration with stakeholders from the bioeconomy sectors while building their capacities.*
- *Capture, organise and disclose EU and international good practices and translate them into a comprehensive knowledge transfer strategy.*
- *Support the identification of appropriate technologies and know-how relevant for CEE2ACT target countries*.

This Knowledge Transfer Strategy document presents the CEE2ACT approach to develop and implement KT activities in alignment with the CEE2ACT National Bioeconomy Hubs. It defines KT elements including know-how and capabilities to be transferred, monitoring key knowledge transfer checkpoints to review progress and performing a final review to complete the knowledge transfer evaluation process and to identify any remaining gaps that require action.

Working in parallel with the Baseline Assessment (WP2) and National Bioeconomy Hubs (WP3), KT elements and needs have been identified per CEE target country. Existing European and international bioeconomy national strategies and their barriers and success factors within the development and implementation processes, including regional knowledge from the Baltic States, have been diagnosed for their fit in the targeted CEE countries. Where relevant, existing information from other initiatives, including the BIOEAST Initiative, has been integrated into our findings.

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2. Scoping the Bioeconomy concept

The bioeconomy is a broad concept with different meanings depending on perspective and interests. In this work, focusing on building bioeconomy strategies in EU countries, we choose a generic definition of the bioeconomy set out by the European Commission (EC) in its updated bioeconomy strategy:

"The bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services.[1] To be successful, the European bioeconomy needs to have sustainability and circularity at its heart. This will drive the renewal of our industries, the modernisation of our primary production systems, the protection of the environment and will enhance biodiversity" (EC, 2018: 4).[2]

In essence, the EC definition of the bioeconomy includes the use of renewable biological resources from land and sea to produce food, materials and energy. When successful, this bioeconomy is circular, low-carbon and enhances biodiversity as well as the modernization and strengthening of the industrial base.

The EC bioeconomy definition and updated strategy proposes sustainable bioeconomy innovation and transition for European member states to comply with a variety of EU and international sustainability related policy targets, such as the Sustainable Development Goals and the Paris Agreement and maintain or grow in industrial competitiveness contributing to economic growth and societal welfare.

This EC definition established the basis for a CEE2ACT working definition that fits the purpose of the project in drawing National-level roadmaps for the bioeconomy strategies in CEE target countries (D6.3). The CEE2ACT D2.1 deliverable on the Baseline Assessment, proposes the following CEE2ACT definition on bioeconomy:

[1] Biomedicine and health biotechnology are excluded.

[2] https://op.europa.eu/en/publication-detail/-/publication/edace3e3-e189-11e8-b690-01aa75ed71a1/language-en/format-PDF/source-149755478

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"Bioeconomy at project level shall include and interlink:

- *land and marine ecosystems and the services they provide.*
- *all primary production sectors that use and produce biological resources. (agriculture, forestry, fisheries, and aquaculture) and other sources (insects, algae, yeasts, fungi, microorganism etc.)*
- *and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services.*

This involves not only the extraction of renewable raw materials (Principle 1: the avoidance of fossil carbon sources and scarce, non-renewable raw materials) but also the utilisation of biogenic waste and residues (Principle 2: the circular orientation) in a sustainable way (Principle 3: the recognition of ecological and social framework conditions)". (CEE2ACT, 2023)

The bioeconomy refers to an economy that relies on renewable, natural resources from all parts of the ecosphere in a sustainable manner to produce food and feed, pulp and paper, wood and wood products, as well as other biobased products and bioenergy (including biofuels), as well as the circular use of organic residues and waste. Ecosystem services are part of the bioeconomy.

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3. Knowledge Transfer

Knowledge transfer (KT) is, simply put, the process of sharing knowledge with another actor, within an organization, between two or several organisations. Creating effective and successful knowledge transfer is challenging because it requires certain collaborative capacities and structures of the knowledge sender and receiver in terms of adapting the knowledge in a way in which the receiver can absorb it (Duan et al., 2010; Hildingsson & Nyström, 2018). The management of transnational knowledge transfer (TKT) – knowledge transfer between countries, as in this project - is particularly challenging due to the increased complexity that comes with cross-cultural, political, economic and geographical gaps between the sender and receiver (Duan et al., 2010).

TKT is an emerging area of study within the literature of knowledge transfer (Duan et al., 2010; Hildingsson & Nyström, 2018). So far, Duan et al. (2010) have identified 10 key factors affecting the success of publicly funded TKT projects, like CEE2ACT. In order of relevance, those ten factors are:

- the participants' relationship
- culture awareness
- language
- motivation
- knowledge distance[3]
- clarity of project objectives and focus
- selection of appropriate transfer channel
- selection of appropriate partners
- trust
- openness between participants

3.1 Knowledge Transfer elements – working definition.

Within CEE2ACT, a knowledge transfer element is any type of information, knowledge or tool that can be transferred or applied from one context to another. Within this project and work package 5, this often refers to shared knowledge between one or many of the partner countries but can also be between actors within a country. In this report, it refers to a way of addressing a specific challenge or need that has been identified, either by direct involvement (through the use of specific tools or methodologies) or more general learning (such as how to approach a specific stakeholder group) which cannot be directly be transferred between CEE2ACT partners, but can rather be of use when applied to a specific context, or to be used as inspiration without having much practical input on the day-to-day work of establish national bioeconomy hubs.

[3] Defined here as a gap between partners in terms of their knowledge bases.

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3.2 Knowledge Transfer needs – working definition

Within CEE2ACT and work package 5, a knowledge transfer need is defined as any identified change, action or shift in focus that is required in order to facilitate a desired transformation or course of action for individuals or groups of stakeholders within a company, region, country or for the European Union. A need can be related to any branch of society, including, but not limited to, technical, sociological, economic or political. It also includes various elements that are highly relevant but not limited to the development of a bioeconomy, such as education on various levels of society, public awareness or general transitions to sustainable practices.

It should also be noted that within CEE2ACT, a knowledge transfer need is usually linked to a perceived need in one of the CEE target countries. While also needs for the contributing countries in CEE2ACT have been identified and will be discussed below, this is done with the purpose of knowledge transfer and sharing lessons learned (matchmaking) between stakeholders representing the CEE2ACT countries.

3.3 Knowledge Transfer within CEE2ACT

In relation to the KT factors (Duan et al., 2010) mentioned above, the CEE2ACT partners have discussed the roles of the countries involved and the importance of aligning the findings of the report with the goal of supporting the development of the bioeconomy in the target countries. Knowledge transfer, in particular, plays a crucial role in facilitating the practical flow of information. It is closely related to the principles of Transnational KT (Duan et al., 2010; Hildingsson & Nyström, 2018) described above, making it a complex practice with a limited academic foundation. Therefore, the project has focused on inclusive, humble, and transparent knowledge transfer activities and data collection to maximize the benefits of interactions among the partners and promote trust and motivation. This is especially significant since the represented countries have been categorized as "contributing" and "target" partners based on their roles and objectives in CEE2ACT.

The findings presented in this report represent the most important knowledge transfer elements or activities, either explicitly stated by a CEE2ACT partner (e.g., a specific KT element applicable to a particular country) or identified by the authors. It is important to note that the lists and discussions below are not exhaustive, as there may be other challenges and potential solutions. The authors of this report encourage each CEE2ACT partner and external reader to interpret the presented findings in relation to their own context.

Considering the CEE2ACT ambition to contribute to the development of sustainable bioeconomy in target countries, the knowledge transfer approach is inspired by the sustainability transition studies literature, with a special focus on sustainable Technology Innovation Systems (TIS) (Bergek et al., 2008; Hekkert et al., 2007) and related literature on transformative and mission-oriented governance (Haddad et al.,

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2022; Wesseling & Meijerhof, 2020; Elzinga et al., 2023). According to sustainability transition studies literature, novel sustainable (bioeconomy or other) innovations that target societal challenges of e.g., climate change, biodiversity loss and resource depletion, do not come about easily. This is because these innovations challenge the conventional socio-technical system of unsustainable and co-dependent technologies (e.g., fossil-based technologies) that are "locked-in" and thus steer actors' daily practices, including ways of understanding and solving problems. Hence, by continuing the production and consumption of unsustainable socio-technical systems, we reproduce their power to influence our behaviour (Markard, Raven, & Truffer, 2012).

According to TIS scholars, transitioning from an unsustainable to a sustainable society implies that novel sustainable inventions (such as sustainable biobased solutions) need an innovation system of relevant *actors*, *networks* and *institutions* to enable the invention to develop, mature and diffuse on the market. Hence, a wide range of public and private actors need to collaborate in networks to construct new sustainable technology value chains, including the collection and conversion of a sustainable resource to a product that can be sold, used and recycled. Moreover, these actors need to create an institutional structure for the innovation system. That represents policy incentives (R&D subsidies, visions, roadmaps, standards and regulations etc.) as well as informal norms and values that support and guide the creation and maintenance of the innovation system of the novel value chains. For successful innovation system development, TIS scholars argue for the need of key innovation activities throughout the development process. Examples of such innovation activities are relevant R&D, continuous experiments to learn what works, creation of legitimacy for the invention (through e.g., visions), recruitment of relevant actors, mobilization of financial resources and creation of a (niche) market. The success of these activities depends on the actions of the network actors that are part of the innovation system but also on events in the system context, such as changes in international policies (e.g. EU updated bioeconomy strategy), natural disasters (e.g. climate change effects), social movements (various activistic movements such as the climate protests invigorated by Greta Thunberg and Extinction Rebellion), energy and cost of living crises, conflict and geopolitical conflicts (e.g., the recent war between Ukraine and Russia).

The CEE2ACT knowledge transfer method is inspired by the TIS framework and its theory about fostering sustainable innovation and transitions. Key TIS concepts of technology, actors and networks and institutions listed in Figure 1. below have been guiding the exploration of receiver countries' knowledge needs, contributing countries knowledge resources as well as the way in which these can be bridged with relevant knowledge transfer elements.

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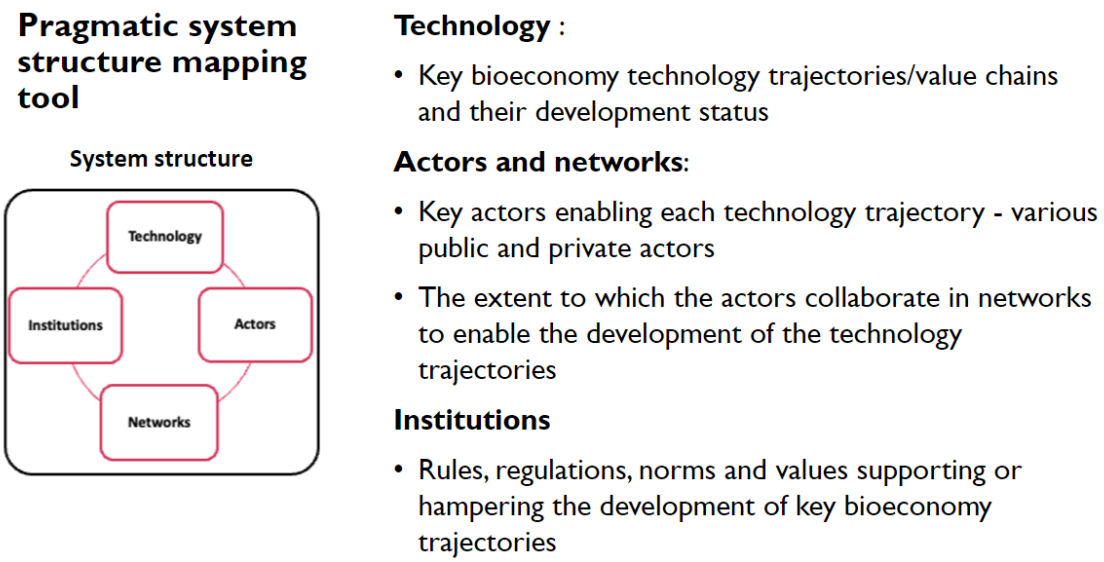

Figure 1. Key technology innovation concepts guiding the identification of knowledge transfer needs, resources and transfer elements.

The CEE2ACT ambition to develop sustainable bio economies, includes the issue of how such development should be governed through the development of appropriate roadmaps for bioeconomy strategies. Lately various scholars, including transition and innovation systems literatures and mainstream economics literatures, have called for the need of a "third-generation innovation policy" to overcome particularly complex and wicked societal challenges such as climate change, resource depletion and growing biodiversity loss., i.e., transformative innovation policy or mission-oriented innovation policy (Haddad et al., 2022).

Within novel innovation policy literature (Wesseling & Meijerhof, 2020), it is claimed that the Mission-oriented Innovation System (MIS) is the first framework for (formative and summative) evaluation of mission governance actions. Thus, MIS can offer a practical perspective on governance that can guide KT strategies related to bioeconomy strategy development within CEE2ACT.

The MIS approach recognizes the need for TIS to come about. However, to tackle a particularly complex societal challenges or missions, there is a need for a mission-oriented innovation system to govern, that is direct and coordinate, multiple TIS and non-technical IS and related contextual developments. Without such governance, there is a risk that the multiple possible solutions may hinder each other by competing for resources. Moreover, synergies between complementary solutions may not be exploited and the most sustainable solution may not be prioritized (Elzinga et al., 2023).

In MIS the **mission arena** is a central concept, in which relevant actors are gathered to formulate and govern the mission by means of five key MIS functions listed below. The three first functions are programming functions aimed at delineating and organizing the work of the mission arena and the last two are performance function aimed at

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monitoring the transformation towards the mission goal (Elzinga et al., 2023). All together those functions are:

- **Providing problem directionality**: Actions aimed at creating consensus regarding the urgency of the focal mission and the level of prioritization over other societal problems (Elzinga et al 2023). From the perspective of CEE2ACT and an EC Bioeconomy strategy context, a mission could be interpreted to develop sustainable bio economies in each European member state as means to contribute to the tackling of complex societal challenges of climate change, resource depletion, biodiversity loss etc.
- **Providing solution directionality**: Actions aimed at providing insight in viable (sustainable bioeconomy) solutions, aligning expectations regarding solutions or strategies to ultimately converge around solution directions.
- **Coordinating the transition**: Monitoring (sustainability bioeconomy) solution potential and progress to coordinate and structure solution directions, according to learned lessons. Creation or rise of coordinating actors or groups via platforms, intermediaries, or transition teams to provide validation, comparison, and structuring of transition routes.
- **Promotion of innovative solutions**, e.g., processes of knowledge development and diffusion, entrepreneurial experimentation, market creation, resource mobilization and legitimacy creation.
- **Destabilization of incumbent (mainly fossil) structures,** and related processes that obstruct the development of innovative solutions that contribute to the completion of the mission. Example of such activities are unlearning, knowledge network break-down, restriction of experimentation, market destabilization, resource withdrawal and challenge status quo (Elzinga et al., 2023).

In the CEE2ACT project we take stock on the need of an arena to learn, govern and stimulate transformation towards a sustainable bioeconomy by gathering key actors for bioeconomy governance and innovation in national bioeconomy hubs. By these means we intend to facilitate knowledge transfer and learning about key challenges and solutions, both related to single innovation system trajectories as well as in the way in which these trajectories may be successfully governed in a wider systems context encompassing multiple innovation trajectories.

3.4 Analytical approach

The data collection and analysis are largely based on intensive involvement from all project partners and relies on their collective and individual understanding of what knowledge transfer elements will be relevant when progressing with the establishment of the national bioeconomy hubs. The process was designed firstly to fulfil the requirements on work package 5.1 where focus is largely on creating a foundation of understand as well as suggesting a knowledge transfer strategy. Second, the process aims to build a solid foundation and support structure to allow the CEE2ACT project to

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flourish and to maximize impact throughout the entire project, for example by enabling open discussions and learning sessions regarding needs and challenges of the target countries.

Steps and methods in the development of the KT strategy:

Figure 2. Timeline of the Knowledge Transfer Strategy development and its implementation.

1. **Perspectives analysis** – The process was initiated with open discussions about challenges, needs and what contributing countries can and should provide, where the already existing knowledge of the CEE2ACT partners was collected on a more general basis (questions on Annex 1 were distributed among the partners). This was done in preparation for the following step, both to prepare the partners for the process in general but also for the work package leads to gauge what type of information is likely to be the most useful to focus on going forward in the work package and project as a whole.

2. **1-on-1 conversations** – Information and data regarding KT needs (target countries) and potential contributions (contributing countries) were collected through interviews with all CEE2ACT partners (generated based on the guiding question of Annex 2). The data was then analysed to identify the most crucial aspects and to identify overlaps and synergies that could be of use for all or individual partners.

