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REPLICATION GUIDE

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Table of Content

1. Introduction to the BIOMODEL4REGIONS Project	03
2. Purpose of the Replication Guide.....	03
2.1. Replication in the Context of the BIOMODEL4REGIONS Project.....	04
2.2. Benefits of Using Tools and Methodologies	04
2.3. BIOMODEL4REGIONS Project Replication Group	04
3. BIOMODEL4REGIONS Project Pilot Regions.....	06
4. How to Replicate BIOMODEL4REGIONS Project Methodologies and Tools	09
4.1. Self-assessing Regional Governance Performance in the Bio-based Economy .09	
4.1.1. Methodology and Tools for Replication	10
4.1.2. Added Value and Target Users	13
4.1.3. Using the Self-Assessment Tools.....	13
4.1.4. Illustrative Best Practice: Tuscany, Italy	14
4.1.5. Funding Sources for Bio-based Economy Projects.....	14
4.2. Developing a Blueprint for a Regional Bio-based Economy Strategy	15
4.3. Implementing a Successful Bio-based Business Model	23
4.3.1. Methodology and Tools for Replication	24
4.3.2. Added Value and Target Users	25
4.3.3. Applying the Bio-based Business Model Framework.....	25
4.3.4. Using the MCMD Commercialisation Tool for Self-assessment.....	27
4.3.5. Success Factors	30
4.3.6. Illustrative Best Practice: Delta Region, Netherlands.....	31
4.3.7. Illustrative Best Practice: Northern Sweden.....	31
5. General Recommendations.....	32
6. References	35

Annex Regional Bio-based Economy Strategy Blueprint Template



1. Introduction to the Biomodel4Regions Project

The project “Supporting the establishment of the innovative governance models to achieve better-informed decision-making processes, social engagement and innovation in the bio-based economy” (**BIOMODEL4REGIONS**) aims to support the establishment of innovative governance models at the local and regional levels, enabling more informed decision-making, enhanced social engagement, and increased innovation in the bio-based economy. Beyond its regional focus, the project also seeks to strengthen European and international science-policy interfaces in the bioeconomy, contributing to the achievement of the **Sustainable Development Goals (SDGs)** and the objectives of the **Circular Cities and Regions Initiative (CCRI)**.

To achieve these goals, the project will deliver several key outcomes:

- ⊙ A comprehensive analysis of the bio-based economy policy mix in six pilot regions to identify opportunities, bottlenecks, and potential capacities related to feedstock, infrastructure, skills, and innovation.
- ⊙ Development of a **Regional Bio-based Economy Strategy Blueprint** in each of the six pilot regions, designed to set shared goals, leverage local innovation potential, and enhance regional collaboration.
- ⊙ Creation of a novel business model framework and commercialisation tool to encourage consumers, industry, producers, and public bodies to adopt environmentally responsible behaviours using bio-based products and services.
- ⊙ Compilation of best practice guidelines for local operators and innovation developers, aimed at promoting climate neutrality and reducing the environmental footprint of bio-based solutions.

The project's methodology is centred on the governance structures of six pilot regions across Europe, each actively engaged in the bio-based economy: the **Delta Region** (Netherlands), **Nitra Region** (Slovakia), **Normandy Region** (France), **Northern Sweden**, **Tuscany** (Italy), and the **Western Macedonia Region** (Greece). This approach is underpinned by the project consortium's extensive experience in research, collaborative initiatives, and best practices in the bioeconomy field.

The BIOMODEL4REGIONS project is funded by the European Union's (EU) Horizon 2020 research and innovation programme.

2. Purpose of the Replication Guide

Regional governments, clusters, and bio-based businesses looking **to assess and support the growth of their regional bio-based economies** are encouraged to use the tools and methodologies developed by the BIOMODEL4REGIONS project.

This guide acts as a practical roadmap, helping users identify the most suitable tools and approaches for their specific needs. It provides an overview of the intended users and the value each tool offers, step-by-step guidance for implementation, and best practice examples drawn from our six pilot regions.



2.1. Replication in the Context of the BIOMODEL4REGIONS Project

The **BIOMODEL4REGIONS** project outputs are designed for replication through two distinct pathways:

1. **Direct replication of tasks** using provided instructions and templates.
2. **Use of assessment tools** developed from the project's findings.

The following key methodologies and tools are available for use by any interested local or regional government, bio-based cluster, or business:

- ⊙ **Governance Self-Assessment Tool (G-SAT):** Enables analysis of governance performance related to the regional bio-based economy (see Section 4.1).
- ⊙ **Strategy Blueprint Development Methodology:** Provides guidance on how to act toward developing a regional bio-based economy strategy blueprint, with examples from regions at different stages of development (see Section 4.2).
- ⊙ **Business Model Framework:** Supports the transition of consumers, industry, producers, and public bodies toward more environmentally responsible behaviour through the adoption of bio-based products and services (see Section 4.3).
- ⊙ **Commercialisation Evaluation Tool:** Assesses bio-based product innovation within a regional context (see Section 4.3).

2.2. Benefits of Using Tools and Methodologies

The **key benefits** of using the BIOMODEL4REGIONS tools and methodologies are as follows:

- ⊙ Assess the strengths and weaknesses of your current bio-based economy governance structure.
- ⊙ Identify opportunities to enhance the performance of bio-based businesses.
- ⊙ Access best practice examples for implementing each methodology and tool.
- ⊙ Gain insights from the challenges overcome and success factors of bio-based clusters across Europe.

2.3. BIOMODEL4REGIONS Replication Group

To validate the replicability of the methodologies and tools developed by the BIOMODEL4REGIONS project, **a Replication Group was established**, consisting of three geographically diverse bio-based clusters and/or regions (please see Table 2.1).



Members of the BIOMODEL4REGIONS Replication Group

<u>South-West Ireland</u>	
Circular Bioeconomy Cluster South-West [More information]	
Sothern Waste Region (representing 10 municipalities in Southern Ireland) [More information]	
Interest Sectors: ⊙ Agricultural by-products and residues ⊙ Marine by-products (oyster shells, fish processing by-products) ⊙ Macro-algae and industrial wastes	 
<u>Plovdiv and Bulgaria-wide</u>	
Green Synergies (Bulgarian National Cluster) [More information]	
Interest Sectors: ⊙ Efficient use of natural resources and biomass-to-energy technologies ⊙ Production and utilization of biofuels ⊙ Management of compost and bio-waste	
<u>Western-Pomeranian Region, Poland</u>	
Zielona Chemia [More information]	
Interest Sectors: ⊙ Agricultural by-products and residues ⊙ Fisheries ⊙ Food processing ⊙ Forestry	 

Source: The members of the BIOMODEL4REGIONS

Two online workshops were held to introduce the clusters and regions to the project findings and to validate their potential for replication. A final Replication Workshop, focusing on the Replication Guide, took place in June 2025. Participants benefited from the project's insights and had the opportunity to learn about the latest project outcomes, explore strategies for developing a territorial bioeconomy in their own cities, and network with leading experts in the field.

Additional **support offerings** included:

- ⊙ One-on-one exchanges with pilot clusters.
- ⊙ Free participation in the Blueprints Workshop.
- ⊙ An offer to activate the Holland Circular Hotspot Network.



3. BIOMODEL4REGIONS Project Pilot Regions

BIOMODEL4REGIONS brings together six pilot regions from different EU countries, **covering different geographical and climate conditions** (Northern, Southern, Central-Eastern and West EU) and quite all type of primary biomass available in EU, forestry, agri-food, aquatic biomass and waste (OFMSW) (please see Table 3.1).

Tab. 3.1

BIOMODEL4REGIONS Project Pilot Regions

Delta Region (Netherlands) Agri-food; OFMSW	
 	A central theme for the large crops continues to be optimum valorisation of the residual streams and by-products to higher value applications; closed loop solutions (infrastructure and regulations) are needed bringing back water, carbon and minerals to the land; the circular economy calls for considering waste as feedstock with challenges of safety, quality, logistics, end-of-waste-status etc.
	Partner: HOLLAND CIRCULAR HOTSPOT Stakeholders: Royal Cosun cooperative, Hem Cell biopolymers, DSD BV, Innovative sustainable technologies BV, Natuuruurvezel Applicatie Centrum
Nitra Region, Slovakia Agri-food	
	Association of municipalities for waste management in Nitra region operates in 57 municipalities with a total population of 81,000 and with more than 25,000 households. From January 1st, 2021, municipalities are obliged to introduce a collection system of bio-based food waste. The association thus must collect and process almost 7,000 tons of food waste produced by households each year. Currently, most of the bio-waste is processed in composting facilities or biogas stations to produce renewable energy. The association is in the preparation of a new investment of about 10 M€ for waste processing including food waste. The BIOMODEL4REGIONS helped assess various governance and business models considering economic efficiency, environmental and social sustainability of the facility.
	Partner: BIOECONOMY CLUSTER Stakeholders: Association of municipalities or waste management in Nitra region, producers, knowledge providers and companies



Tab. 3.1 (continued)