3. **Confirmation** – The initial findings based on the 1-on-1 conversations were presented during a Consortium meeting in Prague (March 2023). All partners present participated in a session where these findings were discussed and analysed, with the purpose of identifying gaps, clarifying details in established needs and to start creating a common understanding of the current and future situation for the National Bioeconomy Hubs.

4. **External outreach with key stakeholders** – Building on the stakeholder identification in work package 3.1 (Stakeholder Engagement Plan), representatives from the ten target countries interviewed 2-6 actors within the bioeconomy sector. This was done to support the partners and their local contacts to discuss and align the view on the development of a national bioeconomy hub, as well as to validate the findings from the internal data collection process (Annex 3 & Annex 4).

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5. **Validation of KT Needs and KT Elements** – During an online WP5 partner meeting, the initial conclusions regarding needs and contributions from partner countries were presented and discussed to validate the findings before the completion of this deliverable, and to continue the process of involving all partners to consolidate a shared understanding of the general challenges related to establishing bioeconomy hubs.

6. **Creating a Knowledge Transfer Menu** – The "Menu Approach" (as it is referred to in the remainder of this report) is a modular and choice-based approach to allow the CEE2ACT partners to obtain needs-based support from the contributing countries in a structured way; the menu is a set of general steps that can all be adapted according to the needs that arise throughout the runtime of the project.

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4. Bioeconomy strategy examples lessons from contributing countries

This section presents examples of KT strategies and practices from the CEE2ACT contributing partners. The findings were collected through a questionnaire and 1-on-1 conversation with the contributing partners. These activities had a specific focus on KT elements, including how bioeconomy strategies were developed and over success factors and barriers in in the implementation process. Core questions addressed were about the lessons from collaborative, bottom-up approaches, and how these lessons and examples can be made relevant for the CEE target countries for the remainder of the project and beyond.

4.1 Austria

The Austrian bioeconomy is mainly based on forest and agricultural feedstock. The country's bioeconomy strategy[4] was published in 2019. Its biobased industry is at the forefront in Europe of selected bioeconomy specialisations, including textile, cellulose, construction and insulation, paper and polysaccharide applications.

KT elements that Austria can contribute focus on current structures for cooperation and collaboration for increased knowledge exchange and learning. Examples of the latter include the universities' "Third Mission" which is the obligation to transfer knowledge to combat societal challenges and collaborate on research with companies. Additionally, they have knowledge transfer centres, various cooperation platforms and competence centres.

4.2 Belgium

Belgium is divided into three regions with different governments and little policy integration. While Belgium as a whole has yet to produce a national bioeconomy strategy, the Flanders region has a bioeconomy strategy since 2013. According to the strategy[5], the region has a good position for sustainable bioeconomy development considering its strong chemical industry, food industry and energy sector, intensive agriculture and horticulture and large and well-managed material flows.

The KT elements that Belgium could contribute relate to biomass logistics, biotechnology, social dialogues and experiences from initiatives and policy. Regarding the work on bioeconomy roadmaps and related strategies, Belgium has ample experience with achieving necessary actor collaborations. Pitfalls in Belgium are related to failures in connecting policies and government ministries.

[4] https://www.bmk.gv.at/en/topics/climate-environment/climate-protection/bioeconomy/strategy.html
[5] https://publicaties.vlaanderen.be/view-file/13902

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4.3 Finland

Finland published its first bioeconomy strategy in 2014, which was updated in 2022[6]. The Finish bioeconomy is mostly built around forestry and related industries, and agriculture and the food sector are considered essential parts. The current focus of bioeconomy development is on added value products and on integrating the bioeconomy more holistically to society, connecting for example, with other sustainability themes such as biodiversity.

The KT elements that Finland can contribute are related to agriculture-and-forest-based bioproducts, bioenergy, new bio-products, circular economy, holistic sustainability transitions and system resilience. A bioeconomy development pitfall in Finland is the dominance of the forestry-industry in setting the development trajectory for the Finnish bioeconomy. This could cause a system lock-in and potentially hamper other innovative and maybe more sustainable or profitable solutions. Continued reflexivity in the development of novel socio-technical structures to avoid the promotion of suboptimal solutions is advised.

Another pitfall mentioned is the expert-centred and bureaucratic design of the Finnish decision-making process. While the process is argued to facilitate sufficient collaboration between key stakeholders, it excludes the average citizen from participating in the policy process. Transition literature dictates that broad participation is key for successful transformative policy, and if not handled correctly it may lead to limited legitimacy for bioeconomy.

4.4 Germany

Germany published a bioeconomy strategy in 2020, although concerns about a gap between the strategy and practical applications are expressed. Agriculture and forestry are two key pillars of the German bioeconomy. Key bioeconomy knowledge areas are biofuels and biorefineries, though many more sectors are involved in the development or production of German biobased products.[7]

The KT elements that Germany may contribute are biomass valorisation, life-cycle assessment (LCA), biobased technologies, biomass logistics, bioeconomy roadmap design and social readiness level evaluation. They can further share the experienced success in the development of a bioeconomy strategy and aligning people towards common goals through collaboration.

[6] https://www.biotalous.fi/wp-content/uploads/2022/05/The-Finnish-Bioeconomy-Strategy-Sustainably-towards-higher-value-added-VN_2022_5.pdf

[7] When describing the German bioeconomy, the interviewees refer to the key relevant areas mentioned in the bioeconomy strategy, i.e., automotive sector, engineering, construction sector, food & beverage industry, chemical sector, pharmaceutical sector, energy sector, consumer goods, land- agricultural sector and textiles.

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The latter relates to the importance of building actor networks and creating directionality towards a common goal for successful transformative policy and related outcomes.

An experienced pitfall was that not all stakeholders were represented in the discussions related to bioeconomy policy development. This is similar to one of the Finnish pitfalls. As mentioned in literature, the participation of a broad range of stakeholders is a prerequisite for successful transformative policy because it builds legitimacy and societal ownership.

4.5 Spain

Spain has a bioeconomy strategy since 2016, which targets the food, agriculture and forestry sectors[8] . Key bioeconomy knowledge areas are biomass valorisation from waste and residues, LCA and hydrogen production for electricity.

The three main KT elements that Spain could contribute include 1) the design of the bioeconomy roadmap which jump-started actor engagement, 2) the assessment of biomass potential and 3) LCA. Other KT elements include biomass valorisation technologies, biomass logistics, social readiness level evaluation, and design and promotion of sustainability labels. Similar to Finland and Germany, an experienced pitfall in Spain relates to stakeholder representation.

4.6 Sweden

Sweden has a bioeconomy research and innovation strategy since 2012, a strategy for fossil-free competitiveness focussed on bioenergy and bio-based feedstock in industry transition from 2021[9] and a "Delegation for circular economy" to foster a circular economy transition since 2018.[10] A cohesive national bioeconomy strategy is currently being produced and expected to be finalised in late 2023.[11]

Sweden has a large forest-based economy, but agriculture and processing of biobased feedstock and waste are also important parts of the bioeconomy. The bioeconomy involves large incumbent industries (e.g., forestry and petrochemical) and innovative SMEs. Swedish bioeconomy policy incentives have mainly focussed on increasing bioenergy and biofuel demand to stimulate production and use. In addition, there are incentives for R&D, pilots, and demonstrations.

[8] https://bioeconomia.chil.me/download-doc/102159

[9] https://www.formas.se/download/18.462d60ec167c69393b91e60f/1549956092919/Strategy_Biobased_Ekonomy_hela.pdf ; https://fossilfrittsverige.se/wp-content/uploads/2021/11/Biostrategi_ENG.pdf

[10] https://delegationcirkularekonomi.se/om-oss

[11] https://www.regeringen.se/rattsliga-dokument/kommittedirektiv/2022/06/dir.-202277

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Key KT elements are about a forest-based industry (forestry, pulp, paper, wood construction etc.), including valorisation of by-products into, for example, biofuel and bioenergy, biochemicals and new materials. Sweden can also contribute experiences about the development of integrated biorefineries and biorefinery technologies including energy efficiency and environmental technology.

Additionally, there are experiences from the engagement of the private sector in bioeconomy strategy work and various stakeholder collaborations between research, industry and government in national strategic innovation programmes and regional innovation hubs.

One of the pitfalls relates to the policy focus on increased biofuel demand, which led to large biofuel imports instead of the expected support for domestic production. There are also challenges with creating collaboration between key stakeholders such as the forestry - and petrochemical industries. Literature[12] has acknowledged potential lock-in into incumbent industrial structures, which may block the transition into other potentially more sustainable and economically lucrative bioeconomy solutions.

4.7 The Netherlands

The Netherlands bioeconomy strategy was published in 2018[13], following strategies published earlier in 2007 and 2012.[14] Key knowledge and business areas relevant for the Dutch bioeconomy are agrifood, biofuels, green chemistry, biomaterials and biorefineries.

Examples of KT elements that the Netherlands could contribute to include biomass valorisation, biomass potential assessment, biomass logistics, bioeconomy roadmap design, social readiness level evaluation, food loss and waste monitoring and reduction, and post-harvest assessment tools.

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Seehttps://lucris.lub.lu.se/ws/portalfiles/portal/82516913/POST_PRINT_Hellsmark_Hansen_A_new_dawn_final.pdf

13 Ministerie van Economische Zaken en Klimaat. (2018). De positie van de bio-economie in Nederland. http://www.bio-economie.nl/wp-content/uploads/2019/12/Min-Econ-Zaken_2018_De-positie-van-de-bio-economie-in-Nederland_brochure.pdf; http://www.bio-economie.nl/wp-content/uploads/2019/12/Min-Econ-Zaken_2018_De-positie-van-de-bio-economie-in-Nederland_brochure.pdf

14 Ministerie van Economische Zaken en Klimaat. (2012). Hoofdlijnennotitie Biobased Economy. http://www.rijksoverheid.nl/documenten-en-publicaties/kamerstukken/2011/09/13/kamerbrief-naar-de-top-het- http://www.rijksoverheid.nl/documenten-en-publicaties/kamerstukken/2011/09/13/kamerbrief-naar-de-top-het-
Ministerie van Landbouw, N. en V. (2007). Overheidsvisie op de biobased economy in the energietransitie. “De keten sluiten”.

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The Netherlands has showcased competence and experience in creating multiple stakeholder collaborations, specifically a so-called quadruple helix collaboration between government, academia, industry and civil society, to increase learning and alignment of actors in bioeconomy development trajectories.

Pitfalls in Dutch bioeconomy strategy development include difficulty in creating social awareness of planetary boundaries, and general societal and political apathy to recognize the urgency of sustainability transitions.

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5. KT Elements for CEE target countries

This chapter presents generic and country-specific knowledge transfer elements: any type of information, knowledge or tool that can be transferred or applied from one context to another. Although each individual CEE target country has their own potential and challenges related to developing and implementing a bioeconomy strategy, most countries also share some challenges. These challenges are described in generalised terms in this report, but at the country and regional level will likely be experienced differently.

5.1 Generic KT Elements

The overlap between needs in the target countries was presented in the CEE2ACT baseline assessment (WP2-D2.1). These similarities are summarized below. It is likely that all countries need to make efforts within all categories listed on Table 1, but some are likely to be more important than others, depending on the situation of the individual countries.

Table 1. Overview of identified challenges by experts in the CEE2ACT baseline assessment[15]

Country / Category	Bulgaria	Croatia	Czech Republic	Greece	Hungary	Poland	Romania	Serbia	Slovakia	Slovenia
Financial barriers	X	X	X	X	X	X	X	X	X	X
Knowledge barriers						X	X	X		X
Lack of awareness		X			X	X	X	X	X	
Lack of collaboration	X	X		X	X	X			X	
Lack of implementation									X	
Lack of infrastructure and capacities	X				X	X	X	X		
Lack of market demand						X				
Lack of motivation			X		X	X				X
Lack of policy					X	X	X		X	X
Legal barriers			X	X		X		X	X	X

Source: CEE2ACT (2023) report for D2.1 "Baseline assessment report on bioeconomy implementation and policy development in CEE2ACT target countries") and extra input from Croatia.

Other general KT elements relevant to all CEE2ACT target countries include the following:

[15] "Lack of implementation" in the baseline report refers to limited use of already existing solutions that exists in Slovakia.

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Public awareness

Many partners have expressed the need for increased public awareness related to the bioeconomy. While this is a highly complex topic, the contributing countries in CEE2ACT can likely provide a mix of approaches and methods that can be of use. These include experiences in social dialogues in Belgium, aligning people towards common goals as done in Germany, and the "quadruple helix" focused on increasing collaboration and learning between stakeholder groups as used in the Netherlands.

Multiple contributing countries have shared experiences of pitfalls and challenges from which target countries can learn, most notably related to stakeholder representation, including civil society (Finland and Germany), and social awareness about the urgency of sustainability transitions (The Netherlands).

Technological capacity

Technological capacities and needs are dependent on the available resources and interests of each target country. Table summarizes technical capacities in the contributing countries.

Table 2. Overview of sectoral technical capacities in the contributing countries.

Sector / Country	Austria	Belgium	Finland	Germany	Spain	Sweden	Netherlands
Forestry	x	x	x	x	x	x	
Agriculture	x	x		x	x	x	x
Chemicals						x	x
Food/Nutrition		x			x		
Energy		x	x	x		x	x
Transportation (incl. fuels)				x			x
Waste and waste management			x		x	x	
Sustainable materials and recycling		x	x			x	x
Miscellaneous*	x						

*Includes textile, cellulose, construction, insulation paper and polysaccharide applications

Funding

Acquiring funding is a challenge shared by all CEE2ACT countries, however, the target countries generally struggle with involving the private sector, and to spread sufficient knowledge in what and how different funding streams can be used to promote bioeconomy solutions. When the bioeconomy gets increased traction in the target countries, the national bioeconomy hubs should be supported and focus on enabling information on what funding streams are available and how to access them.

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Governance, policy and legal

There are multiple identified governance and policy actions identified that are likely to be relevant for all ten target countries:

- Clearly separate strategy from roadmap for bioeconomy (where strategy is general and high-level actions, and roadmap is generally more practical and specific points that can be directly put into action), highlight differences and create concrete action points that can give guidance to external stakeholders. Multiple contributing country partners have highlighted that their own strategy could benefit from a clear separation of these two. As such, there is a possibility of a two-way learning process for both target and contributing countries on how to avoid this.
- Create easily accessible information related to how decision and policymaking allow stakeholders to identify opportunities more easily in relation to political development over time.
- Promote long-term development and change in order to avoid continued "lock-in" into existing sectors.
- Explore various cooperation-focused institutions that exist on a high political level.

5.2 Specific KT elements for CEE target countries

This section presents target country-specific actionable knowledge transfer activities where possible, either through activities focused on targeted stakeholder groups or through the transfer of existing knowledge from the contributing countries that address specific needs raised throughout the data collection process.

5.2.1 Bulgaria

It is advised that the NBH in Bulgaria focuses their activities on needs that are in direct control of the partners, namely raising awareness through organisation and participation in public events and communication through social media (to reach the general public), communicating with many stakeholder groups to identify overlaps in interests actively. In terms of specific KT elements from other countries, the partners could collaborate with the Austrian partner, specifically in relation to the "Third mission" of universities (see section 4.1.1), the knowledge related to stakeholder interactions and collaboration from partners in the Netherlands, experience in successful alignment of common goals through collaboration described by the German partners.

5.2.2 Croatia

The progress for establishing a bioeconomy seems to have come relatively far in Croatia compared to other CEE2ACT target countries. The most important challenge identified is raising public awareness. This can likely be aligned with other activities such as enabling collaboration (both promoting collaboration and actively contributing as a "third" part between stakeholders). Experiences from Sweden (interacting with private actors and pitfall when creating collaboration between stakeholders) and the Netherlands (multi-actor collaboration and their lessons learned when creating social awareness on planetary boundaries) might be particularly relevant for Croatia.

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5.2.3 Czech Republic

Biomass from and resources for forestry and agriculture are highlighted as the main areas of bioeconomy development in the Czech Republic, for which experience, and specific knowledge transfer elements can be gathered from most contributing countries.

An experienced challenge is raising awareness about the (benefits of the) bioeconomy with the general public and government. Showcasing proof of concept of specific innovations and highlighting financial viability in contributing countries can support. CEE2ACT partners can further emphasize the structure of the project as a European effort where countries support each other and contribute in diverse ways.

The “quadruple helix” used in the Netherlands can also be explored for improving collaboration between various stakeholder groups, including the government, and for learning and knowledge sharing between knowledge-driven organisations and the government, with the specific aim of creating a convincing case for developing a bioeconomy.

5.2.4 Greece

Greek biomass resources used are mainly agricultural and there is an explicit KT wish from Greek partners to gain additional knowledge to advance the agricultural sector. Hence, experience is likely to be gathered from contributing countries primarily working with agricultural resources including Belgium, Germany, Spain and the Netherlands. These countries and Sweden also have know-how of biomass logistics which is a challenge in Greece. An additional KT wish is to advance the Greek biotechnology sector, with potential learning opportunities from Belgium, and advancing the bioenergy sector, with potential learning opportunities from Belgium, Finland and Sweden.

Limited actor collaboration is a challenge, and experiences could be exchanged with Austria, Belgium, Germany and the Netherlands, specifically the German and Dutch experiences in aligning actors towards a similar goal and the Austrian experience in developing so called “Third mission” to facilitate knowledge transfer from universities to industries and other stakeholders. To facilitate knowledge transfer across borders, the contributing countries could be invited to the Greek hub as per partner request.

5.2.5 Hungary

An expressed need of Hungary is to create awareness of bioeconomy benefits. Various contributing countries could share experiences. One example that can be transferred is the Austrian universities’ “Third mission” model, where Hungarian universities may take on the education of the public and potential bioeconomy stakeholders to a larger extent. Another reported need, which is shared with other target countries, is the need to increase collaboration between actor(s) (groups) for knowledge sharing and bioeconomy acceleration. Once again, we refer to contributing countries with particular good experience and expertise in stimulating and creating structures for collaboration and cooperation, such as Austria, Belgium, Germany, Sweden and The Netherlands.

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A third need expressed by the Hungarian partners is to learn more about social readiness level evaluations, which Germany, Spain and the Netherlands have reported to be able to share experiences about.

5.2.6 Poland

KT needs identified in Poland are similar to other target countries' needs and include increasing awareness of the benefits of various bioeconomy solutions, to which most countries could contribute with experiences. Poland may gain ideas of how to expand their bioeconomy from traditional sectors to new and more innovative ones (increasing the importance and share of the novel sectors in the economy) by getting access to knowledge and experiences of contributing countries. In addition, increasing collaboration is another key need identified. The need for increased collaboration across sectors as well as between policymakers and stakeholders is seen as particularly important to further bioeconomy development.

5.2.7 Romania

Romania has development potential connected to a great range of bioeconomy sectors and related feedstock. Hence, there is a potential to learn from a great range of contributing countries using different kinds of feedstock. Romania also stresses the need to raise awareness and increase collaboration to which various countries could contribute with experiences. Romania also sees the need to increase cooperation between policymakers, researchers and companies, which fit very well with the Dutch quadruple helix expertise as well as the Swedish experience of their strategic innovation programmes. Austria's "third mission" of universities to diffuse knowledge to society at large is again inspiring. Finally, the Romanian partner also mentioned the challenge of companies in gaining access to funding. While this is not explicitly mentioned in the contributing country review, many of the contributing countries have funding schemes for both researchers and companies which Romania could learn from.

5.2.8 Serbia

The main feedstock in Serbia is forestry and related waste streams, which implies that there may be much relevant knowledge transfer from contributing countries where forest resources dominate, such as Finland and Sweden. Serbia's interest in expanding bioenergy also corresponds well with the expertise available in Finland and Sweden. A key challenge is the lack of awareness and urgency for sustainability bioeconomy at the government level and society at large, which also corresponds with the expressed KT element of wishing to increase recognition of bioeconomy among policymakers and related institutions. Austrian universities' "Third mission" of diffusing knowledge to society at large is again relevant as well as the construction of collaboration structures for increased stakeholder knowledge exchange as in Austria and the Netherlands. Regarding the education of policymakers there is a need to learn from contributing countries' experiences (successes and failures) about engaging policymakers with actors driving bioeconomy innovation, such as in the case of Belgium, Sweden, and the Netherlands.

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A general sharing of good practices is also requested by Serbian colleagues and is likely to contribute to increased awareness regarding urgency and sustainability, but also general know-how on how to go about furthering the development of the Serbian bioeconomy.

5.2.9 Slovakia

Similar to other target countries, a key bioeconomy development challenge reported for Slovakia is the need to raise awareness of the bioeconomy, increase collaboration and channel knowledge between science and practice. An inspiring example remains the Austrian universities' "Third mission", which would motivate Slovakian researchers to diffuse new bioeconomy related knowledge to society at large and increase awareness on a practical level. In addition, enabling structures for collaboration such as a CEE2ACT hub for knowledge exchange in Slovakia where other contributing country could be invited to share and exchange knowledge may also be a way forward. For increasing collaboration between stakeholders in general lessons can be learned from Austria, Belgium, the Netherlands and Sweden, and almost all countries that have experienced pitfalls in setting up such collaborative endeavours. A less prioritized challenge expressed by the Slovakian partners is increasing access to financing for research and business. Again, this is not explicitly mentioned in the country review, but many of the contributing countries have funding schemes for companies which Slovakia could learn from.

5.2.10 Slovenia

Slovenia indicates the availability of agricultural and forest resources and rather advanced bioeconomy building blocks, including biotechnology, while lacking government engagement. For biotechnology, knowledge exchange could take place with Belgium that has expertise in this area. Slovenia also reports a priority on circular economy development which may benefit from knowledge transfer of various contributing country experience and expertise in circular economy, e.g., Finland and Sweden, and biomass valorisation, such as Germany, Spain and the Netherlands.

Additional challenges similar to other countries include limited awareness of bioeconomy benefits and limited knowledge on how to accelerate the bioeconomy due to limited knowledge exchange and collaboration. Regarding raising awareness, we see education as key and see potential learnings form the Austrian "Third mission" model of knowledge transfer from academia to the general public mentioned previously. Another way forward is to increase knowledge exchange and collaboration. Slovenia reports that the government does not know about industry needs and industry does not know about innovative bioeconomy solutions developed in academia. Hence, we suggest increased collaboration between these partners. Slovenia could learn from contributing countries positive and negative experiences in setting up structures for such collaboration, e.g., from Austria, Belgium, Germany, Sweden and the Netherlands. The Slovenian partners also wish to take part of contributing countries' best practices to increase learnings on how to accelerate bioeconomy development. Such knowledge transfer may be arranged in the Slovenian CEE2ACT hub.

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6. KT Needs for CEE target countries

This chapter presents generic, and country specific KT needs, defined as any identified change, action or shift in focus that is required in order to facilitate a desired transition or course of action for individuals or groups of stakeholders within a company, region, country or for the European Union.

6.1 Generic KT needs

There are multiple areas for all target countries with shared challenges related to developing a bioeconomy. Some challenges related to KT needs are related to change on a broader level of society and not limited to the bioeconomy, which needs to be considered as part of enabling the general goals of CEE2ACT, namely, to promote sustainable transitions and practices.

Public and political awareness

In general, all CEE2ACT target countries have challenges related to creating public and political interest and awareness of bioeconomy related solutions and benefits as well as lack of publicly shared organisation and structures that allow and likely is a prerequisite for effective and impactful implementation of solutions within the bioeconomy. While it is outside the scope to discuss the historical and geopolitical reasons for the situation in a specific country, it is deemed important to take the current political and financial situation into account when generating interest and implementing bioeconomy solutions. For all target countries, the following points have been identified as being relevant for creating a productive relation with the public population concerning bioeconomy development:

- **Develop structures that allow for knowledge transfer**. Specifically high-and medium-level political interest in bioeconomy solutions, which historically has not had a widespread role in the development of a bioeconomy in many of the target countries.
- **Increase public perception of and interest in bioeconomy solutions** through active interaction over time. Currently, there is limited media and other information diffusion related to both specific bioeconomy solutions and bioeconomy as a topic and potential area of business.
- **Increase cooperation between stakeholders**, specifically that of private actors in relation to the public sector and research institutes.

The potentially best approach to generating political and public interest in general is via various types of proof of concept and measurements of success-related factors, specifically financial viability and competitiveness for bioeconomy solutions. This can, for example, be done by matching good practices identified in work package 4.1 of CEE2ACT, “Online Inventory for good practices” also implementing the “Stakeholder engagement plan” proposed in the Project (WP3).

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Technological capacity

Investment in high-technology solutions within the bioeconomy is considered an essential part of implementing a bioeconomy on a large scale, largely because many solutions depend on modern technology in order to function and be competitive. In relation to knowledge transfer, however, it can be argued that technological capacity is likely to be a result of all other action points in this report, such as education, public awareness, political interest and colliding of funding around activities that promote a transition to sustainable practices. Some points have been identified by CEE2ACT partners and related stakeholders as being of high importance:

- Identify efficient and competitive bioeconomy solutions that fit with the biomass type in specific regions and countries.
- Increase investment in relevant bioeconomy solutions and technologies.
- Promote collaboration and knowledge sharing between universities and other research-related organisations and bottom-level actors that can benefit from recent scientific advancements in order to improve existing and future businesses.

Funding

The challenge of acquiring funding is a common problem and a well-known challenge for many stakeholders working in most types of research or development-focused activities. While some of the aspects discussed in this section are not necessarily unique to the target countries in CEE2ACT, the issue of funding fundamentally is not strictly related to availability of funding resources or mechanisms, but it also concerns how funding is accessed and what type of funding is accessible to stakeholders beyond the research focus. Generally, it has been identified through partner interviews in CEE2ACT that actors struggling to access funding to develop bioeconomy projects often encounter one or all of the following challenges:

- Lack of awareness and clarity of which funding streams exist that are relevant to their area of interest.
- Practical exclusion from identified funding streams due to lack of prerequisite knowledge or education.
- Lack of experience about the application processes to allow for a successful grant application.

According to the partners interviewed within CEE2ACT, all of these factors have resulted in a reliance on EU-funded projects. Related to this, there is also currently a lack of implementation of bioeconomy-focused solutions on a national and regional level. While EU projects are seen as highly valuable for learning and sharing experiences across the EU, it is also recognised that in order for a bioeconomy to achieve significant development and impact in a specific country, interest and engagement from a variety of stakeholders within that region or country is needed, including funding from multiple levels of society.

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Education

Education as a subject in relation to knowledge transfer is not easily separated from other areas as it likely comes "hand in hand" with progress in other areas, such as political interest and public awareness. There are multiple aspects related to education that have been highlighted as being key to address for promoting the development of a bioeconomy. These include, but are not limited to:

- Increase the percentage of the population completing tertiary education (i.e., higher learning such as colleges or universities) through investment and promotion of relevant education programs creating gender-inclusive opportunities.
- Educate existing actors about the benefits of transitioning into sustainable practices to build capacity and knowledge in order to allow for a bottom-up driven implementation of bioeconomy solutions, as well as promoting collaboration and knowledge sharing between various stakeholder types.
- Target younger generations of the population (in a gender inclusive way) with information, education and other actions to promote a long term grassroot movement that is generally more positive towards bioeconomy and sustainable solutions.
- Produce clear examples of "best practices" and financially competitive bioeconomy solutions that can replace existing solutions in various areas.
- Increase the "sense of emergency" related to climate change to incentivise all levels of society to act towards sustainable practices.

Governance: policy, regulations and power dynamics

It has been noted by partners that many ministerial and high-level decision-makers struggle to cooperate with each other and with other stakeholder groups, especially the private sector. In order for the bottom-up approach suggested by CEE2ACT to get sufficient impact, multiple changes are required from policy makers and people in positions with significant political power:

- Improve inter-ministerial collaboration and knowledge sharing, to allow for a holistic approach to policy making that is relevant for bioeconomy and that considers the complex nature of implementing a bioeconomy.
- Increase gender-equal participation in the decision-making processes.
- Provide political incentives and supportive structures to allow for bioeconomy (sustainable) solutions to be both viable and competitive compared to equivalent (unsustainable) solutions.
- Improve knowledge and learning to create prerequisites for impactful policy making related to bioeconomy.

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6.2 Specific KT needs for CEE target countries

This section highlights the factors that have been identified as key for each target country in order to enable their bioeconomy development. Although the details and description of each country's state of bioeconomy development and challenges differ, several topics are reoccurring and represented in the description of the generic needs (see section 6.1). The significant difference is that this section highlights needs that should be addressed in specific countries based on the information gathered through interactions with the CEE2ACT partners. These needs will, to a possible extent, be matched with suggested action points mentioned in section 5.2 of this report.

In order to ensure that the identified needs are well aligned with other ongoing work in the EU, the KT needs identified for each country were also compared to suggested actions for each country made in concept papers produced for the target countries within the BIOEAST initiative. In general, there is a significant overlap and agreement between the needs identified in this report, and those presented in the BIOEAST concept paper for the individual countries. Discrepancies identified are mostly on a detailed level and related to the difference in project focus (e.g., what specific topics were seen as important to address by both the authors and the target country partners). It should also be noted that not all CEE2ACT countries were covered in the BIOEAST concept papers. It should also be noted that the BIOEAST concept paper generally has a larger focus on quantitative data related to technical solutions and biomass, which can likely be used by the partner countries to complement the knowledge transfer-focused content of this report.

6.2.1 Bulgaria

Bulgaria has relevant primary biomass and waste resources from agricultural and forestry and relevant factors that could contribute to developing a sustainable bioeconomy, which was also concluded in the BIOEAST project. Bulgaria also has sectoral and regional bioeconomy strategy documents, but sufficient national level development of roadmaps for the strategies and action plans is still lacking.

To enable bioeconomy development, the interviewees repeatedly stressed the need for stronger collaboration between researchers, public authorities, non-governmental organisations and businesses. Examples of other relevant needs to be addressed are improving the research infrastructure, the translation of research to practice, achieving a direct connection between scientific and educational institutes and businesses to implement a stronger scientific presence in the private sector, increasing the awareness of bioeconomy benefits and overcoming financial barriers. Prioritised KT elements mentioned by the interviewees relate to facilitating learning, e.g., continuous learning from universities, training, maintaining existing cooperation between various organisations and companies, and develop new cooperation between institutions nationally and internationally. These identified needs are well-aligned with those presented in the BIOEAST concept paper for Bulgaria.

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6.2.2 Croatia

Croatia has access to various biomass resources and several bioeconomy projects related to agriculture, forestry and biowaste collection. Moreover, the Croatian government is currently working on a national bioeconomy strategy which is expected to be in place before the end of 2023.

To reach a sustainable bioeconomy, a key challenge to address is collaboration and coordination between various bioeconomy actors and their initiatives. For example, the interviewees suggested increasing coordination between bioeconomy projects and improving collaboration between the government and private actors on strategy work, between the scientific community and industry on innovation and between actors in the private sector in order to scale up and diffuse innovative solutions on the market. Examples of other challenges are insufficient funding and governance measures for bioeconomy development. The most relevant KT elements for Croatia are to inform the private sector on new bioeconomy solutions and how to collaborate to realise these on the market.

While there is a significant overlap between the needs above and those presented in the BIOEAST concept paper (e.g., scientific networking with private actors and the need for coordination between parallel initiatives), digitalization was not discussed in this report in relation to Croatia. This is likely to be an important factor to consider for the CEE2ACT partners as the NBHs are being established, even if it was not identified through the process of work package 5.1.

6.2.3 Czech Republic

According to the interviews conducted, the Czech Republic has access to agricultural and forest resources, a research community supportive of bioeconomy development and a few successful bottom-up bioeconomy initiatives. So far, regional bioeconomy strategies have been developed on the initiative of EU projects. Nevertheless, these strategies have no practical results yet due to the lack of national priorities.

A key challenge in Czechia is the lack of government priority for sustainable bioeconomy development and coordination of ministerial action in this area despite their awareness of the bioeconomy and its gains. Another major challenge is the lack of awareness among the general population of the gains of bioeconomy development. The lack of knowledge in the private sector about sources of financial support for bioeconomy development, which imply that they do not apply for funds. The interviewees have not mentioned or ranked specific KT elements.

The BIOEAST concept paper also highlights the needs to mitigate droughts in relation to climate change and to cultivate crops for biomass that are resilient and viable to use in a future where at least some level of climate change is a reality.

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6.2.4 Greece

Greece has a strong agricultural sector, including forestry, and fishery as well as relevant industries in the field of cosmetic and pharmaceuticals with relevance for bioeconomy development. Lately, interest in bioeconomy has grown stronger in the energy and waste industries. Furthermore, the Greek government supports sustainable bioeconomy development through national research agendas, academic funding programs, and other initiatives. There are also regional bioeconomy strategies in place, though a national bioeconomy strategy is still missing.