Normandy Region (France) Shellfish	
	Normandy holds a quantity of about 30,600 tons of shellfish caught per year representing 66% of the French shellfish fishery. The sector is characterized by strict and restrictive regulations for companies. Also, the French regulatory status of shellfish co-products is still not clear. The main objective is to set-up new governance models to overcome difficulties and obstacles regarding the management and valuation of shellfish by-products in Lower Normandy. Aquimer has recently been appointed by ADEME to establish and coordinate a Regional Committee on “the sea and the circular economy” in Normandy.
	Partner: AQUIMER Stakeholders: NaturePlast, Normandy Region
Northern Sweden Forestry	
	The region is characterized by vast boreal forest resources and large sparsely populated areas. Forest biomass is today used for production of sawn goods, pulp and paper, green electricity and district heating. Sweden is as of 2021 responsible for 90% of Europe’s iron ore extraction. Most of this production is in north Sweden and is now shifting towards fossil free steel production utilizing the region’s large production of renewable electricity. An overview of the forest industry and forestry side streams in the region was worked out together with RISE Processum. An estimation of the existing annual volumes, qualities, present use, and potential for upgrading into biobased products and bioenergy was carried out. Technical, logistical and policy barriers for mobilizing and upgrading these biomass flows were evaluated and recommendations on how to overcome these barriers were suggested. A detailed value chain analysis for two assortments was carried out in close cooperation with forest industry representatives. Existing regional bio-based economy statistics for all 21 regions in Sweden was updated.
	Partner: BIOFUEL REGION Stakeholders: Regions of Västernorrland, Västerbotten, Jämtland and Norrbotten, C-Green, Domsjö Fabriker AB, Holmen AB, Metsä Board Husum, Mondi Dynäs AB, Ragn-Sell AB, SCA AB, SEKAB, Sveaskogs, Norra Skog, Umeå Energi, Skellefteå Kraft, Övik Energi, Jämtkraft and REBIO AB



Tab. 3.1 (continued)

Tuscany, Italy OFMSW	
	In Italy good examples of management and treatment of different wastes are already running, and other are under development: such models, as the recovery and extraction of molecules of interest from waste waters and industrial sludges, the production of bioenergy from different wastes, the production of biofertilizers from wastes and composting, represent innovative solutions but also face some challenge, also related to regulations and to the need to correctly manage the entire value chain (from collection to final use). Involvement of the stakeholders and dialogue with the policy makers are required to establish governance models able to act quickly and support the deployment of such opportunities. Tuscany is already active in monitoring how the regional policies can promote innovation in the waste management (see for instance the “Smart Waste” Interreg project (https://projects2014-2020.interregeurope.eu/smartwaste/), and BIOMODEL4REGIONS supported them to develop circular bioeconomy solutions.
	Partner: SPRING Stakeholders: Spring’s Table of Regions, Direct involvement of AIREs, Regional representatives of Tuscany
Western Macedonia, Greece Agri-food	
	Several difficulties still need to be addressed mainly concerning the fragmentation in policy, the lack of logistics infrastructure and the weak stakeholders’ networking. During the project the entire supply chain of biomass in the region, from both the forest and agriculture sector, was addressed. Special focus was given on production, storage, and transportation of biomass. A pre-feasibility analysis for the development of a Biomass Trade Centre as one possible solution was undertaken. A Regional Committee and a Technical Group for Bio-based economy was developed.
	Partner: CLUSTER OF BIOECONOMY AND ENVIRONMENT OF WESTERN MACEDONIA Stakeholders: Forest Cooperative of Agia Kyriaki, Agricultural Cooperative DIMITRA, University of Western Macedonia, Regional Development Agency of Western Macedonia (ANKO), Alfa Wood S.A, CHLIAPAS A

Source: BIOMODEL4REGIONS Project



4. How to Replicate BIOMODEL4REGIONS Project Methodologies and Tools

Each tool and methodology developed by the BIOMODEL4REGIONS project is presented below in a clear, easy-to-follow snapshot format.

4.1. Self-assessing Regional Governance Performance in the Bio-based Economy

Tools for policy analysis and regional governance are pivotal in advancing the bio-based economy for several reasons:

1. **Holistic Policy Integration:** Effective tools enable the alignment of bio-based economy strategies with broader policy agendas, such as sustainable development, circular economy, and climate neutrality. The absence of horizontal integration across ministries and policies has been identified as a major barrier. Analytical tools facilitate the creation of coherent, multi-level governance frameworks to address this gap.
2. **Customization to Regional Needs:** The regional dimension is crucial, as bio-based economy clusters concentrate value chains and expertise in specific areas. Governance tools allow for tailoring strategies to regional contexts, leveraging local strengths, and addressing unique challenges. This ensures efficient deployment of bio-based economy strategies in diverse socio-economic landscapes.
3. **Stakeholder Coordination:** The bio-based economy involves a complex web of actors across the quadruple helix (policy, research, industry, and civil society). Tools for governance can bridge gaps between these stakeholders, fostering collaboration, innovation, and co-creation. For example, methodologies for stakeholder mapping and engagement can drive participatory governance.
4. **Monitoring and Implementation:** Policy analysis tools provide mechanisms for tracking the implementation of strategies and measuring their outcomes. This is critical for adjusting policies in response to emerging challenges and ensuring accountability.
5. **Enhancing Policy Impact:** By identifying synergies between policies at local, regional, and EU levels, governance tools can enhance the impact of bio-based economy strategies. They facilitate the exploitation of complementary policies, reducing redundancies and maximizing resource efficiency.
6. **Catalysing Social Innovation:** Tools help transition from technical innovation to social innovation by involving diverse groups like citizens, brand owners, and small and medium-sized enterprises (SMEs). This inclusion ensures that policies are relevant, desirable, and sustainable in real-world contexts.

In essence, policy analysis and governance tools are foundational for designing, implementing, and scaling bio-based economy initiatives effectively, ensuring alignment with regional and EU priorities while fostering innovation and inclusivity.

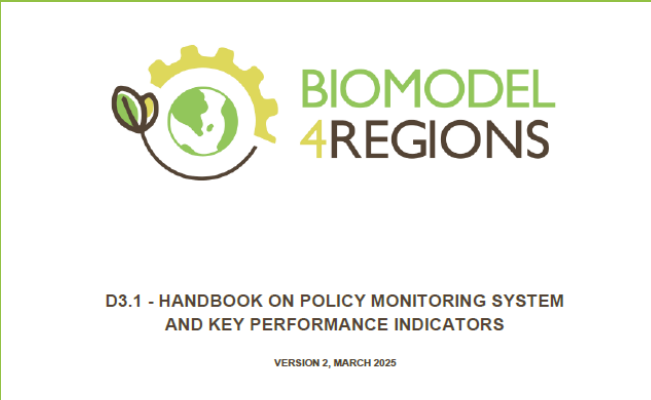
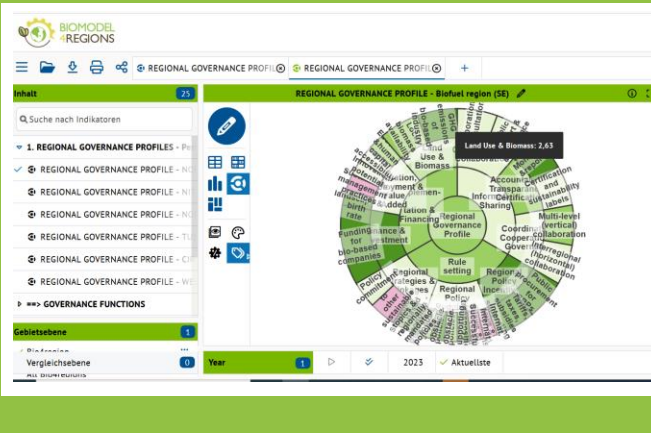


4.1.1. Methodology and Tools for Replication

The BIOMODEL4REGIONS project has developed comprehensive methodology and tools to support regions in self-assessing their governance related to the bio-based economy. Central to this process are the **Handbook** which describes the governance model and how to use the associated interactive tools, the online **BERST Monitoring Dashboard** where users can explore the governance assessments of the six pilot regions in the BIOMODEL4REGIONS project, and the **Governance Self-Assessment Tool (G-SAT)**, an Excel-based self-assessment tool. These tools are designed to help regions identify strengths and areas for improvement in their bio-based economy governance (please see Table 4.1).

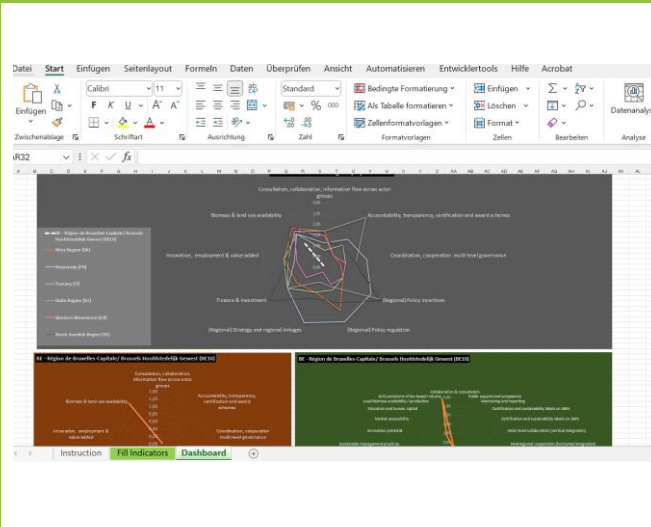
Tab. 4.1

Core BIOMODEL4REGIONS Project Methodologies and Tools

	Handbook on Policy Monitoring System and Key Performance Indicators (KPIs): The handbook outlines a generic framework for governance assessment, featuring specific governance functions and KPIs. Link: https://berst.databank.nl/
	BERST Dashboard: The BioEconomy Regional Strategy Toolkit (BERST) enables regions to benchmark their governance performance against other regions. It provides a dashboard that visualises key governance indicators. Replicator regions may observe and explore data and visuals related to the B4R pilot regions. Link: https://berst.databank.nl/



Tab. 4.1 (continued)

	Governance Self-Assessment Tool (G-SAT): This Excel-based tool guides users through data collection, indicator evaluation, and performance visualization. It includes tabs for instructions, data entry, and dashboards to present findings clearly. This excel tool is mirroring the assessment done by the B4R pilot regions and specifically designed to be used by interested replicator regions. Link: https://berst.databank.nl/ > Content > “2. Governance Self-Assessment Tool: Download and create profile” > G-SAT Excel & G-SAT Handbook
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Source: BIOMODEL4REGIONS Project

The tools presented in Table 4.1 assess bioeconomy governance using a three-tier indicator framework. The highest level (Tier 1, see inner circle) addresses three fundamental aspects of governance, as outlined below:

- ⊙ **Information-sharing:** The ability of governance systems to facilitate the exchange of knowledge, data, and best practices among stakeholders, including government entities, businesses, and research institutions.
- ⊙ **Rule-setting:** The presence and effectiveness of policies, regulations, incentives, and strategic frameworks that guide bioeconomy development at the regional level.
- ⊙ **Finance and Implementation:** The availability and management of financial resources, investment mechanisms, markets, a regional workforce, and natural resources that support the bioeconomy.

The Tier-2 includes functional governance fields for the bio-based economy (in principle also applicable to other areas), breaking down the three primary governance functions identified in Tier-1. These functional governance fields are not exclusively focused on regional level actors, but mostly span across multiple governance levels:

- ⊙ Consultation, collaboration and information flow across actors.
- ⊙ Accountability, transparency, certification and award schemes.
- ⊙ Coordination, collaboration and multi-level governance.
- ⊙ Policy incentives.
- ⊙ Policy regulation.
- ⊙ Regional strategy and regional linkages.
- ⊙ Finance and investment.



- ② Innovation, employment and value added.
- ② Local biomass production and land use.

The Tier-3 includes assessment criteria, which are derived from Tier-2 and form the criteria that are being assessed and evaluated as part of the BIOMODEL4REGIONS project for each pilot region, using a set of existing (e.g., BERST case studies) and newly developed indicators.

For more detailed information, please refer to Deliverable D3.1, “*Generic Model for Regional Bio-based Economy Governance*”, available on the BIOMODEL4REGIONS project website – <https://www.biomodel4regions.eu/>.

Figure 4.1 presents an example of visualisation of the governance indicators from the online BERST Monitoring Dashboard for the Circular Delta Region, Netherlands.

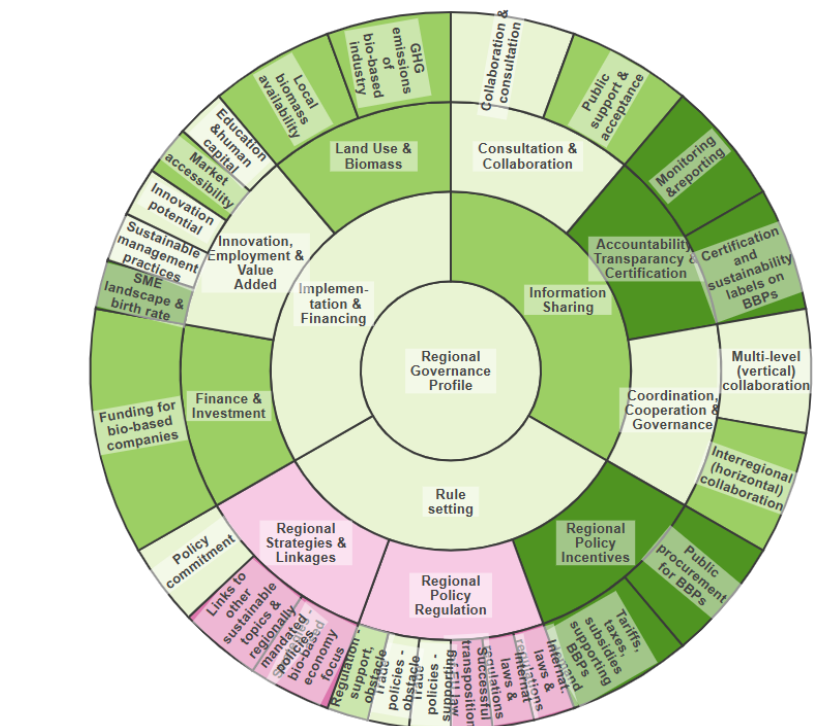


Fig. 4.1 Regional Governance Profile ‘the Delta Region’, The Netherlands, BERST Dashboard 2023

The regional bio-based economy in the Delta Region has been found to have well established structures for information sharing both vertically (between governance fields/government levels) and horizontally (between actor groups at regional level), including with the public. See in image above, on the Tier-1 “*basic governance structure*”, how the Delta Region scores highest on information-sharing.

In terms of *finance and implementation*, the results suggest that the regional bio-based economy is characterised by very robust value chains, strongly developed and partly diversified bio-based market structures.

In the *rule-setting* space, results based on its dedicated and integrated bio-based economy policy framework suggest that the bio-based economy in the region uses and advocates for using a large variety of incentivising mechanisms available to stimulate production and consumption of bio-based products.

For more detailed information on the Delta Region best practice, please refer to Deliverable D5.1, “Six Regional Bio-based Economy Strategy Blueprints, one by each Pilot Region”, available on the BIOMODEL4REGIONS project website – <https://www.biomodel4regions.eu/>.

4.1.2. Added Value and Target Users

The tools presented above can support both regional governments and bio-based businesses. For regional governments, bioeconomy clusters, and other regional stakeholders, they offer a structured approach to evaluating existing governance structures, enabling data-driven decision-making to strengthen bioeconomy strategies. For bio-based businesses, the insights help characterize the operating environment in terms of governance models and practices, as well as identify potential areas for advocacy to improve regulatory frameworks. These tools are particularly valuable in contexts **where regions seek to develop or refine bio-based economy strategies, benchmark performance against peers, or identify governance gaps and opportunities for policy enhancement.**

4.1.3. Using the Self-Assessment Tools

The process of using the Self-Assessment Tools includes four steps, as follows:

- 🕒 **Step 1:** Download the Governance Self-Assessment Tool (G-SAT) from the BERST Monitoring Dashboard (<https://beta-berst.databank.nl/jive>).
- 🕒 **Step 2:** Select your NUTS2 region and input data into the 'Fill Indicators' tab.
- 🕒 **Step 3:** Review the generated dashboard to analyse governance performance, including comparative benchmarking against the six BIOMODEL4REGIONS pilot regions.
- 🕒 **Step 4:** As appropriate, develop or update policies, regulations, or strategies based on the identified governance gaps and needs.

For more detailed guidance on accessing and using the self-assessment tools, please refer to the Handbook (<https://berst.databank.nl/>).

Depending on the goal and resources availability for the governance self-assessment, different approaches to gathering and validating data can be taken. In situations with less capacity, own background knowledge and desk-based research can be applied to estimate or collect data to input for the governance indicators. If more resources are available, diverse stakeholders can be engaged during data collection to ensure comprehensive and accurate insights or validate findings through workshops or expert consultations. You can also update data regularly (i.e., every year) to track progress over time.



4.1.4. Illustrative Best Practice: Tuscany, Italy

Tuscany has a diverse bioeconomy, supported by strong agricultural and forestry sectors. Its bioeconomy is linked with broader sustainability and circular economy strategies. The assessment results revealed that Tuscany performs well in Financing and Implementation, particularly in supporting SMEs, reducing greenhouse gas (GHG) emissions and the scale of production of local biomass. However, Rule-Setting and Information Sharing are lagging. This entails challenges in policy alignment and collaboration between sectors or different levels or agencies of government, which may reflect the region's lack of a dedicated bioeconomy strategy. Through this assessment, it became clear that Tuscany should streamline regulatory frameworks to reduce administrative burdens, strengthen cross-sectoral stakeholder collaboration and invest in education and skills development for the bioeconomy workforce. In addition, supplementary interviews with regional stakeholders flagged capacity-building among relevant public-sector staff could facilitate better collaboration and governance related to the bioeconomy.

For more detailed information on the Tuscany best practice, please refer to Deliverable D5.1, *“Six Regional Bio-based Economy Strategy Blueprints, one by each Pilot Region”*, available on the BIOMODEL4REGIONS project website – <https://www.biomodel4regions.eu/>.