A key challenge for sustainable bioeconomy development in Greece is limited collaboration. Increased collaboration is suggested between key bioeconomy stakeholders in general and, more specifically, between industry and academia to facilitate the transfer of innovative knowledge into practice and between international organisations to facilitate knowledge transfer across borders. Examples of additional challenges are limited investments in R&D and training, better insight in available bioresources and how to use them sustainably, improved efficiency and competitiveness of bio-based products, better understanding of policy and regulation and development of adequate infrastructure and logistics. Key KT elements mentioned were mainly targeted at advancing Greek bioeconomy sectors (i.e., agriculture, renewable energy, biotechnology).[16]

6.2.5 Hungary

Hungary has a significant potential for implementing bioeconomy, with various actors acting within what could be considered bioeconomy solutions. However, many actors that could contribute to the bottom-up approach represented by CEE2ACT are often either poorly informed about the benefits of establishing a bioeconomy in general or lack the means for sufficient collaboration between individuals as well as groups of actors.

It was explicitly stated during the partner interview that the CEE2ACT partners from Hungary would likely benefit greatly from a better understanding of how the contributing countries within CEE2ACT have promoted collaboration and knowledge sharing between bioeconomy stakeholders. As the social awareness and readiness level can be considered low in the country, therefore a “Social Readiness Level evaluation” would be highly beneficial. These points are also highlighted in the BIOEAST concept paper. It also highlights more specific needs, such as supporting emerging biorefineries and preservation of sustainable biomass production on a national level and Carbon Capture and Storage (CCS) solutions.

[16] No concept paper for Greece has been published in the BIOEAST project.

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6.2.6 Poland

Poland has a promising environment that could support the development of an extensive bioeconomy. However, at this point, there is limited awareness related to the high-level development of a bioeconomy and how it could be effectively implemented (i.e., a framework/roadmap that translates a future strategy into clear action points). While there exists interest as well as established bioeconomy solutions within multiple sectors, these are deemed to be limited to just some sectors that have traditionally garnered significant support in the country, rather than financial and political support being more broadly distributed over various sectors and areas to promote a sustainable bioeconomy. In Poland, there is a sectoral rather than a holistic approach, and individual initiatives generally are supported more than a cross-sectoral approach to implementing a bioeconomy.

Related to the above, Poland has a clear need for both public and targeted communication about the benefits of bioeconomy solutions, and specifically the need for a diversified focus to allow many types of solutions to be implemented, as well as promotion of cross-sector collaboration to support knowledge transfer and long-term development of bioeconomy as a business sector. While not only limited to bioeconomy, this need also extends to the need for policy-makers to interact with various stakeholders interested in contributing to a bioeconomy to drive a bottom-up push from the private sector (e.g., those actors that are involved in CEE2ACT), which would be beneficial for a broader establishment of the bioeconomy sector.

The BIOEAST concept paper highlights the need for high-level actors to be involved and for policymakers to gain a sufficient understanding of bioeconomy and sustainability in general, as well as poorly developed structures for cooperation that could support a bioeconomy (e.g., clusters).

6.2.7 Romania

According to the interview data, Romania has significant development potential in various bioeconomy sectors such as waste, agriculture, agri-food, forestry and fisheries. Regarding bioeconomy strategies, Romania has had EU funded projects that have addressed regional bioeconomy strategy work and currently (spring 2023) a concept paper for the development of a national bioeconomy strategy is under development.

A challenge is the limited awareness of the potential of bioeconomy development in general society. Then, an example of another challenge is the difficulty of gaining access to funding by companies. Examples of knowledge transfer elements were to raise awareness about bioeconomy concepts and their potential, increase cooperation between policymakers as well as between knowledge institutes and companies. The BIOEAST concept paper also identified many general topics that need to be addressed, such as those above, as well as developing bioeconomy clusters, consolidation of companies and increased valorisation for sustainable products.

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6.2.8 Serbia

Serbia has various biomass production, mainly related to forestry and related waste streams. Potential is especially seen in large for the development of bioenergy. While Serbia lacks dedicated legislation for the bioeconomy, there is notable enthusiasm surrounding the circular economy. This interest provides a promising foundation and starting point for the development of the bioeconomy.

The roadmap for the circular economy was established and adopted in 2022, and it is set to be further strengthened through the introduction of the Program in 2024. Recognizing the benefits, the Ministry of Environmental Protection of the Republic of Serbia has accepted the inclusion of the bioeconomy concept in the Program, as it will facilitate its integration into relevant legal documentation. In general, the bioeconomy is not yet prioritised by the government.

Another challenge for Serbia is the lack of awareness of and urgency for sustainable bioeconomy development at the government level and in society at large. Example of other bioeconomy development challenges relate to limitations in technology development, access to relevant knowledge, high development costs and limited available financing (especially for companies). Key knowledge elements identified were related to the sharing of good practices and increasing recognition of bioeconomy amongst policy makers and various institutions.[17]

6.2.9 Slovakia

Considering Slovakia, the interviewees see potential for sustainable bioeconomy development in several areas, particularly bioenergy, based on available biomass resources. Currently (spring 2023), the Slovak Ministry of Agriculture is working on a Roadmap for circular bioeconomy.

A key bioeconomy development challenge is the need to raise awareness of the bioeconomy and its economic potential, which is a necessity for future competitiveness. Examples of additional challenges identified relate to knowledge on how to reach the economic benefits in terms of adding value or trying new business models, improving collaboration and coordination between stakeholders, and increasing access to financing for research and business. Knowledge transfer elements mentioned relate to building bioeconomy expertise and infrastructure, accessing experience from countries with more advanced bio economies through international projects and learning how to channel knowledge between stakeholders such as R&D to practice.

The BIOEAST concept paper also mentions evidence-based policymaking, implementing EU policies related to bioeconomy, and preparation for implementation of the mentioned roadmap for circular bioeconomy.

[17] No concept paper for Serbia has been published in the BIOEAST project.

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6.2.10 Slovenia

Bioeconomy activities in Slovenia include the development of novel biotechnologies, a prioritization of circular economy, work on sustainably produced forest and agricultural feedstock, and a promotion of bioenergy development. However, the political ambition to accelerate the transition to renewable energy is low.

Challenges of limited knowledge and investments for bioeconomy development were highlighted. There are limited investments in both R&D and companies. Knowledge gaps are multiple and relate, for example, to the awareness of bioeconomy benefits at society at large, about industry needs at the government level and innovative solutions at industrial level due to limited collaboration with academia. Transfer elements relate to good/best practices related to the development and implementation of biobased and circular solutions and related policies to support such a transition. The BIOEAST concept offers specific examples of this, such as identifying national industrial leaders, strengthening knowledge from industrial partners and supporting/promoting biobased products and solutions to increase the general demand on a national level. It also highlights the need for coordinated measures and improved legislation, data and rules.

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7. Validation Phase - External Outreach

For the external Outreach phase of the project, a summary of the captured perspectives was made to introduce the stakeholders to the topic. The 2-pager summary can be found in Annex 3. The summary shows the 5 main categories of current barriers present due to knowledge gaps (Figure 3).

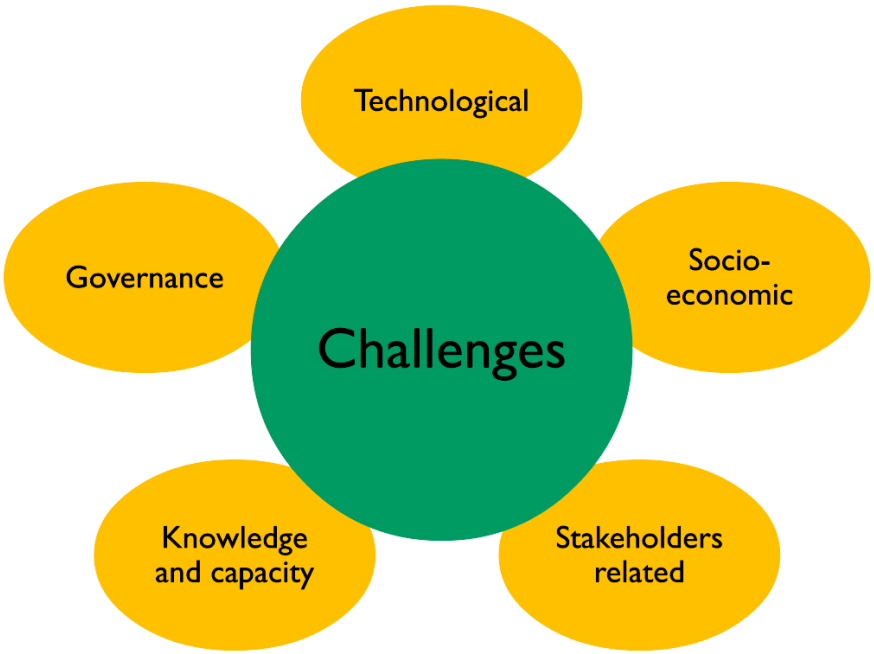

Figure 3. Five main categories of present bioeconomy challenges due to knowledge gaps.

This and the next chapter present findings from the interviews by target country representatives with 2-6 actors operating in the bioeconomy. The graphics are meant to illustrate our understanding at this point in time but are by no means representative of the countries. Rather, they are a valuable way to communicate and act as starting points for discussions further to come in the project.

All mentioned challenges were validated by the interviewed stakeholders (Figure 4). Still, there was a clear recognition of the knowledge and capacity plus the socio-economic challenges. The least mentioned challenge category was the Technological. This presumably expresses a preference to first build general knowledge for a solid bioeconomy basis before diving into specific technical needs.

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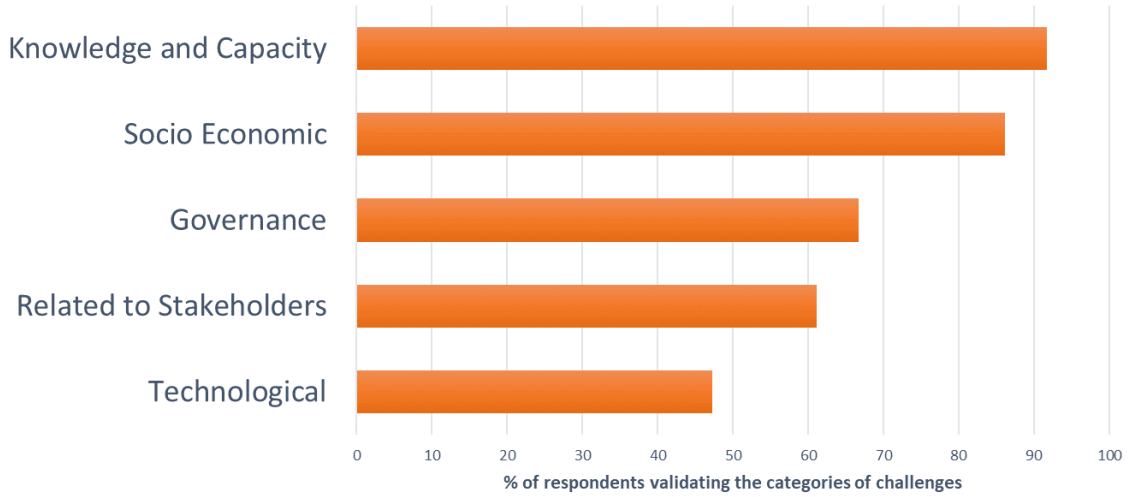

Figure 4. Percentage of categories of challenges validated among the interviewed stakeholders in the region.

7.1 Bulgaria

Bulgarian stakeholders validated all challenges with a higher inclination to report on socio-economic challenges. In that category, several stakeholders mentioned the low awareness related to the economic benefits of bioeconomy and the need for collaboration. After that, knowledge and capacity building were mentioned as tools to promote cooperation.

An interesting observation by one of the stakeholders was the challenge of complying with the hierarchy of waste management. Then, other stakeholder mentioned how the EU directives can also change the overview of the Bulgarian actions. Another stakeholder pointed out that the challenges are related to legislative gaps and lack of funding for companies and enterprises that have waste-free production in the bioeconomy sectors, including tax, social and other benefits. All emphasised the need for public communication and the need for access to funding.

A possible way to engage with stakeholders in this country could be to show how to comply with EU regulations while inviting policymakers to interact, collaborate and build plans together. Likewise, the visualization of examples integrating whole chain forestry models (and the circular use of wood) and specific best practices examples (also provided by CEE2ACT work package 4) would be highly important for the country. Engaging with different multi-level actors and sharing experiences and best practices with clear examples can also help to build trust, promoting dialogues and collaboration.

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7.2 Croatia

Croatian stakeholders validated all challenges except for the Technological category and with higher remarks towards Knowledge and Capacity and Socio-Economic challenges. Missing the Technological category could be because there were fewer stakeholders interviewed. Nevertheless, it could mean that there is a great need to build general knowledge and to provide a good foundation for more and better bioeconomy activities, including the goal of broadening the bioeconomy concept beyond agriculture and forestry.

Promoting collaboration between academia and private sectors could also include interactions with key citizens and policymakers (local/regional/global) to generate interactions at multiple levels.

A possible way to engage with stakeholders is to evaluate possibilities for funding projects and to create capacity or coaching mechanisms within the NBHs to generate higher success rates of access to funding resources. Hopefully, these mechanisms can already include a vision for interactions considering the triple, quadruple or quintuple helix model of innovations (Franc & Karadžija, 2019; Cai & Lattu, 2022).

7.3 Czech Republic

Czech stakeholders validated all challenges. Nevertheless, while the Knowledge and Capacity category was mentioned the most, it was linked to specific groups of food system stakeholders, their current situation and their transition towards a (more developed) bioeconomy.

Interviews in the Czech Republic mentioned very detailed examples going from the legislative burden on entrepreneurs to not adequate subsidies for farmers (and researchers) to understand better the current situation of their pollution, soil degradation and the potential of waste valorisation for feed purposes.

A possible way to engage with stakeholders could be to address the common needs of multiple sectors at the time. Perhaps the application of the Small Wins theory (Termeer & Dewulf., 2019; Termeer & Metze, 2019) could serve as a starting strategy to build up collaboration within the bottom-up approach of the project taking people from the specific actions that can contribute to the general bioeconomy.

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7.4 Greece

Greek stakeholders validated challenges in all categories. The first challenge to tackle in the region is general knowledge and capacity building. However, according to the stakeholders, there is a significant need for capacity building related to organisational skills (improving governance and reducing bureaucracy) and tools to promote collaboration.

Several stakeholders also mentioned limitations of resources, infrastructure and opportunities. Also, the specific potential of market opportunities i.e., the better use of forest and non-timber forest products (e.g., fruits, berries, mushrooms, resins).

A potentially interesting approach for Greek stakeholders could be to engage them in international platforms to open the doors for more resources and exchange of good practices and clear examples beyond CEE2ACT (an example of a platform could be https://ecopreneur.eu/).

7.5 Hungary

Hungarian stakeholders validated challenges in all categories. There seems to be high awareness related to having Knowledge and Capacity, Socio-economic and Governance challenges.

Even though there is a clear need for general capacity building for the bioeconomy, stakeholders seem to have high motivation and potentially good abilities to push forward bioeconomy. Perhaps, for this combination of characteristics, it could be interesting for Hungarian NBH leaders to implement elements from the behaviour change wheel from Michie et al. (2011) to potentiate opportunities further and to design interventions considering the context.

Furthermore, it is possible that the Small Wins theory (Termeer & Dewulf., 2019; Termeer & Metze, 2019) applied in local contexts could help potentiate bottom-up goals.

7.6 Poland

Polish stakeholders confirmed challenges in all identified categories, even to the point of challenging back the elements in each category. There seems to be a clear awareness of the challenges and of the bioeconomy baseline status of the country. There appear to be issues with collaboration between stakeholders. It is likely that the Polish NBHs could benefit from promoting the triple, quadruple or quintuple helix model of innovations (Franc & Karadžija, 2019; Cai & Lattu, 2022).

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Nevertheless, motivation could be something to take into consideration while building a bioeconomy roadmap for Polish stakeholders. Then, it is possible that the Small Wins theory (Termeer & Dewulf, 2019; Termeer & Metze, 2019) could help potentiate the motivation of bioeconomy players and boost confidence slowly.

7.7 Romania

Romanian stakeholders validated challenges in all categories. There seems to be high awareness of having Knowledge and Capacity and Socio-economic challenges, particularly on needing general bioeconomy knowledge education and tools to promote collaboration.

Particularly for Romania, biomass logistics and valorisation related to forestry/wood supply chains could potentiate the involvement and collaboration of multiple-level stakeholders. It could be interesting to evaluate if specific industry actors could further influence the policy-making process. Also, NBH leaders could import elements from the behaviour change wheel from Michie et al. (2011) to potentiate opportunities in the bioeconomy roadmap implementation.