4.1.5. Funding Sources for Bio-based Economy Projects

Limited access to funding is exacerbated by bureaucratic hurdles, lengthy procedures, and inconsistent regulations that impede innovation. SMEs, especially those in rural areas, face challenges securing financial support, while poor coordination between EU, national, and regional funding strategies reduces overall efficiency.

Conversely, opportunities exist to leverage public-private partnerships to mobilize resources, as well as targeted regional programs like municipal vouchers and provincial grants aimed at supporting bio-based industries. EU and national initiatives, including the Just Transition Fund, provide substantial funding to facilitate the transition of traditional sectors. Streamlining application processes and offering tailored SME support – along with subsidies and fiscal incentives for research and development – can further stimulate innovation and sustainability within the bio-based economy.

While the governance assessment primarily focuses on structural, policy, regulatory, and capacity aspects, findings from Deliverable D3.3, *“Reports on Governance and Policy Regime for the Bioeconomy and Bioeconomy Potential in the Pilot Regions,”* (available on the BIOMODEL4REGIONS project website – <https://www.biomodel4regions.eu/>) suggest that regions with robust governance frameworks typically have better access to both public and private funding. Integrating bioeconomy governance with funding strategies can enhance the effectiveness of bioeconomy initiatives.



4.2. Developing a Blueprint for a Regional Bio-based Economy Strategy

What is the blueprint about?

The **blueprint** for a Regional Bio-Based Economy Strategy is one of the key BIOMDOEL4REGIONS project collective intelligence initiatives to support the regional governments, bio-based clusters, and businesses in their transition to a circular and low-carbon economy. It aims to build the knowledge and capacity of the public administrations, industry, primary producers, small and medium-sized enterprises, civil society organisations, knowledge providers, citizens, and consumers to work together on creating the framework for sustainable growth and jobs at a regional level.

The **development of the blueprint** for a Regional Bio-Based Economy Strategy is a structured approach regional governments, bio-based clusters, and businesses can use to create, implement, and evaluate a long-term plan to achieve their goals on using renewable biological resources from land and sea.

Six BIOMODEL4REGIONS project pilot regions implemented and evaluated the Regional Bio-Based Economy Strategy **blueprint development methodology**. The project report entitled “*Six Regional Bio-Based Economy Strategy Blueprints, one by each Pilot Region*” (i.e., deliverable 5.1) presents a thorough compilation of distinct Regional Bio-Based Economy Strategy blueprints (<https://www.biomodel4regions.eu/>).

What is the blueprint development methodology?

The BIOMODEL4REGIONS project blueprint for a Regional Bio-Based Economy Strategy follows the format of a **strategic guide** for co-creation and co-development of the bio-based economy strategy at the regional level. Its main purpose is to help the regional governments, bio-based clusters, and businesses to plan and lead the progress towards a climate-neutral, resource-efficient, and circular economy. This blueprint can help the interested stakeholders in building better understanding on the connection between the regional economy, society, and the environment.

The blueprint development methodology has three conceptual basis elements (please see Figure 4.2).



Fig. 4.2 Conceptual elements of the blueprint development methodology

- 🕒 **Inspiration:** It is inspired by the ICLEI – Local Government for Sustainability (ICLEI) [Green Climate Cities \(GCC\)](#) programme, that offers cities a proven systematic approach for walking step-by-step toward climate neutrality.



- ◎ **Knowledge:** It is built on the Biomodel4Regions project created knowledge – methodologies and tools, and the application of that knowledge assets (**KA**) in practice:
 - ❖ **KA-1:** Governance assessment tool to analyse the bio-based economy at regional level.
 - ❖ **KA-2:** A business model framework to enable consumers, industry, producers and public bodies to switch towards more environmentally responsible behaviour by use of bio-based products and services.
 - ❖ **KA-3:** A commercialisation evaluation tool to evaluate biobased product innovation in a regional context.
- ◎ **Co-creation:** It relies on the key principles of collective and innovative knowledge co-creation, that requires active engagement of all relevant stakeholders, including experts, practitioners, and communities, to contribute their knowledge and perspectives.

What are the key steps for developing the blueprint?

The development of a Regional Bio-Based Economy Strategy blueprint is a 6-Step Planning Process (please see Figure 4.3) that is driven by engagement of the regional and local stakeholders in setting-up the supporting governance structure and related capacities. It is also built on the analysis of the bio-based economy governance system and related policies in the region, outlining functions, roles and opportunities of different entities and stakeholders.



Fig. 4.3 Regional Bio-Based Economy Strategy blueprint development steps

The Regional Bio-Based Economy Strategy blueprint development steps are organized in a sequential manner, with each step building upon the previous one. Each step includes a defined set of actions that operationalize the strategic objectives (please see Table 4.2).



Key Actions for Developing the Regional Bio-based Economy Strategy Blueprint

1	Define Objectives & Scope Goal: Clarify what the strategy blueprint aims to achieve and what it will cover. • Identify the main challenges and opportunities driving the need for this strategy blueprint. • Define the geographic, thematic, and temporal scope. • Clarify intended stakeholders and users of the strategy blueprint.
2	Analyse the Local Context (Baseline & Policy) Goal: Understand the current situation to ground the strategy. Local Policy Context • Map relevant local, national, and EU-level policies. • Identify synergies, gaps, or conflicts with the bio-based economy agenda. Governance Model & Implementation Ecosystem • Assess current governance frameworks, roles, and institutions. • Identify key actors (public, private, academia, civil society). • Understand existing initiatives, networks, and capabilities.
3	Develop the Vision & Strategic Direction Goal: Define where the region wants to go and how it plans to get there. Policy Priorities • Identify thematic or sectoral areas that should be prioritized (e.g., agriculture, forestry, waste management). Vision for a Bio-Based Economy • Co-create a compelling, shared vision for the future with stakeholder input. • Make it inspirational but realistic. Strategic & Operational Objectives • Set high-level strategic goals (long-term outcomes). • Break them down into operational objectives (concrete, short/medium-term steps). Summary • Recap the key insights and decisions from this section in a short digestible format

Tab. 4.2 (continued)

	Define Key Action Fields for Implementation Goal: Translate strategy blueprint into actionable areas of work. Improving Bio-Based Business Models • Identify gaps and opportunities for innovation, scaling, or diversification. • Recommend specific support mechanisms (e.g., funding, partnerships, capacity building). Actions / Interventions • List specific actions with timelines, responsible entities, and resources. • Use a logical framework or action matrix to clarify responsibilities and milestones.
	Set Up Monitoring, Evaluation & Learning (MEL) Goal: Ensure the strategy blueprint is adaptable and accountable. • Define key performance indicators and success indicators. • Plan how progress will be tracked, reviewed, and reported. Build in mechanisms for learning and course correction (e.g., annual reviews).
	Outlook Goal: Provide a forward-looking perspective and call to action. • Reflect on the strategic potential of the region. • Outline next steps, key risks, and future opportunities. • Encourage stakeholder commitment and engagement.

To streamline the development of the Regional Bio-based Economy Strategy blueprints, the ICLEI – Local Governments for Sustainability has created a template with the annotations, instructional guidance, and recommendations for each of the sections. The template has a flexible structure, allowing sufficient localisation and adaptability given the differing framework, context, and scope of each of the bio-based economy strategy blueprints to be developed. The template is available in the Annex of this Replication Guide.

How can your region benefit from developing the blueprint?

Development of a Regional Bio-Based Economy Strategy blueprint is a dynamic and collaborative process. It brings together multiple stakeholders with diverse expertise and knowledge to create new collaboration opportunities toward a more sustainable and more bio-based economy at the regional level. The process of developing the blueprint offers to regional public authorities numerous learning, capacity-building, and regional competitiveness strengthening benefits (please see Table 4.3).



Tab. 4.3

Potential Benefits from Developing the Regional Bio-based Economy Strategy Blueprint

	Economic Growth and Job Creation	• Creation of new industries and markets • Generation of new jobs • Attracting national and international investments
	Sustainable Resource Management	• Utilizing renewable resources • Sustainable land management • Integration of the circular economy principles
	Environmental Benefits	• Reduction in greenhouse gas emissions • Biodiversity preservation • Waste reduction and management
	Improved Energy Security and Sustainability	• Developing bio-based energy sources • Enhancing energy security • Creating decentralized energy systems
	Regional Competitiveness and Innovation	• Fostering partnership between research institutions and the private sector • Building technological leadership in bio-based innovations
	Enhanced Agricultural and Rural Development	• Promoting sustainable farming practices • Boosting rural economies and supporting rural communities
	Improved Public Health	• Promoting healthier food production • Reducing air pollution • Reducing pollution from landfills and providing cleaner environment
	Stronger Regional Identity and Collaboration	• Building a regional identity based on sustainable products and services • Encouraging collaboration between regions within the country and beyond
	Resilience to Climate Change	• Enhancing region's resilience to climate change by promoting adaptive practices • Diversifying income sectors to protect from the economic impact of climate-related disruptions
	European Union and National Policy Alignment	• Aligning the region with EU policies and strategies • Contributing to the EU's climate goals and bio-based commitments



Identifying the potential benefits from developing the Regional Bio-Based Economy Strategy blueprint is a fundamental component of the blueprint co-creation process. It can help stakeholders to better understand the positive outcomes and advantages of collaboration, and thus promote their motivation and active and enthusiastic participation in the bio-based economy development in the region.