7.8 Serbia

Serbian stakeholders validated mostly the categories of Knowledge and Capacity, Socio-Economic and Governance challenges. Knowledge was mentioned as a key element, and the need to secure financial resources (funding) is perceived as crucial for implementing bioeconomy activities. Then, there appears to be a feeling of lagging behind in the implementation of legislations.

A stakeholder mentioned a specific need related to logistics and management of forest waste. Other stakeholder mentioned the need of clustering the participants. Another mentioned further the importance of know-how related to funding acquisition. Perhaps it would be useful for NBH leaders to screen further for common interests that can allow for multi-level interactions as interdisciplinarity promotes innovation. The Serbian NBH could evaluate having a coaching mechanism to access for funding in which they can promote the triple, quadruple or quintuple helix model of innovations (Franc & Karadžija, 2019; Cai & Lattu, 2022) according to the possibilities and building such model could be part of the roadmap for bioeconomy strategy.

7.9 Slovakia

Slovak stakeholders validated all the categories of challenges. Particularly, they validated the ones related to having Knowledge and Capacity and Socio-economic challenges. Also, there seems to be awareness related to Governance being something beyond policymakers and involving industries and awareness related to the fact that all industries are linked to the use of biomass from soil, water and/or forest.

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This awareness of the need for interaction could be a potential engagement point to motivate stakeholders and promote collaboration. For Slovakia, it could be helpful to promote the triple, quadruple or quintuple helix model of innovations (Franc & Karadžija, 2019; Cai & Lattu, 2022) according to what is suitable for the country. A bottom-up approach could also alleviate the barriers encountered with no continuity of governments. In addition, coaching people on know-how related to funding acquisition could help boost the engagement into the NBH.

Furthermore, the visualisation of examples integrating best practices through whole supply chains (also provided by CEE2ACT work package 4) could promote dialogues and collaboration within the country.

7.10 Slovenia

All interviewed stakeholders from Slovenia validated all the categories of challenges. However, an interesting remark was made that not all challenges need to be solved immediately. Increasing knowledge and collaboration were cited as critical challenges for the country. Collaboration also included communication and fragmentation challenges among ministries or specific stakeholders (e.g., farmers).

The concept of “greenwashing” was also mentioned, referring to companies making environmental claims while environmental impacts are not there. This could also mean a lack of trust among stakeholders. It is likely that the Slovenian NBH could benefit from proposing the implementation of some of the multiple helix models of innovations (Franc & Karadžija, 2019; Cai & Lattu, 2022) to promote collaboration and trust among multi-level actors.

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8. KT priorities

All priority categories were confirmed and described as relevant for all CEE2ACT target countries. Summing the average values assigned to each category per country, we observed a trend of prioritizing first general knowledge and tools to promote collaboration (Table 3).

Table 3. General ranking of priorities derived from the sum of the average values of the 10 target countries.

General ranking of priorities	Sum of average values of 10 countries per theme
Knowledge and tools to promote collaboration	32.55
Bioeconomy example setting	31.25
Favourable legal context	30.48
Funding access know-how	30.25
Technical circular and biobased knowledge	30.07

Source: KT external outreach - interviews with stakeholders across 10 CEE2ACT target countries.

As mentioned above, generated graphics from the interviews are an illustrative representation of the reflections captured. Once again, the graphs do not pretend to depict the general situation of the country. The generated graphical views do pretend to serve as tools to promote further discussions among stakeholders in their way of integrating KT elements while building their bioeconomy roadmaps.

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8.1 Bulgaria

A global overview of the KT Priorities evaluation across the interviewed stakeholders can be observed in Figure 5. Among Bulgarian stakeholders, Bioeconomy example setting and Knowledge and tools to promote collaboration are the top 2 priorities.

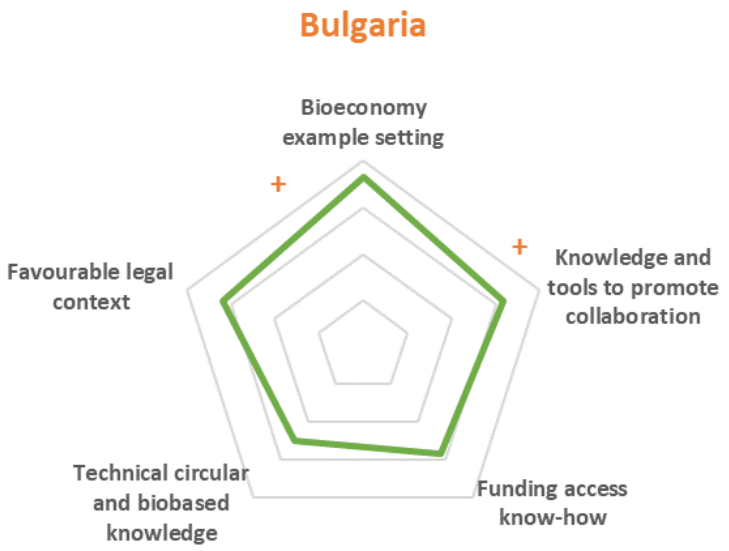

Figure 5. Representation of captured priorities by Bulgarian stakeholders. Top 2 priorities are highlighted with a + symbol.

Furthermore, extra priorities of "*general education in bioeconomy*, *strategic documents and current legal framework and its compliance* and *adequate management"* were included and listed as #1 in each case. The mentioned priorities could also fit among the identified categories. However, it is important to address specific priorities for certain stakeholders to also increase their motivation and engagement.

Then, the Bulgarian stakeholders perceived the KT element of technical circular and biobased knowledge as the one having the highest potential for transfer and the greatest impact on bioeconomy roadmaps (Figure 6). Thereafter come the Knowledge and tools to promote collaboration and the Funding access know-how. These insights can also be considered while choosing the elements for the KT Activities.

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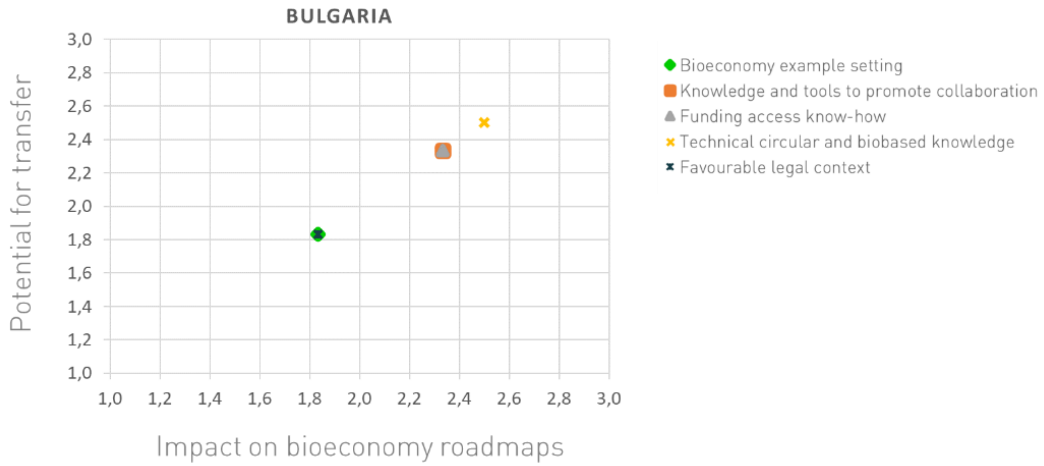

Figure 6. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Bulgaria. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.2 Croatia

KT Prioritization was evaluated for Croatian stakeholders. Among them, Favourable legal context and technical circular and biobased knowledge were the top 2 priorities (Figure 7).

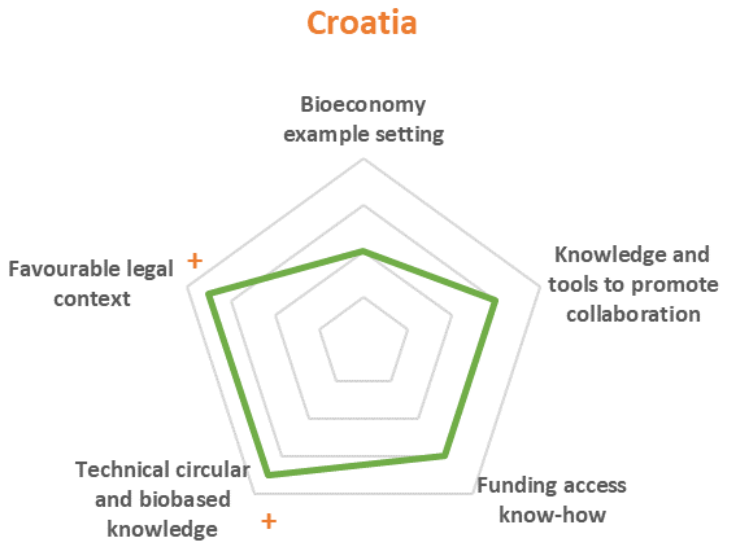

Figure 7. Representation of captured priorities by Croatian stakeholders. Top 2 priorities are highlighted with a + symbol.

One stakeholder mentioned that "*without the real strategy that will explain the meaning of the bioeconomy and who to include from the industry, there will be no development of the bioeconomy in Croatia*". This statement highlights the importance of combining the elements found in the stakeholder mapping phase of the project (WP3) together with the elements found here into a strategical roadmap for bioeconomy.

For the evaluation of specific elements, the Croatian stakeholders perceived the KT element of Knowledge and tools to promote collaboration and the Funding access know-how as the most convenient ones to transfer knowledge with highest impact on the bioeconomy roadmaps (Figure 8).

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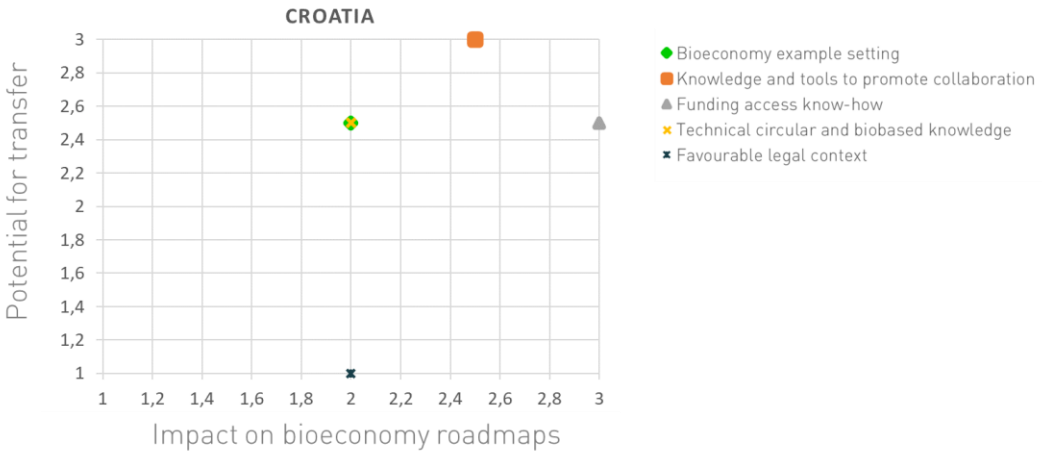

Figure 8. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Croatia. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.3 Czech Republic

A global overview of the KT Priorities evaluation across the interviewed stakeholders can be observed in Figure 9. Among Czech stakeholders, Knowledge to promote collaboration and Favourable legal context are the top 2 priorities.

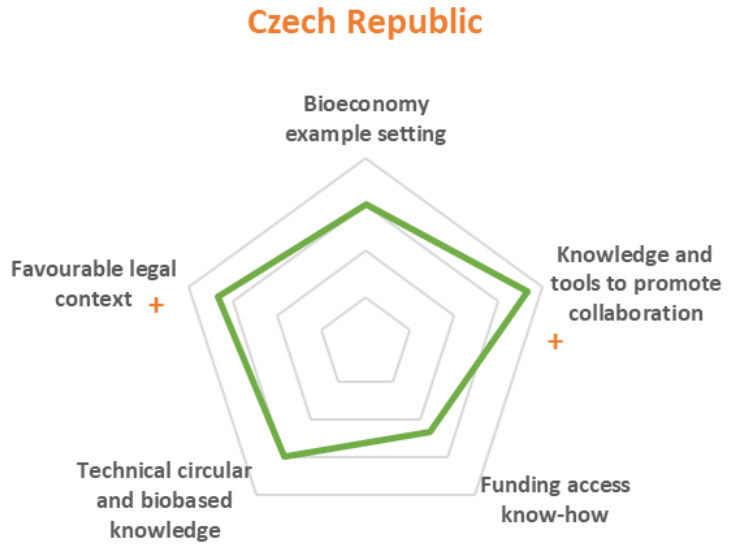

Figure 9. Representation of captured priorities by Czech stakeholders. Top 2 priorities are highlighted with a + symbol.

Within the ranking of priorities, one stakeholder mentioned that "practical examples are often destroyed by imports". Perhaps it would also be essential to transfer knowledge related to solid business models, taking into consideration the whole supply chain of products.

Thereafter, the impact analysis (Figure 10) showed that it is convenient to start addressing funding access know-how to engage further with the stakeholders.

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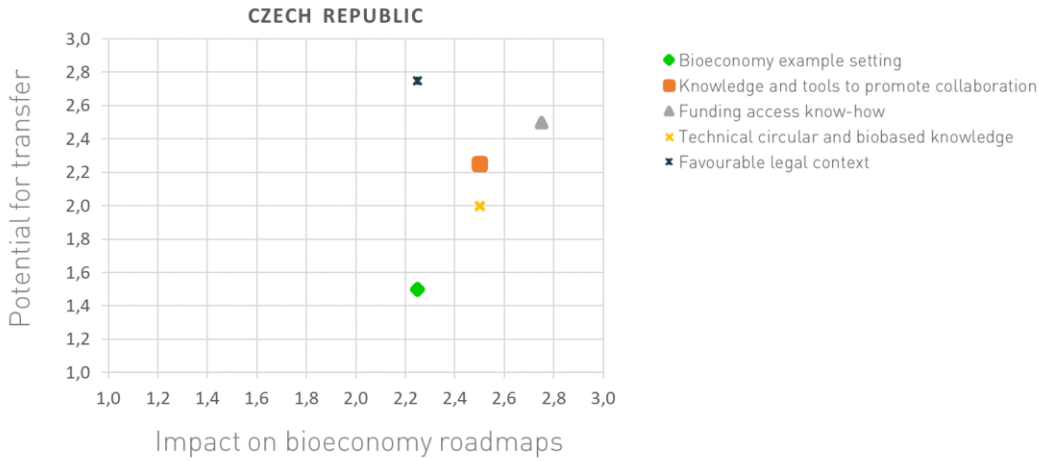

Figure 10. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Czech Republic. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.4 Greece

The KT Priorities evaluation across Greek stakeholders can be observed in Figure 11. Among Greek stakeholders, technical circular and biobased knowledge and Favourable legal context are the top 2 priorities. One remark related to the Favourable legal context was that it "*is essential for the success of any initiative in the bioeconomy sector. It provides a regulatory framework that enables innovation and investment, reduces uncertainty, and provides incentives. Without a favourable legal context, the other KT priorities may not be effective or sustainable*".

Greek stakeholders can evaluate mechanisms to influence the policy-making frameworks from the NBH. The first KT Activities series could further address questions as: "What would be needed to generate a favourable legal context? How do you see the NBH promoting a (local) favourable legal context?".

Figure 11. Representation of captured priorities by Greek stakeholders. Top 2 priorities are highlighted with a + symbol.

Then, Greek stakeholders considered all KT Elements as having maximum impact on the bioeconomy roadmap while considering funding access know-how as the KT Element with more potential for transfer (Figure 12).

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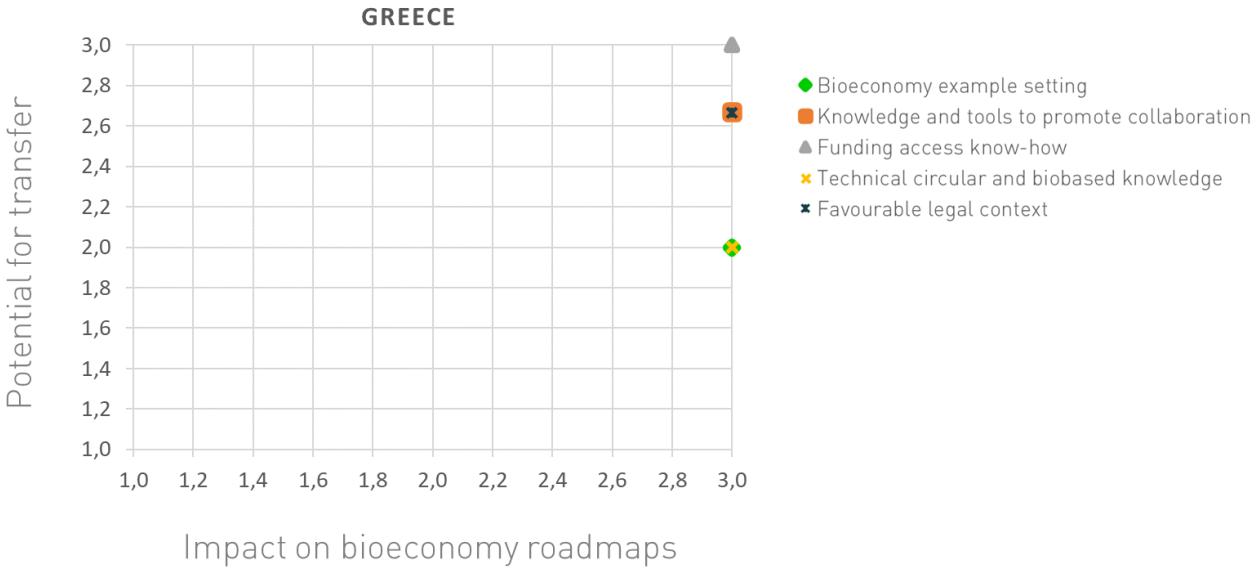

Figure 12. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Greece. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.5 Hungary

The KT Prioritization analysis for Hungary showed Knowledge and tools to promote collaboration ranked at the top while Bioeconomy example setting, and Favourable legal context tied second. Nevertheless, Technical circular and biobased knowledge followed very closely (Figure 13).

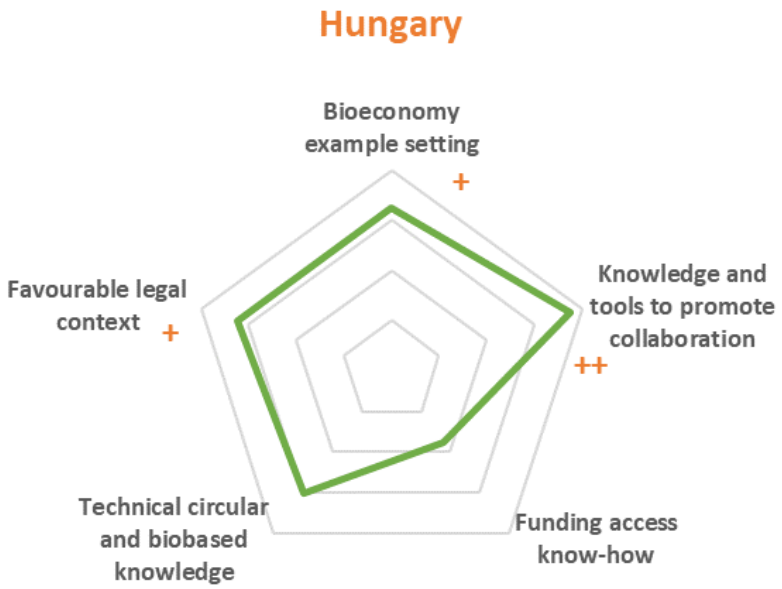

Figure 13. Representation of captured priorities by Hungarian stakeholders. Top 1 priority is highlighted with a ++ and the tied 2nd ranking of priorities are highlighted with a + symbol.

Included extra priorities mentioned the need of life cycle analysis (LCA) of bioeconomy value chains and one referred to the motivation of companies to conquer energy/fuel market shares with a sustainable solutions.

Following the impact analysis of the Hungarian stakeholders, it appeared that the Bioeconomy example setting could be the best way to engage with the stakeholders in Hungary (Figure 14), particularly framed as "storytelling from the bottom".

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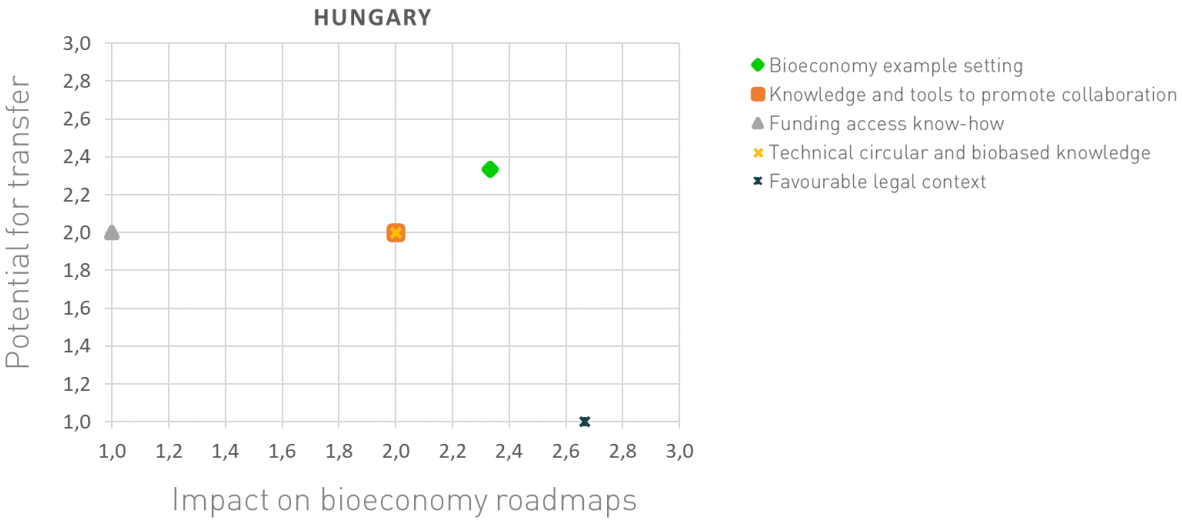

Figure 14. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Hungary. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.6 Poland

The KT Prioritization analysis for Polish stakeholders showed Knowledge and tools to promote collaboration and Funding access know-how as the top 2 priorities (Figure 15). They specifically mentioned the element of horizontal collaboration as a mechanism to generate a bioeconomy phenomenon.

Figure 15. Representation of captured priorities by Polish stakeholders. Top 2 priorities are highlighted with a + symbol.

Thereafter, the impact analysis showed that the Bioeconomy example setting could be the best way to engage with the stakeholders in Poland (Figure 16).

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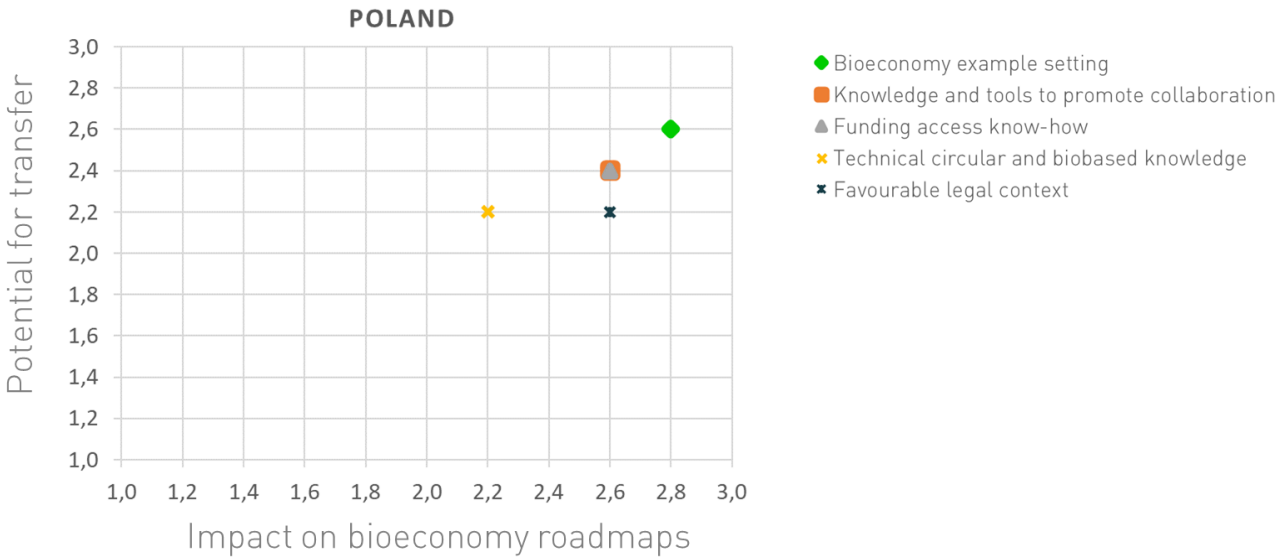

Figure 16. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Poland. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.7 Romania

The KT Prioritization analysis for Romanian stakeholders showed Knowledge and tools to promote collaboration and technical circular and biobased knowledge as top 2 priorities (Figure 17). They seemed to require tools for a faster implementation of the bioeconomy. Then, also "Education and Awareness" was included as an extra priority.

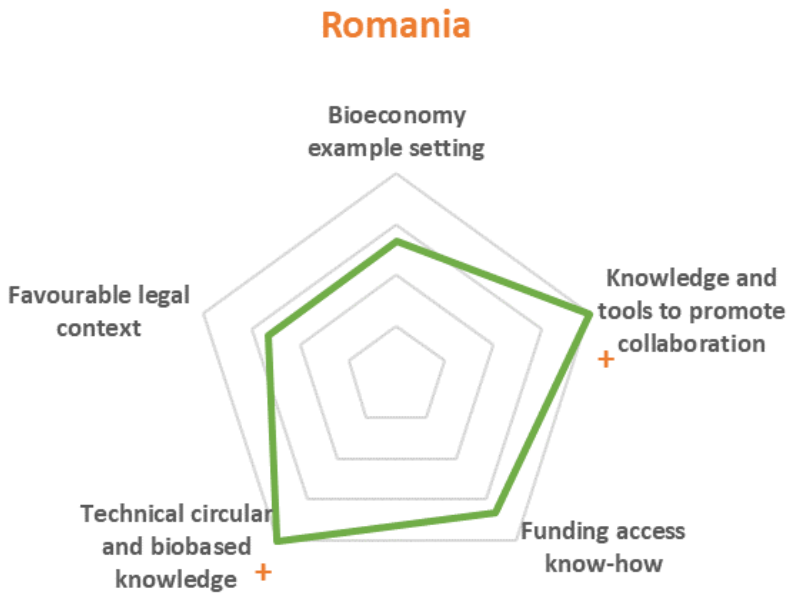

Figure 17. Representation of captured priorities by Romanian stakeholders. Top 2 priorities are highlighted with a + symbol.

Thereafter, the impact analysis (Figure 18) showed it convenient to start addressing funding access know-how to engage with the stakeholders.

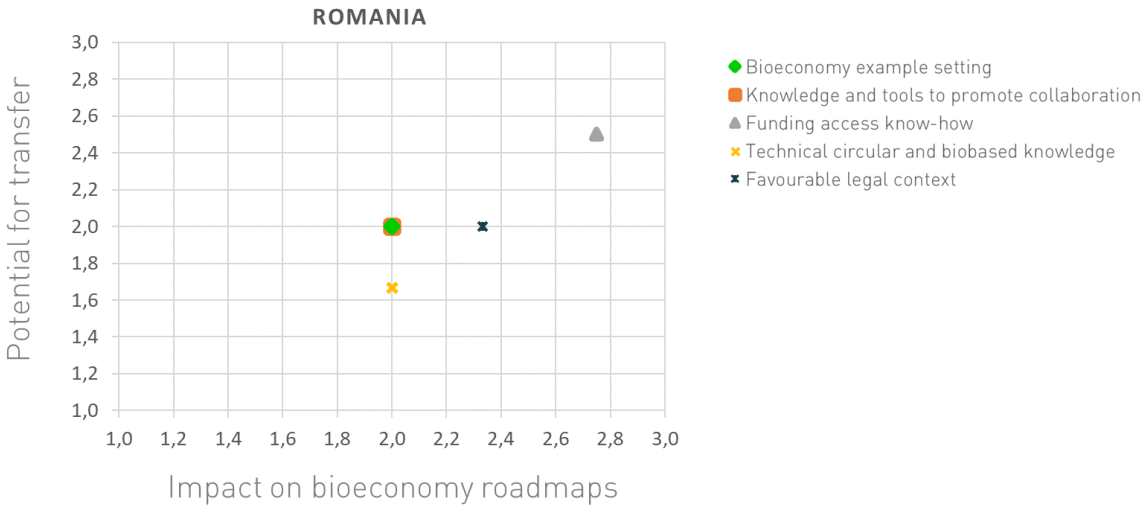

Figure 18. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Romania. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.8 Serbia

The KT Prioritization analysis for Serbia showed the Bioeconomy example setting and technical circular and biobased knowledge as the top 2 priorities of the country (Figure 19).

Figure 19. Representation of captured priorities by Serbian stakeholders. Top 2 priorities are highlighted with a + symbol.

Subsequently, the impact analysis showed a similar consideration for scoring the potential for transfer (Figure 20). Nonetheless, it could be that starting with technical circular and biobased knowledge would promote the engagement of the stakeholders.

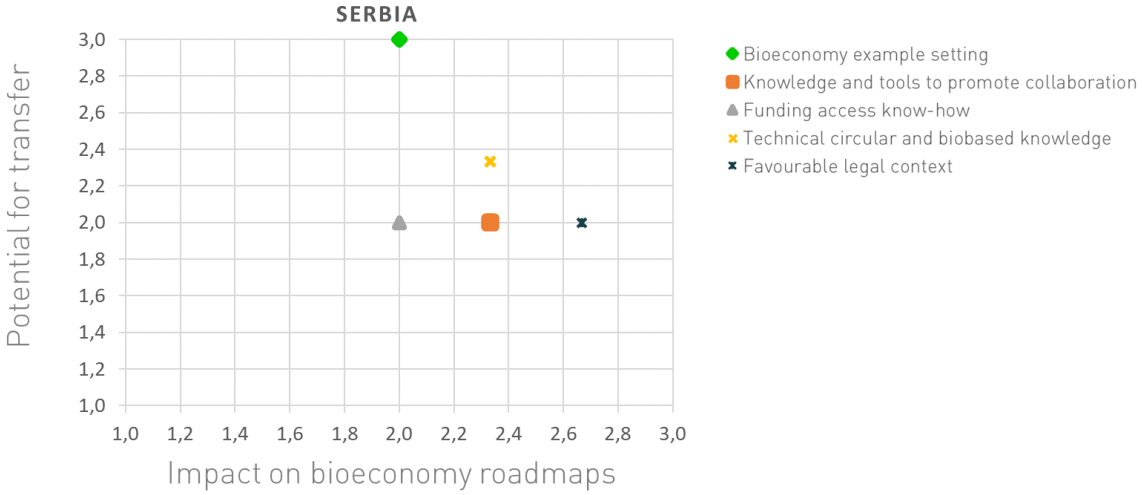

Figure 20. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Serbia. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.9 Slovakia

Slovak stakeholders indicated Favourable legal context and Funding access know-how as top 2 priorities for the country (Figure 21). In all cases, Bioeconomy general education was also included as a ranking priority, but in 2nd or 3rd place.

Figure 21. Representation of captured priorities by Slovakian stakeholders. Top 2 priorities are highlighted with a + symbol.

Bioeconomy general education was excluded from the ranking to strive for more specific answers. Nevertheless, it is important to recognize the clear need and evaluate the best way to address it. Thereafter, clear preference for Bioeconomy example setting mechanisms was mentioned among the stakeholders (Figure 22).