What are the best practices for developing the blueprint?

The BIOMODEL4REGIONS project implementation has shown that the development of the Regional Bio-Based Economy Strategy Blueprints requires a cross-sectoral collaboration, stakeholder engagement, and combination of diverse knowledge and experiences. Six BIOMODEL4REGIONS project pilot regions developed the regional bio-based economy strategy blueprints with consideration of their bio-based economy development challenges, knowledge base, and goals. Each of six blueprints demonstrates a unique approach of localisation of the BIOMODEL4REGIONS project Regional Bio-Based Economy Strategy blueprint development methodology and can serve as a source of inspiration and knowledge for the regional public authorities across Europe. Table 4.4 presents the key insights for developing regional bio-based economy strategy blueprint.

Tab. 4.4

Key Insights for Developing the Regional Bio-based Economy Strategy Blueprint

Delta Region (Netherlands)	
	Engage a diverse range of stakeholders – spanning the public sector, private sector, and knowledge institutions – to co-create the regional bio-based economy strategy blueprint. Facilitate continuous input through workshops, meetings, and interviews to ensure the blueprint reflects current insights and remains relevant, comprehensive, and actionable.
	Foster extensive cross-border collaboration, leverage complementary value chains, and build on local knowledge to enhance scalability and increase access to European funding. These strategies, drawn from broad stakeholder engagement, are key to developing impactful and sustainable initiatives.
	Translate stakeholder needs and aspirations into a shared vision with strategic objectives and actionable steps to guide the development of a regional bio-based economy. This ensures the blueprint is both practical and aligned with local priorities, fostering effective implementation and regional impact.
Nitra Region (Slovakia)	
	Empower regions to lead bio-based economy strategy blueprint, as they are best positioned to engage local stakeholders and address community-specific needs. Use regional blueprint as tool to translate national strategies into localized action, raising awareness and mobilizing key regional actors in the bio-based economy.



Tab. 4.4 (continued)

	Design regional bio-based economy strategy blueprint that reflect the unique characteristics and needs of the regions. Foster collaboration among regional authorities, industry, science, and civil society to ensure inclusive and context-specific solutions.
	Prioritize community involvement and education to drive effective waste management. Launch large-scale awareness campaigns and implement hands-on programs in schools and local organizations to empower residents with the knowledge and tools needed for waste separation, resource conservation, and embracing circular economy principles.
Normandy Region (France)	
	Focus the regional bio-based economy strategy blueprint on building a sustainable economic model using renewable biological resources, aligned with ecological and energy transition goals by promoting sustainable agriculture, bio-based industries, renewable energy, etc.
	Develop new regional ecosystems as part of the bio-based economy strategy blueprint, bringing together local stakeholders, technical centres and specialised laboratories, an agricultural and maritime heritage, a diversified industrial infrastructure, emerging sectors, and professional organisations and unions.
	Identify , discuss, and plan in the regional bio-based economy strategy blueprint, solutions to overcome barriers hindering bio-based economy development. Focus on the following key areas: regulatory evolutions, administrative simplification, sector structuring, supply chain optimization, innovation financing, adapt funding mechanisms, interregional synergies, etc.
Northern Sweden (Sweden)	
	Ensure the regional bio-based economy strategy blueprint establishes a unified vision that aligns with national bioeconomy objectives and related national strategies. This alignment promotes coherence between regional, national, and European policies, supports coordinated implementation, and strengthens synergies across all levels of governance.
	Promote regional collaboration, digital innovation, and industrial clusters to optimize resources and drive innovation. Strengthen recycling and cross-sector use of residual streams to support climate goals, national resilience, and long-term economic and environmental stability.
	Consider including in the regional bio-based economy strategy blueprint regular measurement of the bio-based economy's economic impact on regional development (i.e., indicators). While many strategies set ambitious goals, such as increasing added value and employment, they often lack tools for monitoring progress, especially at the regional level.



Tab. 4.4 (continued)

Tuscany Region (Italy)	
	Develop a regional bio-based economy strategy blueprint as a strategic tool to promote sustainable resource management and drive regional development. Use it to create a structured framework that engages local stakeholders with policies, coordinates funding sources, and supports bioeconomy initiatives aligned with regional priorities.
	Integrate education and skills development into the regional bio-based economy strategy blueprint to build a workforce equipped with specialized expertise, essential for the transition to a bio-based economy. Tailor initiatives to emerging industries to enhance employability, promote social stability, and ensure inclusivity.
	Incorporate actions in the regional bio-based economy strategy blueprint to establish a structured network between universities and enterprises. This network will enhance collaboration and knowledge transfer, bridge gaps, and foster innovation by integrating research with industry to address sector-specific challenges.
Western Macedonia Region (Greece)	
	Create the regional bio-based economy strategy blueprint as a strategic planning and policy development tool to clearly define a vision and set focused goals for the effective use of bio-based resources. Ensure alignment between regional, national, and European bio-based economy strategies to promote policy coherence and unlock funding opportunities.
	Promote economic diversification and innovation by reducing reliance on traditional sectors and fostering the growth of bio-based industries. Focus on developing fields like bioenergy, bioproducts, and sustainable agriculture to build economic resilience. Encourage research and development in bio-based technologies to drive continuous innovation.
	Incorporate in the regional bio-based economy strategy blueprint advanced data collection tools, robust data analysis methods, and strong feedback loops that connect evaluation results directly to strategic planning. This approach will deliver clear, actionable insights and enable timely adjustments to your strategy.

For more insights to help develop the Regional Bio-based Economy Strategy Blueprint, please refer to the Deliverable D5.1, “Six Regional Bio-based Economy Strategy Blueprints, one by each Pilot Region”, available on the project website – <https://www.biomodel4regions.eu/>.



4.3. Implementing a Successful Bio-based Business Model

When trying to assess what a successful bio-based business model is, it is important to first define the bioeconomy in which they can operate. The EU defines the bio-based economy, often referred to as the bioeconomy, as an economic system that utilizes renewable biological resources from land and sea – such as crops, forests, fish, animals, and microorganisms – as well as biological processes to produce food, materials, and energy. It emphasizes sustainable and circular use of resources, aiming to reduce dependence on fossil fuels, enhance environmental health, and foster innovation and economic growth in a sustainable manner. This approach integrates various sectors, including agriculture, forestry, fisheries, and biotechnology, while promoting innovative technologies like biorefineries and bio-based chemicals to create value-added products and services (*Bioeconomy Strategy, 2022*). Considering this broad scope, bio-based businesses have opportunities to operate in a large range of sectors and earn revenue from a wide spectrum of activities.

When describing and discussing business models it is important to understand that this is a dynamic concept. A business model is never set in stone and can change as the strategy of the business changes. So, when talking about developing a successful bio-based business model, we talk about the elements that should be considered which ‘make or break’ a business (please see Figure 4.4).

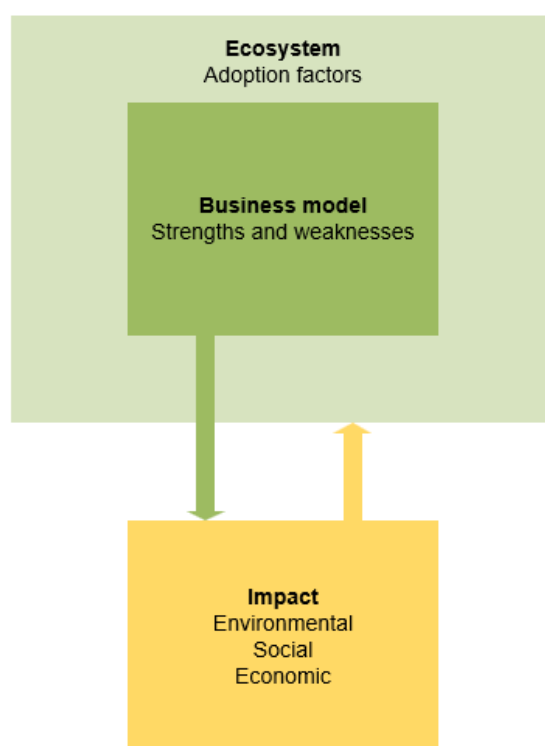


Fig. 4.4 Bio-based Business Model Framing Building Blocks

These elements can be put into three categories:

- 🌐 **The social and physical context**, which contextualizes the environment (ecosystem) in which the company operates in different aspects and examines existing. These are



external factors and can be grouped into the following categories: political/institutional, economic, social, technological, legal, environmental.

- ⊙ **Building blocks of bio-based business models**, pertain to activities at the business level, with an internal focus on elements that are primarily within the business's control. Here, the difference is made between strengths and weaknesses.
- ⊙ **Sustainability impact**, examining the impacts and value added by the bio-based business in a broad sense. To define the value added, a categorisation is made between environmental, social and economic. Identifying the value added requires analysing both the positive and negative impacts of the enterprise.