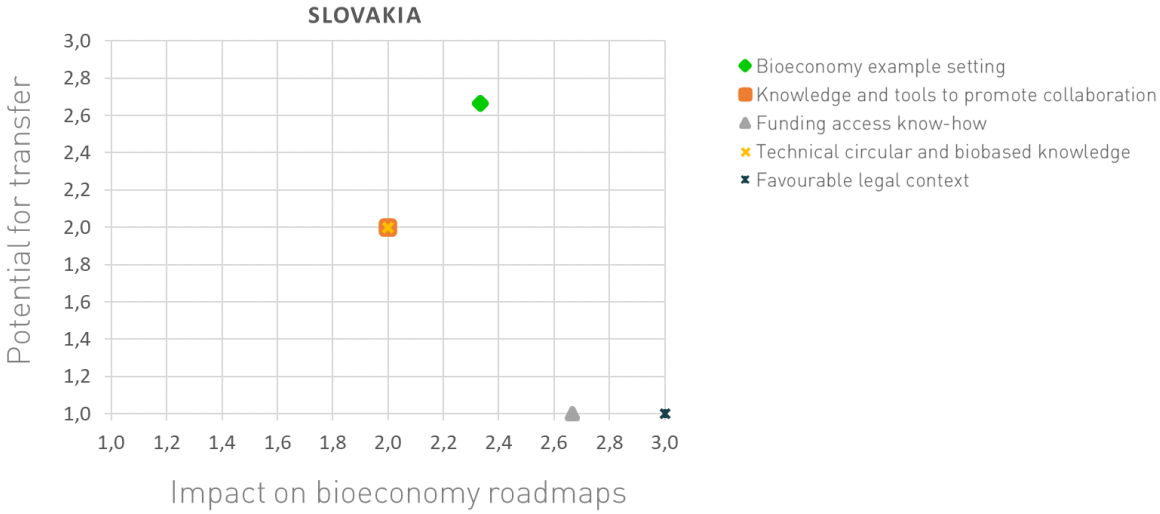

Figure 22. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Slovakia. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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8.10 Slovenia

The KT Prioritization analysis among Slovenian stakeholders showed Bioeconomy example setting and Funding access know-how as top priorities. Nevertheless, Knowledge and tools to promote collaboration followed closely (Figure 23) and stakeholders commented further on the role of the NBHs to connect bioeconomy players.

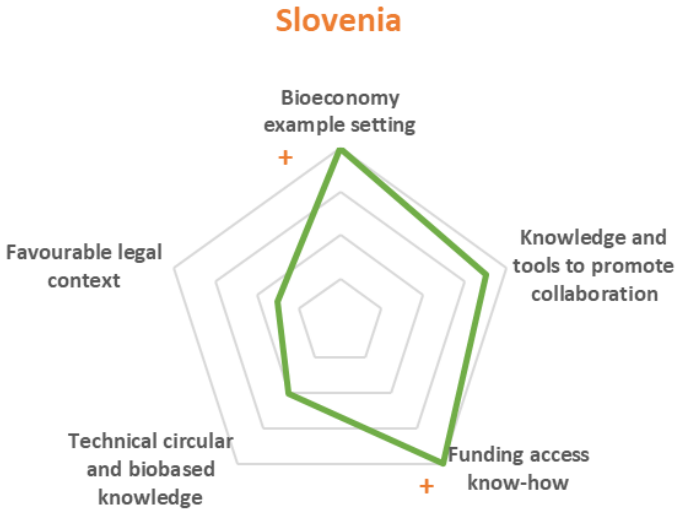

Figure 23. Representation of captured priorities by Slovenian stakeholders. Top 2 priorities are highlighted with a + symbol.

Additionally, stakeholders included the priorities of Ministry fragmentation/The government is not working in unison, Lack of pilot infrastructure and Absence of a large (bioeconomy) player in the country. It would be convenient to explore further with stakeholders the needs behind these priorities and which KT elements could support them. Then, as well, it is possible that from an NBH perspective, lobbying activities can push the government to act according to the value activities that will be created.

Thereafter, the impact analysis showed Bioeconomy example setting as a good target to engage further with stakeholders (Figure 24).

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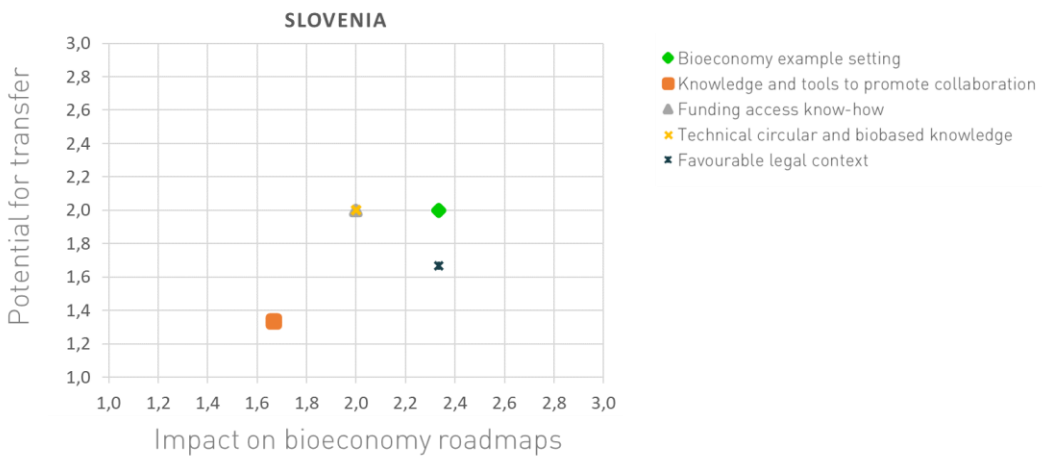

Figure 24. Graphical representation of the average views KT Elements on impact on BE Roadmaps (X Axis) and Potential for transfer (Y Axis) according to the interviewed stakeholders in Slovenia. Axes are modified to a minimum of 1 and maximum 3 for improved visualization.

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9. KT Strategy Menu Approach and Activities

The knowledge transfer "Menu-Approach" is a knowledge transfer structure designed within CEE2ACT to allow for all CEE target countries to receive support in developing a bioeconomy roadmap while also customising the knowledge transfer to the specific needs discussed in this report. It purposefully overlaps and synergises with various work packages within CEE2ACT, with the end goal of enabling a level of "hand holding" that allows for the extraction of any type of knowledge already described in this report and more during the process of the development of the NBHs in the target countries. It covers the initial part of the process including building trust through interaction and cooperation through various workshop series focused on capacity building, peer-to-peer learning, and finally, the creation and completion of National-level roadmaps for the bioeconomy strategies in CEE2ACT target countries (D6.3). This connects the activities in year 2 for the implementation of the KT strategy with the other activities in the project, which is represented in the figure below.

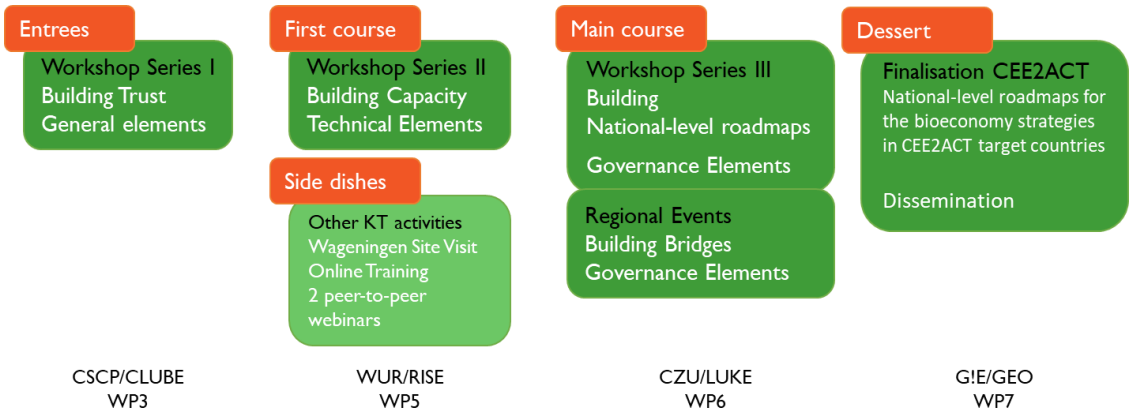

Figure 25. Graphical description of the "Knowledge Transfer Menu".

9.1 KT "Dishes on the menu"

To decide what 'dishes' are available on the KT Menu, input from target countries was collected via outreach interviews with relevant national and regional organisations. First, there were general KT needs expressed among most target countries, which can be seen as the 'general dishes', and include:

1. Instruments to promote industry/value chain and inter-ministerial/multi-level governance cooperation;
2. Access to finance;
3. General attention for barriers, limitations, pitfalls and challenges.

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The first point on cooperation includes expressed needs for building networks, bridging academia and industry, stimulating B2B, engagements with industry, and joint approaches.
Secondly, other KT needs were expressed by parts of the target country actors, which can be summarised in four main themes, namely:

1. **Governance**, including
    a. Legal framework requirements/issues (incl. carbon mechanisms, tax regulations)
    b. Collectively agreeing on numbers, defining priorities and targets
    c. Budget allocation for sustainability

2. **Awareness and skills**, including
    a. Show, demonstrate and communicate the need for the bioeconomy
    b. Public communication, awareness
    c. Bioeconomy in education
    d. Bioeconomy leadership programs for young and old
    e. Building eco-management and eco-design skills

3. **Inspiration**, including
    a. Showcasing bioeconomy innovative business cases, demonstrating practices
    b. Effective storytelling of success stories
    c. Living labs and pilots

4. **Targeted approaches**
    a. Targeted technology transfer
    b. Niche and specialised workshops for specific value chain(s) (actors)
    c. Incubation/acceleration programs, flexible projects for supporting innovators

Additionally, various preferred 'serving styles' of the KT activities were expressed, including online and physical workshops, local study visits and excursions, and team building activities for the NBHs. A preference was expressed to organise the KT elements in an approachable and informal manner and to stimulate practitioners (peers) to guide/lead the activities.

9.2 Chef´s recommendation

During the duration of the project, it was identified that a "recommendation" of what KT elements will likely be relevant for most or all CEE2ACT target countries is of use. It can be argued that all target countries would benefit from considering these points of action and applying it in their national context.

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Broadly speaking, the elements included in the “Chef’s recommendation” of the menu of KT elements within CEE2ACT include:

- Identify the most suitable way of ensuring collaboration between stakeholders. The authors suggest seeking inspiration from the various identified arenas or initiatives from the contributing countries identified in this report.
- Identify the most relevant technologies given the type(s) of biomass available in each respective country that has the higher chance of financial success while also considering cross-over technologies in other fields (traditional and established industries) and alternative technologies in order to build a robust and diversified bioeconomy (i.e., avoid lock-in to certain areas).
- To the extent that it is possible, promote and push for governing structures in target countries to take actions that support the establishment of bio economies. This should likely include solid proof of concept and financial viability and competitiveness of both existing and emerging solutions within the bioeconomy area.
- Focus on clear and straightforward communication and education in relation to bioeconomy, including all parts of society, but with a special focus on the younger generation to promote long-term longevity of the bioeconomy.

9.3 KT activities year 2

Following the completion of this report, it is intended to contribute to the general goal of supporting the establishment of bioeconomy hubs in the CEE2ACT target countries (WP3). As part of this effort, various activities will be organised with various focus subjects to facilitate continued learning and knowledge transfer between the project partners. While the general topics and approach for these workshops have been defined in the description of the project, the detailed content is expected to be based on expressed needs and interests of the project partner. These activities are incorporated in the ‘Menu’ approach described earlier in this report.

Within the scope of CEE2ACT project and the KT strategy implementation, the following activities will be organised:

- **Workshops series II on building capacity and technical elements (Spring 2024)**

These workshops follow the series I meetings that established the NBHs within the CEE2ACT project. Ten workshops will be organised, 1 in each CEE target country. The agenda and presenters will be established in collaboration with the CEE2ACT lead partners. The findings on the KT elements and needs presented in this report will be the starting point for selecting ‘dishes’ and developing working formats for learning and exchange during the workshops. The contributing partners will share their learning experiences and bring best practices on knowledge transfer to the table. The

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stakeholders of the NBH will be encouraged to taste the dishes but also to develop their own 'taste for cooking'. The workshops will pay attention to both technological aspects, but also to collaboration, governance and other process-based challenges. The workshops will follow both the Chef's recommendation, as well as their own selection of dishes, specific to their country's needs and priorities. In co-coordination with CSCP and CLUBE as lead partners within the NBH approach of CEE2ACT, WUR and RISE will collaborate with the target country lead partners to organise the workshops. To this purpose, regular online progress meetings will be organised. WUR and RISE will also mediate the inputs from the contributing partners to the workshop series.

- **International Site Visit @ Wageningen University & Research (date to be determined 2024)**

WUR will host the anticipated site visit on their Campus and showcase innovative bioeconomy companies and technologies working in the field of circular bioeconomy, whilst providing a forum for knowledge exchange and networking. It aims to build motivation and inspiration for circular bioeconomy development. Participants will include CEE2ACT partners and stakeholders from the NBHs of the target countries.

- **Online training**

Allowing the wide participation of stakeholders across the target countries, the online training will include two types of interaction: 1) expert inputs by the scientific partners of the CEE2ACT contributing countries, sharing their first-hand experience, answering questions on how to overcome KT barriers and how to organise the implementation of innovation action, and 2) peer inputs by a selection of public and/or private parties from the contributing as well as the target countries. This will support the further development of commitment of stakeholders across the bioeconomy. It will create a common understanding of what is necessary to drive the transition within CEE target actions towards a circular bioeconomy, and how knowledge transfer can contribute with practical know-how and skills development. The online training will be in English and made accessible via the e-Learning platform for promoting bioeconomy and sustainable governance to be launched via the project's website. The training will be aligned with other training and learning modules developed within the project (WP4 on E-solutions for sustainable governance and green transition).

- **2 Peer-to-peer learning & exchange webinars (autumn 2024)**

These webinars will contribute to the platform function of the National Bioeconomy Hubs and serve as between-country capacity building events. The webinars will programme specific topics of interest, based on requests collected from the target country lead partners and their NBH stakeholders. The webinars complement the other KT activities by focusing on the learning experience of the CEE target country stakeholders.

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In year 3, the KT activities will serve as support for WP6. Support will be given on including KT elements within the guidelines for new collaboration and organizations (link between tasks T5.4 and T6.3) and on the templates to develop the Bioeconomy Strategies Concept Papers.

From a SWOT analysis for implementation of strategies (T6.4), changes in national policy instruments will be identified to further enable and leverage innovative action, as well as removing those that discourage such innovation from a KT perspective.

If needed, WP5 will support further WP6 by addressing a number of criteria, including the timing of potential KT interventions (e.g. whether it is a short-term "quick win", "small win" or a longer-term initiative), the complexity of the KT interventions (e.g. single-actor vs multi-stakeholder, addressing one stage of the supply chain vs cross-cutting measures); which KT actors need to be involved in the intervention; and whether the KT intervention is dependent on a change in policy or the success of another intervention.

- **Workshops series III on building National Bioeconomy strategy roadmaps and governance elements (Spring 2025)**

The last workshop series, to be led by WP6, will focus on "Building a national vision and strategy roadmap together". For this workshop series, leaders would require KT on Governance Elements that allow the elaboration of bioeconomy strategy concept papers. These papers should be supported on the information and results from WP2, WP3, WP4 and WP5.

- **2 CEE regional events**

WP6 will also lead 2 regional events for "building a bridge to national policy" where CEE2ACT target countries will be encouraged to present their national strategy concept papers to find synergies and to contribute to the platform function of the National Bioeconomy Hubs. These events will highlight environmental benefits and, above all, will seek support for achieving long-term goals for climate change.

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10. Progress Tracking & Impact Evaluation

In the 3rd and final year of the project, the KT strategy and its implementation will be evaluated through a series of (online) interviews and written surveys across the stakeholder representatives of the CEE target countries. As the NBH approach itself will also be evaluated (WP3), this evaluation effort will be aligned to minimize overlap or overburdening the stakeholders and project partners. The evaluation will follow a qualitative approach to estimate the impact on the success of the KT strategy. KT check points and KPIs will include amongst others:

- Level of awareness on KT elements across stakeholders from the target countries
- The inclusion of KT elements in the national-level roadmaps for bioeconomy strategies and action plans identified for the target countries.
- Uptake of KT strategy building skills at the partner and stakeholder level
- Perceived success factors and barriers for the uptake of KT and capacity building

Based on the insights from the evaluation, a set of recommendations will be developed towards the successful implementation of the bioeconomy roadmap from a KT perspective at the national and European level (spring 2025).

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11. Conclusions

The development of the KT Strategy in collaboration with the project partners and the stakeholders involved in the external outreach was valuable from both a content and a process perspective. It provided the opportunity for the partners to go beyond the window-shopping of existing examples of bioeconomy strategies. Instead, they were encouraged to deep-dive into what KT for a circular bioeconomy really entails and how it can be translated into the context of their country. Validating their own priorities and points of view in conversation with their stakeholders can open up a creative bottom-up space to build roadmaps.

As expected, the target country lead partners shared many common challenges. These include public awareness levels, political interest, funding issues, educational challenges, business participation, and more. Tying these challenges in, we presented generic KT elements as well as country-specific findings. Not all CEE target countries have a similar focus, pending amongst others on the size and economic importance of their bioeconomy sectors such as forestry, commodity crops and animal production.

Most stakeholders expressed priorities for the bioeconomy from their own perspective. It was interesting to capture the insights into the role of national and European governmental institutions. Knowledge transfer implies a well-working collaboration mechanism between parties, and across the target countries there are variations on how the building of trust and collaboration across stakeholders will influence this process. Priorities differ between countries, although the importance of increasing awareness resonated across the countries.

There are many concrete KT actions that can be undertaken by the target country lead partners and their stakeholders. There is a plethora of available methodologies, technologies, best practices, capacities, and motivations for the bioeconomy. The KT “menu” approach will help the matchmaking between available know-how and the needs and priorities for the CEE target countries. Leaders of the bottom-up approach will be supported for selecting the most convenient elements within the KT menu to further create their National-level roadmaps for the bioeconomy strategies.

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13. Annexes

Annex 1. Template for the Perspectives Intake (Homework).

Questions on KT perspectives

1 What are the technological and socio-economic challenges that are there due to knowledge gaps?

Zooming in on the Baseline Assessment done for T2.1, and your current understanding of the bioeconomy state of affairs for your country. This will provide pointers on key areas where advancements are necessary to achieve bioeconomy targets. What specific Knowledge gaps can you identify? Not only technology-driven, but also those from a socio-economic 'readiness level' viewpoint?

Provide your answers here: _____

2 What (existing) knowledge can spark further national research and innovation?

Zooming in on T4.1 findings on best practices, what are key knowledge areas relevant for bioeconomy, which are currently being prioritised in your country? E.g., in national research agendas, national academic funding programmes etc. What is missing?

Provide your answers here: _____

3 Who are key KT stakeholders in your country?

Zooming in on stakeholders that have been identified in the stakeholder mapping done for T3.1. which ones would be key to involve in Knowledge Transfer (and why?). E.g., stakeholder X that advocates awareness to scientific progress related to bioeconomy; stakeholder Y that calls to action policy and business stakeholders to support shift towards bioeconomy.

Provide your answers here: _____

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4 What are, to your opinion, the KT elements (know-how / capabilities) that are of interest for your country?

Provide your answers here: _____

5 What experiences/examples do you have in working with bioeconomy roadmaps or other parallel transitions included in national strategies (e.g., climate, energy, mobility, land use), that we could learn from?

Provide your answer here: _____

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Annex 2. Template for 1-1 Conversations.

1-1 Conversation Interview guide

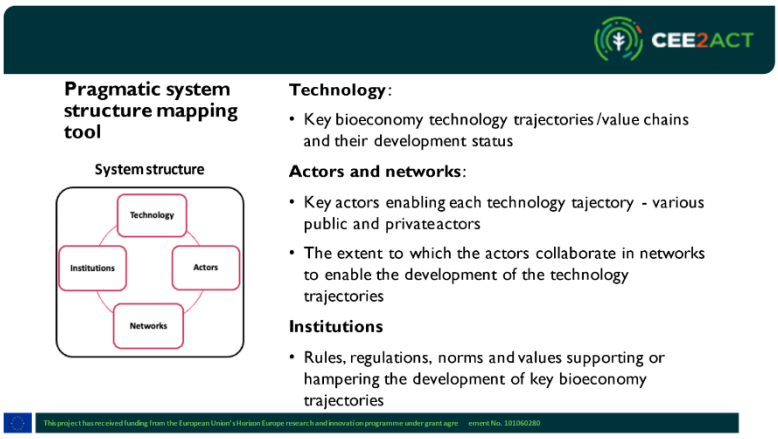
Meeting - participation information

Date	
Interviewer's name	
Country	
Participant's name(s) / position	

Reminder of the instructions

a. Please fill out your answers on the KT Perspectives document before the conversation.

Try to consider different components of the innovation system in your answers.



b. Share the KT Perspectives document during the conversation.

c. The conversation can be recorded as a back-up for creating the RECAP document, summarising the findings of the conversation.

d. After the 1 on 1:

- you will have the opportunity to update the KT Perspectives document
- you will receive the RECAP document, summarising the findings of the conversation. Please check this for accuracy and feel free to add any suggestions and please send it back to the interviewer asap.

e. Please share the KT perspectives document & the RECAP feedback at your earliest convenience, but no later than **14 March** to Jonas.joelsson@ri.se and jakob.dahlqvist@ri.se.

f. After analysis, we will delete the recordings of the conversations.

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Conversation questions on KT perspectives

1 What are the technological and socio-economic challenges that are there due to knowledge gaps?

A 'Knowledge Gap' suggests there is a difference on what the current knowledge levels and capacities are, and what is required against the backdrop of having achieved bio-economy targets in 2030 – 2050. These targets are set at EU-level and urge Member States to develop a strategy to achieve them.

The baseline assessment of T2.1 and your current understanding of the bioeconomy state-of-affairs for your country are starting points for identifying knowledge gaps as they point out the 'hotspots' (distance to target) where action is needed.

a. What are, in your opinion the most relevant circular bio-economy challenges for your country, and why?
   - From a technological perspective?
   - From a socio-economic (readiness level) perspective?
   - Specific to sectors or stakeholders?

b. What do you consider specific Knowledge & Capacity aspects that are currently hindering the move towards more circularity?

E.g., in national research agendas, national academic funding programmes, academic-business relations and joint research, innovation/KT services, funding schemes for technology-intensive start-ups, IP, commercialisation or licencing of public research results, open innovation/open science, enhanced access to research data, cluster policies, etc.)

2 What (existing) knowledge can spark further national research and innovation?

Also zooming in on T4.1 findings on best practices:

a. What are key knowledge areas relevant for bioeconomy, which are currently being prioritised in your country? And why?

b. *How is national research and innovation typically funded in your country? Also accessible for private parties?*

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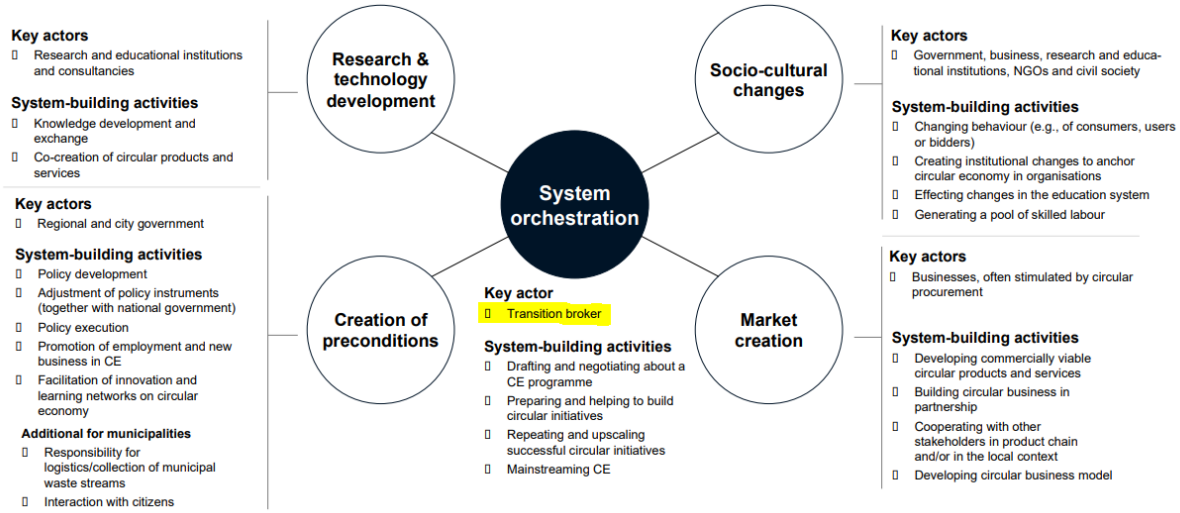
3 Who are key KT stakeholders in your country?

Zooming in on stakeholders mapping done for T3.1:

a. *Which stakeholders do you think should be involved in KT activities in your country? Why these? What is their current role in KT (maybe also related to other topics).*



b. How would you describe the current level of collaboration between different stakeholder groups/actors (academia, government, businesses, NGOs), related to KT? What do you think is necessary to improve this? What is needed to achieve that?

c. CEE2ACT takes a bottom-up approach. Most stakeholders involved in e.g., the NBH, will play a role in the formal economy of your country. However, we also need to consider informal economy aspects as well, where people and organisations produce food / biobased products for their own use and/or within exchange-based relations in a closed network.

a. Are you aware of any stakeholders or contexts where informal economy plays a role in the food & biobased economy of your country? Can you describe their role/activities?

b. If any, what do you think are their current (positive or negative) contributions to moving to a more circular bioeconomy?

c. To your opinion, in what ways should CEE2ACT, and the NBHs in particular, connect with, motivate and/or support informal stakeholders to support the transition to a circular bioeconomy?

4 What are, to your opinion, the KT elements (know-how / capabilities) that are of interest for your country?

a. *From those KT elements*

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Please rate on a 0-10 scale how absent (0) or how present (10) those elements are in your country.

Element	***Presence Scale 0-10***

b. *Would you give those KT elements a **rank** of priority?*
c. *What do you think could influence society for a change in behaviour towards a bioeconomy?*

5 What experiences/examples do you have in working with bioeconomy roadmaps or other parallel transitions included in national strategies (e.g., climate, energy, mobility, land use), that we could learn from?

a. *What do you think is the greatest success related to those experiences?*
b. *What do you think was the greatest failure?*
c. *How do you think KT could be integrated into the NBHs?*
d. *How do you think there could be long-term cooperation/circular business models knowledge implementation to keep on attracting stakeholders to those NBHs?*

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Annex 3. 2-pager of Knowledge Transfer Impressions for External Outreach of partners April-May'23.

Introduction

The CEE2ACT project is empowering Central Eastern European countries and beyond to develop circular bioeconomy strategies. CEE2ACT takes a bottom-up approach to optimize the involvement and collaboration with different bioeconomy stakeholders.
Within the CEE2ACT project, we are developing a Knowledge Transfer (KT) and Capacity Building Strategy. This strategy supports the identification of key KT elements, methodologies and technologies and how to match these within the given national context. Utilizing tools developed across the project, the core of transferring activities sits in the organization of a series of national and cross-country workshops by the National Bioeconomy Hubs (NBHs). Utilizing expert knowledge and hands-on experience of European and international peers from the networked contacts of the CEE2ACT consortium, these workshops function to exchange ideas and opportunities, and to contribute to capacity building.
Building upon findings related to knowledge transfer challenges, needs and priorities in the CEE region, we are reaching out to key NBH stakeholders to validate some impressions and to add more information. Therefore, reading this summary can help setting the grounds for a conversation.

Challenges

In the development of a Knowledge Transfer Strategy, the first outline for the identification of challenges showed 5 main categories of current barriers currently present due to knowledge gaps (Figure 1).

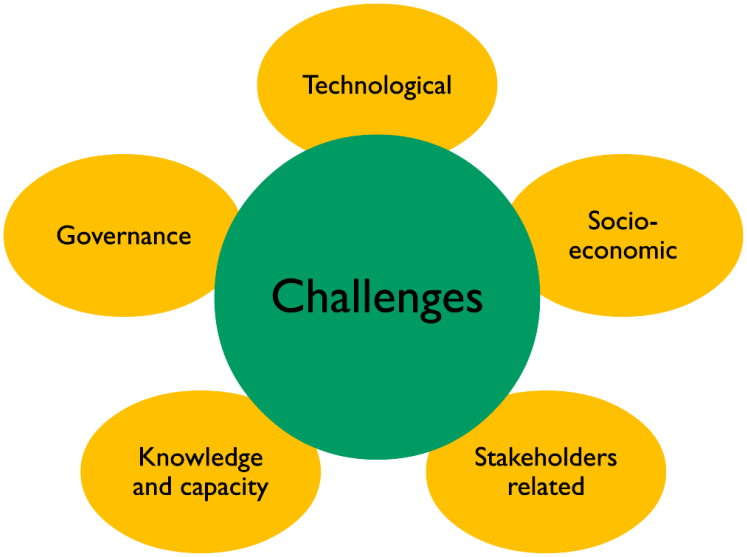

Figure 1. Five main categories of present bioeconomy challenges due to knowledge gaps.

A brief summary of the main challenges within those categories, in random order, which have been voiced in the CEE2ACT project so far is:

- **Knowledge and capacity**: Low general knowledge about bioeconomy (what it is about), a lack of knowledge regarding legal/regulatory issues related to bioeconomy,

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low (interest in) research & innovation investments, there is insufficient workforce training and knowledge exchange.

- **Technological**: Lack of knowledge on the profitable (re)use of biomaterials across the supply chain, the potential sourcing of biomass, lack of appropriate (funding for) infrastructure and logistics for valorisation.
- **Socio-economic:** Low awareness of economic benefits, low levels of multi-actor / cross-value chain collaboration (low Social Readiness Level).
- **Related to stakeholders:** Food system stakeholder experience challenges related to both their current situation and their transition towards a (more developed) bioeconomy, for example: *Farmers* currently dealing with high input costs, *Consumers* lacking information and other incentives to make more circular choices, *Industry* missing best practice examples and insights in new circular business models, *Business networks* lacking access to decision-making processes within strategic policy development.
- **Governance**: Lack of inter-departmental/institutional collaboration, departmentalization of policy domains, misalignment between policy ambitions and targets, also between local, regional and national levels.

Priorities

A brief summary of main priorities, in random order, which have been voiced in the CEE2ACT project so far is:

- **Bioeconomy example setting**: To promote storytelling, best practices, clear examples, showcases and specific advice related to the implementation and scaling of technologies and business models from contributing countries on how to develop a bioeconomy. To share proven financial success of bioeconomy solutions/tools.
- **Knowledge and tools to promote collaborations**: To foster collaboration between various types of stakeholders and policy makers, both through communication as well as activities focused on aligning goals and highlighting the benefits of a bioeconomy.
- **Funding access know-how:** To develop know-how on accessing various funding streams for a wider variety of actors, especially private and local actors with links to research organisations and/or universities (that often acquire grants from EU-projects).
- **Bioeconomy general education**: Educating all levels of stakeholders on bioeconomy. Tools for knowledge dissemination directed to different target groups.
- **Technical circular and biobased knowledge**: Country's self-assessment of the Bioeconomy potential taking into consideration: monitoring methodologies, available resources, infrastructure and logistics. Assessment of side-streams valorisation potential. Knowledge about Biobased Technologies.
- **Favourable legal context**: Identification and management of legal barriers ensuring that the many policy areas of bioeconomy have a solid legal ground for implementation in the country context.

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Annex 4. External Outreach Summary for Stakeholders.

CEE2ACT WP5: Knowledge Transfer & Capacity Building
Answer template

T5.1 External Outreach Stakeholder Interviews

Country:	
Name Interviewer:	
Date Interview:	

	ID Q-Code	Question (short version)	Answer (native language)	Answer (English)
Personal information	A_01	Name Respondent		
	A_02	Organisation (name)		
	A_03	Function Title		
	A_04	Email address		
Organisation background	B_01	Main activities/services of organisation		
	B_02	How do these activities relate to bioeconomy?		
	B_03	Current role of organisation within transition to bioeconomy		
	B_04	How will this role evolve in the (near) future?		
Challenges	C_01	Related to the challenges cited in the 2-pager summary: Which challenges do you recognise from your organisation's perspective?		
	C_02	Which other challenges does your organisation / your country face?		
	C_03	Which challenges would be of most importance to tackle from your perspective?		
Priorities	D_01	Related to the challenges cited in the 2-pager summary: Which priorities do you recognise from your organisation's perspective?		
	D_02	How would you rank these priorities to be addressed within your country?		
		KT Priorities	**Ranking order according to the stakeholder needs/ interests**	
		Bioeconomy example setting		
		Knowledge and tools to promote collaboration		
		Funding access know-how		
		Technical circular and biobased knowledge		
		Favourable legal context		
		Insert additional priority here		
		Insert additional priority here		
		Insert additional priority here		
	D_03	Why this ranking order?		
	D_04	How would you score these priorities on their potential for transfer, and their impact on achieving BE targets?		
		KT Priorities	**Potential for transfer (1-2-3)**	**Impact on BE targets (1-2-3)**
		Bioeconomy example setting		
		Knowledge and tools to promote collaboration		
		Funding access know-how		
		Technical circular and biobased knowledge		
		Favourable legal context		
		Insert additional priority here		
		Insert additional priority here		
		Insert additional priority here		
	D_05	Why these scores?		
KT activities within CEE2AC	E_01	What knowledge transfer and capacity building activities would you want to see happening within your country?		
	E_02	Which topics would appeal to you during the NBH workshops and activities of CEE2ACT?		
	E_03	What style of workshops would you like to participate in?		

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