4.3.1. Methodology and Tools for Replication

The BIOMODEL4REGIONS project has developed a **Bio-based Business Model Framework** which bio-based businesses can use to create their business model, including a process to test societal acceptance regarding specific bio-based products and services. A detailed overview is found below. In addition, a commercialisation tool, **the Multi-Criteria Decision-Making (MCDM) Tool** has been further developed during the Biomodel4Regions project to evaluate biobased product innovation in a regional context. The MCDM tool assesses six key criteria, such as cost and sustainability, to guide strategic decisions and finally evaluate biomass availability, market analysis, technology, and economic feasibility (please see Figure 4.5), rendering a total scoring for its commercialisation for a business case scenario.



Fig. 4.5 The Six Key Scoring Criteria of the Multicriteria Decision Making Tool



4.3.2. Added Value and Target Users

Both the framework and commercialisation tool are particularly valuable for bio-based businesses. The framework is a tool that enhances understanding of the business environment – identifying key external factors that influence operations – while also assessing the internal strengths and weaknesses of the business. It also evaluates the impact of the business, both positive and negative. Regarding the commercialisation tool, **the MCDM-tool is valuable for business strategists, policy makers, investors, and researchers involved in bio-based product innovation.** It helps evaluate and prioritize technological pathways and product ideas by balancing factors like cost, sustainability, and market potential. **The MCDM tool aids in making informed strategic choices, aligning policy support with industry needs, and assessing the economic viability and risk profiles of bio-based ventures.** Business modelling is a dynamic concept, so whether a business is a start-up, an established bio-based entity, or a company wanting to move to bio-based production, all tools are and remain relevant.

These tools can also be applied by public regional or national stakeholders, as understanding the ecosystem in which bio-based businesses operate – through this framework – can help governmental agencies provide more targeted support to these businesses.

4.3.3. Applying the Bio-based Business Model Framework

A detailed overview of the **Bio-based Business Model Framework** can be seen in Figure 4.6 below. To develop a business model using the framework, the three key elements – **the social and physical context, building blocks of bio-based business models and Sustainability Impact** – need to be analysed. In the BIOMODEL4REGIONS project, this analysis was conducted via semi-structured interviews with key stakeholders with a comprehensive understanding of the business. However, this process can also be applied to a larger group or even involve external stakeholders.

To replicate this process, the following steps are recommended:

1. **Understanding the Ecosystem:** What external factors drive or inhibit your business? These are elements beyond your direct control, and it can be valuable to involve multiple stakeholders in this step to get diverse perspectives.
2. **Business Model:** What are the strengths and weaknesses of your business model, and how can you enhance the strengths and address the weaknesses?
3. **Impact:** What kind of impact does your business have? Additionally, it's important to consider how to measure and communicate this impact to your clients effectively.

It is important that this is an ongoing process, so rethinking your business model on a regular basis is essential. Detailed findings of each pilot region regarding this framework can be found in D4.1 “*Report on Social and Economic Drivers and Barriers for the Acceptance of Bio-based Business Models*” and D4.2 “*External Barriers and Drivers, Internal Strengths and Weaknesses, and the Environmental Impact of Biobased Businesses*” – available on the BIOMODEL4REGIONS project website – <https://www.biomodel4regions.eu/>.



Evaluation of the bio-based business model	Social and Physical context		
	Adoption factors		
		Barriers	Drivers
	Political/ institutional		
	Economic		
	Social		
	Technological/ informational		
	Legal		
	Building blocks for bio-based business models		
	Elements of business model CANVAS: value proposition, customer relations and segments, channels, activities, key resources, partners, cost structure, revenue streams		
	SWOT: Strengths, Weaknesses		
	Sustainability impact		
		Positive consequences	Negative consequences
	Social		
	Environmental		
	Financial		

Fig. 4.6 Bio-based Business Model Framework

An essential component of a business model is the **value proposition**, which ensures that your product or service is aligned with the values and needs of your customers. In the case of the Biomodel4Regions project, to gain a deeper understanding of the societal acceptance of bio-based products and services, six focus groups were organised in every region. In these focus groups, several bio-based products were discussed. Participants identified both motivations and barriers affecting their consumption of bio-based products. Key drivers included environmental concern, support for local development, long-term investment value, personal values, and health benefits. However, common barriers were a lack of knowledge, financial constraints, preference for familiar products, limited interest, inconvenience, and insufficient awareness or education. As main solutions discussed participants suggested that citizens need better guidance, education, and access to bio-based products; companies should focus on transparency, clear communication, and engagement; and governments



should provide supportive policies, incentives, and infrastructure to promote sustainable practices. The structure that was employed in the focus groups can be found in Figure 4.7.

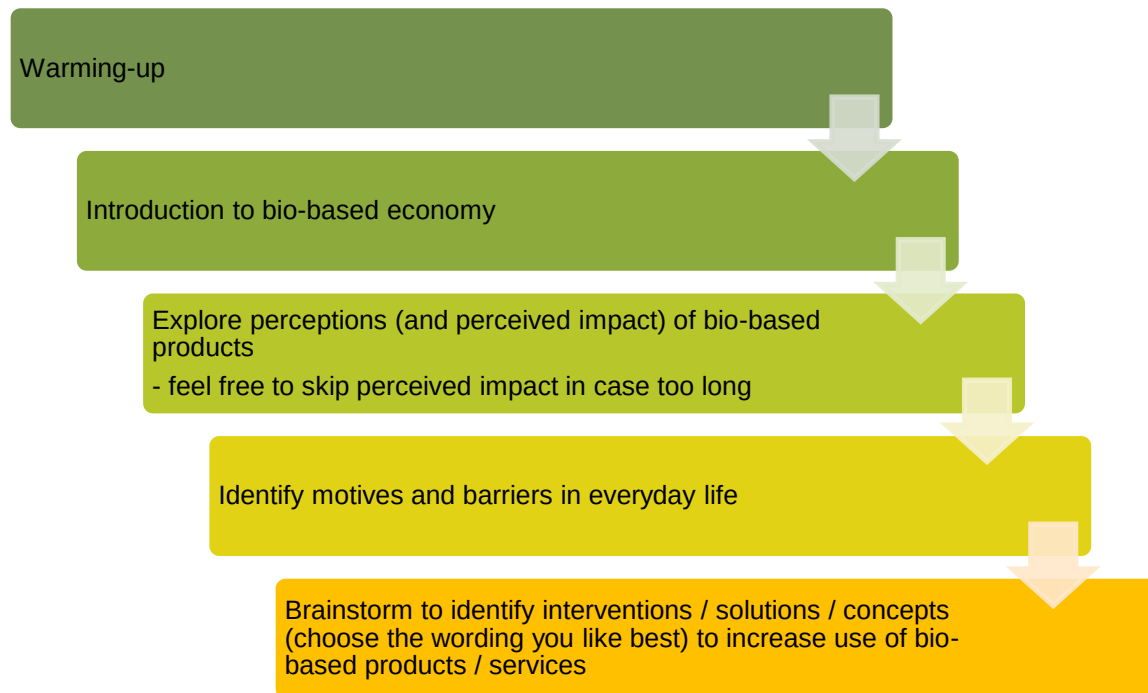


Fig. 4.7 Structure of Consumer Focus Groups to Discuss Perceived Added Value

Organising focus groups is an impactful method for bio-based businesses to validate whether their (potential) product or service has a perceived added value for consumers.

4.3.4. Using the MCMD Commercialisation Tool for Self-assessment

The development of a new product typically follows the structured steps of the **New Product Development (NPD) Process**, which combines design, engineering, and research efforts to create and launch a product. While the specific steps can vary, the process is generally divided into seven main stages:

1. **Idea Generation** – This stage involves brainstorming new product ideas or improving existing ones. It includes analysing market trends and conducting product research.
2. **Idea Screening** – Here, ideas are evaluated to determine which to pursue or discard, based on expected benefits and technical feasibility.
3. **Concept Development and Testing** – Selected ideas are turned into detailed product concepts, which include the target market, features, benefits, and estimated development and launch costs. These concepts may be tested with a select group of consumers to validate their appeal.
4. **Marketing Strategy and Business Analysis** – Once the final concept is chosen, an initial marketing strategy is developed, and a business analysis is conducted to assess market potential and financial viability.



5. **Product Development** – The product is developed into a tangible, market-ready form, often involving prototype creation and user testing.
6. **Test Marketing** – The finished product is introduced to a limited market to evaluate its performance under the proposed marketing strategy.
7. **Commercialization (Product Launch)** – The product is launched into the full market.

At each of these seven stages, a **stage-gate** must be passed before moving to the next phase. To support decision-making across these stages – especially when comparing multiple biobased business cases – the **Multi-Criteria Decision-Making (MCDM)** tool can be used to evaluate and prioritize key parameters.

The MCDM tool, as shown in Table 4.5, consists of six key criteria that will help to evaluate and prioritize a biobased business case by assessing multiple factors simultaneously. The product or innovation is scored based on how well it performs in each section, which allows to modulate an aspect of the product or innovation and evaluate its overall effect. For example, a lower score in one criterion can be offset by higher scores in another. This iterative evaluation allows decision-makers to explore whether added risks are justified.

Tab. 4.5

The Six Key Multi-Criteria Decision-Making Criteria

Criteria	Criteria description
Strategic alignment	The degree of fit with strategy
Competitive advantage	Perceived value for money, competitive advantage, unique benefits
Market attractiveness	Ability to penetrate market, rate of growth for the market
Leverage competence	Ability to leverage core competences
Technical feasibility	Degree of new technology required for business model
Potential for reward	Degree of financial return based on financial indicator

Each criterion included in the Table 4.5, is scored from 0 to 10, reflecting performance against expectations as such:

- ⊙ **0** – No or negative alignment with criteria
- ⊙ **4** – Modest alignment with criteria
- ⊙ **7** – Good alignment with criteria
- ⊙ **10** – Excellent alignment with criteria

Table 4.6 provides an example of the specific scoring method used for the key criterion *Strategic Alignment*.



Tab. 4.6

Multi-Criteria Decision-Making for Strategic Alignment

Criteria	0	4	7	10
The degree of fit with strategy	Not aligned with strategy	Somewhat aligns with strategy	Supports strategy	Aligns very well with strategy

The Figure 4.8 below shows examples of the total scoring of all six criteria, where the left figure has a very low score, only receiving points in strategic fit and importance. The right figure, on the other hand, shows a relatively high score where each criterion has received a score of at least 6.

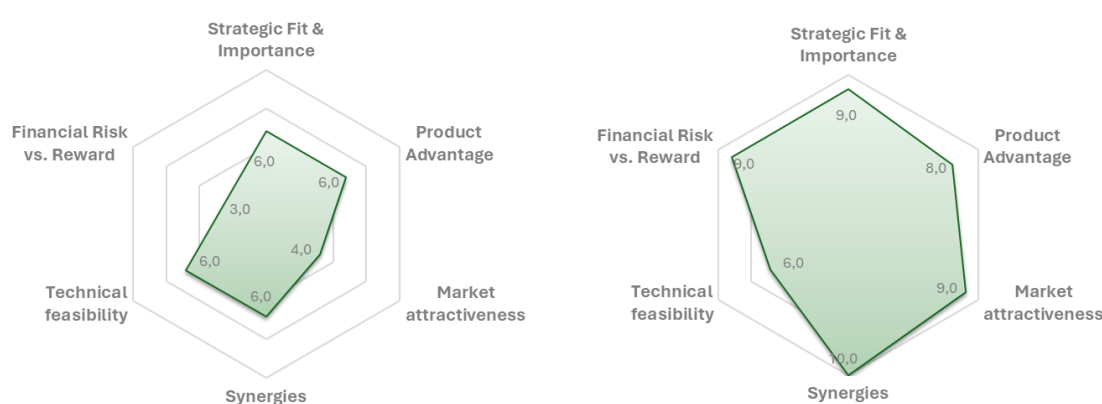


Fig. 4.8 Multi-Criteria Decision-Making Low Performance Scoring (Left) and High Performance Scoring (Right)

Assessing feedstock availability is essential for biobased business cases to ensure there are sufficient volumes of the required quality. This assessment includes both theoretical and practical availability, which depend on geographic location and national resources. Theoretical availability involves estimating potential biomass quantities using various data sources and models. Practical availability considers the actual usable biomass, considering factors like harvesting practices, quality variations, and logistics. Transportation costs and optimization of logistics are also crucial in determining practical availability.

To replicate the use of the MCDM tool:

1. Form a team of all competencies along the biobased products value chain.
2. Collect the data for assessing each key-criteria.
3. Design your base case and compare iteratively the effect of changing business model parameters on the MCDM performance score.



The MCDM tool is thoroughly described in a project report “*Guiding companies and their new concepts from idea to commercialisation*” as an output of task 4.3. To showcase the use of it, the methodology has been applied to a theoretical wood biorefinery in Northern Sweden, described further in best-practice cases below.

4.3.5. Success Factors

Table 4.7 summarizes the key success factors associated with using the business model framework and the commercialization tool, as well as the challenges identified – challenges that must be carefully self-assessed and addressed in the conclusions of the cases.

Tab. 4.7

Summary of Success Factors and Challenges in Use of the Business Model Framework and the Commercialisation Tools

Success factors	Challenges
Tool – Business model framework	
• Comprehensive view of the business present and future situation. • Consideration of the different stakeholders to obtain a complete picture and incorporate them into the strategy • Validation with consumer groups. • Review the framework regularly to see if new factors/barriers and strengths/weaknesses have emerged that can be addressed. • Networking with other companies with same sustainability goals that can support the circular system.	• Clear identification of external factors (barriers or drivers) influencing the business. • Uncertainty about what the company can directly influence at the business level versus external influence of the adoption factors. • Identification of negative impacts that the company produces in the environment, society and economy. • Formulation of a strategy to decrease negative impacts and enhance positive ones, improving the overall added value.
Tool – Commercialisation tool	
• The ability to interpret and analyse complex data accurately. • Easy to collect information on forestry feedstock availability through European databases. • The ability to effectively communicate findings and insights from the different business cases.	• The precision and correctness of the data used for modelling. • The extent to which all necessary data is available to complete analysis. • The reliability of data across different timeframes, especially for comparative analysis of potential for market growth for biobased products. • The requirement of an interdisciplinary competence within the team to cover all key aspects.



4.3.6. Illustrative Best Practice: Delta Region, Netherlands

The developed business model was validated and tested during one of the consortium meetings in the Delta region in Middelburg. The focus of this meeting was **to discuss and validate the barriers identified** in other contexts within BIOMODEL4REGIONS and explore how these challenges are also present in the regional Dutch Delta context, **as well as how they are perceived by different stakeholders**. Attendance was wide-ranging including representatives from local government, businesses, academia, and other organizations in the area, this allowed for a plural and inclusive discussion on the topic.

The discussion revealed that several challenges are faced in the Dutch Delta bio-based sector. On the technical side, investor hesitation, slow innovation, scalability difficulties, and energy network issues limit progress. **Financial barriers include competition with low-cost fossil fuels, limited financing, and a focus on quick returns**. Operationally, there are shortages of energy, space, skilled labour and infrastructure, as well as low public awareness. **Governance problems stem from unclear regulations, policy misalignment, and poor administrative support**. In addition, societal acceptance is poor, with continuing concerns about product costs, traditional economic mindset, and lack of urgency of transition.

The discussion and interaction among participants allowed them **to identify and internalize these challenges, enabling them to apply solutions within their own contexts**. This exchange was valuable in creating a network of collaboration between different stakeholders who must work together to overcome the sector's inherent barriers in the Dutch context. In fact, **these shared challenges served as the foundation for developing the regional bio-based blueprint and shaping the regional strategy**. The implementation of this blueprint has the potential to positively impact bio-based businesses in the region. This blueprint focuses on common regional challenges, solutions and lessons learned and serves as a guide for building a bio-based economy in the Delta region.

4.3.7. Illustrative Best Practice: Northern Sweden

To demonstrate the strengths of the MCDM tool, it was applied to a theoretical case study of building a biorefinery in North Sweden, Västernorrland, using softwood sawdust as feedstock. The study compared a base case with five business scenarios, considering factors like product prices and if all sugar and lignin fraction was valorised into bio-based products. The study involved evaluating biomass availability, conducting a market analysis, assessing technology and infrastructure and performing a techno economic assessment. **The MCDM tool highlighted interactions between strategic alignment, market attractiveness, technical feasibility, and potential for reward** between the five cases and it emphasized the need for flexible strategies to adapt to market conditions and technological readiness. The case study concluded that several scenarios were viable, **offering higher market value but requiring careful risk management**.

Key insights included: the importance of lignin valorisation to create a more diverse product portfolio; **lowering the price of the produced bio-based chemical to increase market growth and improving the downstream processing of the bio-based chemical** to reduce cost and increase market penetration. Overall, the MCDM tool helped evolve the base case



into a more competitive business case, balancing market risks and technological challenges to maximize returns.

5. General Recommendations

Recommendations from the governance analysis in BIOMODEL4REGIONS propose **an integrated strategy to accelerate the growth of the bio-based economy** by addressing environmental, social and economic challenges simultaneously. Businesses are encouraged to adopt circular economy practices, such as reusing and recycling resources while investing in renewable energy to reduce CO2 emissions and operational costs. These **business-level measures** are complemented by the need for strong regulatory frameworks and financial incentives to support bio-based innovations and drive market expansion.

Similarly to these environmental strategies, the **social dimension** should be addressed through investments in workforce development and community engagement. By prioritising **education, training and ethical business practices**, companies can strengthen local capacity to ensure that the benefits of bio-based growth are shared in the region.

Economic sustainability can be achieved through optimizing production processes, reducing costs and diversification of revenue streams through strategic partnerships and new financial mechanisms such as carbon credits. In general, the BIOMODEL4REGIONS implementation experience shows that a coordinated effort by both businesses and policymakers is important to overcome barriers and stimulate the regional development of the biobased economy.

The BIOMODEL4REGIONS are structured around eight key pathways (KP).

KP-1: Strengthen Regional Governance Through Structured Self-Assessment

Recommendation	Action Steps
Adopt the Governance Self-Assessment Tool (G-SAT) as a baseline diagnostic instrument for initiating or refining your region bio-based economy strategies	• Download and populate the G-SAT with regional data
	• Use the results to identify governance strengths and weaknesses
	• Integrate findings into regional planning and policy documents

KP-2: Foster Policy Coherence Across Sectors and Governance Levels

Recommendation	Action Steps
Use the Handbook on Policy Monitoring System and KPIs to align bio-based economy policies with broader goals like climate	• Map existing policies and strategies using the handbook’s framework
	• Identify gaps or misalignments across regional government departments and institutions



Recommendation	Action Steps
neutrality, circular economy, and regional development	Facilitate regional government interdepartmental and interinstitutional workshops to promote horizontal integration

KP-3: Engage Stakeholders in Participatory Governance

Recommendation	Action Steps
Implement inclusive stakeholder engagement strategies based on the quadruple helix model (government, academia, industry, and civil society)	Conduct stakeholder mapping exercises
	Organise regular consultation events (e.g., workshops, roundtables)
	Use participatory methods (e.g., co-creation sessions) when developing or revising strategic regional planning documents

KP-4: Benchmark and Learn from BIOMODEL4REGIONS Pilot Regions

Recommendation	Action Steps
Utilize the BERST Dashboard to compare governance performance against best-practice BIOMODEL4REGIONS pilot regions	Identify key governance areas where your region lags
	Study approaches used by high-performing regions (e.g., Delta Region's success in information-sharing and market development)
	Adapt transferable BIOMODEL4REGIONS practices to your local context

KP-5: Embed Governance Monitoring into Policy Cycles

Recommendation	Action Steps
Institutionalize the use of the BIOMODEL4REGIONS tools as part of regular regional policy reviews and updates	Establish a governance performance review every 1–2 years using G-SAT
	Update policy documents based on assessment results
	Publicly report outcomes to ensure transparency and accountability



KP-6: Encourage Social Innovation and Citizen Engagement

Recommendation	Action Steps
Use governance tools not only to enhance technical and institutional performance but also to catalyse social innovation by engaging SMEs, citizen groups, and NGOs	• Incorporate citizen feedback mechanisms into regional bioeconomy planning
	• Support local initiatives that promote sustainable consumption and production of bio-based products
	• Fund community-led innovation pilots aligned with bioeconomy objectives

KP-7: Build Capacity for Effective Tool Use

Recommendation	Action Steps
Provide training and resources to local authorities, business clusters, and civil society organizations on how to apply the BIOMODEL4REGIONS tools	• Organize training sessions or webinars on G-SAT, BERST Dashboard, and MCDM
	• Develop user-friendly guidance based on the official Handbook
	• Facilitate peer learning through networks of replicator regions

KP-8: Promote Replication and Scaling of Good Practices

Recommendation	Action Steps
Encourage the use of BIOMODEL4REGIONS methodology in non-pilot regions and outside the EU where applicable	• Support replicator regions in setting up regional task forces
	• Translate core tools into multiple languages to support broader adoption
	• Share success stories from the six pilot regions widely through conferences, EU platforms, and publications

These recommendations aim to ensure that the methodologies and tools developed through the BIOMODEL4REGIONS project are not only adopted but also used to drive **tangible improvements** in regional bioeconomy governance, capacity building, and policy integration.



6. References

European Commission, 2022. EU Bioeconomy Strategy Progress Report. European Bioeconomy Policy: Stocktaking and Future Developments. Publications Office of the European Union, Luxembourg, p. 2022. doi:10.277





Annex

Regional Bio-based Economy Strategy Blueprint Template

TOWARDS A BIO-BASED ECONOMY IN [REGION]

(example image, choose own)

A bioeconomy blueprint, prepared in the frame of the
BioModels4Regions project

[Leading cluster organization; address, country]

Authors: [...]

Contributors: [...]

[Date of publication]

Table of Contents

1	OBJECTIVES & SCOPE.....	0
2	BASLINE AND ANALYSIS OF LOCAL CONTEXT	0
2.1	LOCAL POLICY CONTEXT.....	0
2.2	BASELINING GOVERNANCE MODEL AND IMPLEMENTATION ECOSYSTEM FOR THE BIO-BASED ECONOMY	0
3	TOWARDS A VISION FOR THE BIO-BASED ECONOMY IN [REGION].....	0
3.1	POLICY PRIORITIES	0
3.2	OUR VISION FOR A BIO-BASED ECONOMY IN [REGION].....	0
3.3	STRATEGIC & OPERATIONAL OBJECTIVES	0
3.4	SUMMARY	0
4	KEY ACTION FIELDS FOR IMPLEMENTATION	0
4.1	IMPROVING BIO-BASED BUSINESS MODELS IN [REGION].....	0
4.2	ACTIONS / INTERVENTIONS	0
5	MONITORING, EVALUATION AND LEARNING.....	0
6	OUTLOOK	0

List of Abbreviations

[illegible]

1 OBJECTIVES & SCOPE

Annotation: Elaborate on the scope your bioeconomy blueprint and how it has been developed, answering the following exemplary guiding questions:

- What function does the bioeconomy blueprint take within the governance model of your region?
- For whom is this document primarily, who are involved stakeholders?
- Is it the first step towards a full dedicated bioeconomy strategy? If not, what are the steps to follow?
- What sectors does it cover?
- Who has been involved in developing it?
- What are envisioned next steps?
- Etc.

2 BASELINE AND ANALYSIS OF LOCAL CONTEXT

Annotation: Include here min. two different chapters: (1) on policy analysis, summarizing if needed parts of D3.3 to elaborate the policy context in which the bio-based economy in your region operates, which policy frameworks and documents exist, how these impact etc.; and (2) a chapter on the governance model, using results from the analysis of governance KPIs in D3.3.

2.1 LOCAL POLICY CONTEXT

Annotation: Briefly elaborate on existing regional and national policies and frameworks and how these hinder or support the development of the bb-economy in your region.

2.2 BASELINING GOVERNANCE MODEL AND IMPLEMENTATION ECOSYSTEM FOR THE BIO-BASED ECONOMY

Annotation: Outline status quo (baseline) of bio-based economy governance and implementation based on the self-assessment results derived from the profile and governance KPIs (WP3) as well as from the work on business models in WP4. Use graphics to visualize data where appropriate. WP3 indicators should be complemented with additional data from the cluster or the region, e.g. from past assessments, strategies or reports.

3 TOWARDS A VISION FOR THE BIO-BASED ECONOMY IN [REGION]

Annotations: this chapter should be dedicated to the vision and strategic objectives, following key priorities for the bio-based economy for the region. The content for this chapter will likely come from the WP5 blueprint workshops and can tentatively contain:

3.1 POLICY PRIORITIES

Annotation: State key priorities, e.g. which of the targets set by the national or regional government can be taken-up and prioritized by B4R region?

3.2 OUR VISION FOR A BIO-BASED ECONOMY IN [REGION]

Annotation: Elaborate on the question, what is our vision with regard to the implementation of the bio-based economy and what do we want to achieve through it?

3.3 STRATEGIC & OPERATIONAL OBJECTIVES

Annotation: Break down the vision elements further to include strategic objectives (action areas such as e.g. improving the interdepartmental governance on the bio-based economy in the regional administration) as well as operational targets (key operational targets, such as e.g. to improve the interdepartmental governance of the bio-based economy by increasing staff dedicated to cross-departmental collaboration by 50%)

3.4 SUMMARY

Annotation: Include a summary, e.g. as part of a simple log-frame.

Vision	Strategic objectives	Operational objectives
Vision element 1	Strategic objective 1.1	Operational objective 1.1.1
		Operational objective 1.1.2
	Strategic objective 1.2	Operational objective 1.2.1
...	...	...

4 KEY ACTION FIELDS FOR IMPLEMENTATION

Annotation: please elaborate in this chapter on the challenges and strengths of the bio-based implementation eco-system in your region (e.g. R&D, industry, SMEs & start-ups, finance etc.) as well as on key pathways for enhancing bio-based business models, drawing from contents developed in WP4.

4.1 IMPROVING BIO-BASED BUSINESS MODELS IN [REGION]

Annotation: elaborate in detail on priority areas for action, improving business models to better utilize the bio-based potential in the region to achieve set vision.

4.2 ACTIONS / INTERVENTIONS

Annotation: If scope of your blueprint allows / or if WP5 workshop can be used for this, please include also concrete actions to address the operational objectives, expanding the log-frame from chapter 3 above to include concrete activities.

Vision	Strategic objectives	Operational objectives	Activity
Vision element 1	Strategic objective 1.1	Operational objective 1.1.1	Activity 1.1.1.1
			Activity 1.1.1.2
		Operational objective 1.1.2	Activity 1.1.2.1
			Activity 1.1.2.2
	Strategic objective 1.2	Operational objective 1.2.1	Activity 1.2.1.1
...	...	...	...

5 MONITORING, EVALUATION AND LEARNING

Annotations: if applicable, briefly outline the evaluation framework already in use or planned to be developed to monitor and evaluate progress of the bio-based economy implementation in your region.

6 OUTLOOK

Annotation: Include here planned next steps for the further development of bio-based strategy in your region, outline key open questions, issues and research needs.