

D4.1 BIORADAR IMPLEMENTATION SCORECARD

MONITORING SYSTEM OF THE ENVIRONMENTAL AND SOCIAL SUSTAINABILITY AND CIRCULARITY OF INDUSTRIAL BIO-BASED SYSTEMS

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EXECUTIVE SUMMARY

The **D4.1 BioRADAR Implementation Scorecard (IS)** submitted in the M18 of the project presents a methodological framework for developing the final BioRADAR Implementation Scorecard (IS), a tool designed to assess the sustainability contributions of small and medium-sized enterprises (SMEs) in three bio-based sectors: textile, packaging and fertilisers. This report outlines the approach taken to create the IS and provides a roadmap for its further development and integration into the BioRADAR Replication Facility (M30). The IS will enable companies in the textiles, packaging, and fertilizers sectors to evaluate their sustainability impact, focusing on the Sustainable Development Goals (SDGs), and will offer a standardized, comparable framework for assessing environmental, social, economic, and circularity performance. SMEs in the bio-based sector often lack the resources and tools available to larger corporations for assessing and improving their sustainability performance, creating a gap in sustainability reporting. This gap hinders companies from tracking their contributions to SDGs and fully participating in the transition toward a circular economy. The BioRADAR IS seeks to address this by providing SMEs with a simple yet effective tool to measure their sustainability impact and identify opportunities for improvement.

The methodology behind the IS development is explained in this report, which consists of five key stages: identifying relevant KPIs, creating sector-specific questionnaires, implementing a scoring system, aggregating results, and providing feedback and recommendations. This approach ensures the tool remains adaptable to the needs of different SMEs in the bio-based sectors while maintaining consistency and comparability among companies. The final product, the BioRADAR IS, will be integrated into the BioRADAR Replication Facility, expected to be finalized by M30 of the project. However, in alignment with the project timeline, part of this deliverable, including the description and methodology, is being delivered at M18. This interim report describes the progress made thus far, outlines the workflow, and identifies the next steps to complete the IS by M30. The BioRADAR IS will continue to be developed over the next 12 months, with further refinement and co-creation with SMEs to ensure its effectiveness across various sectors within the bio-based industry.

1 INTRODUCTION

1.1 DESCRIPTION OF THE DELIVERABLE

In response to the EU Green Deal call to decrease dependency on non-renewable resources but also considering the limited land and biological resources in the EU, it is crucial to prioritize material circularity, carbon emissions and iLUC risks within bio-based systems. The BioRADAR project “Monitoring system of the environmental and social sustainability and circularity of industrial bio-based systems” aims to fill critical gaps in indicators for material circularity, environmental and social impacts of industrial bio-based systems. The project considers a comprehensive systems approach to empower different stakeholders with digital monitoring tools, allowing them to identify opportunities for circularity within bio-based systems, integrating circular principles from material selection to business models. Central to BioRADAR’s mission are the Material Circularity Indicators (MCIs), which help to assess a bio-based system performance within the context of circular economy. Moreover, BioRADAR seeks to develop frameworks and metrics to evaluate the environmental and social impacts of bio-based systems, driving the transition towards sustainability and circularity.

In the Task 4.2, BioRADAR project is incorporating Sustainable Development Goals (SDGs) in order to create a tool that will assist relevant bio-based start-up companies together with small and medium enterprises (SMEs) to assess their contribution to the SDGs and incorporate them in their strategic business decisions. Companies play a critical role in achieving the SDGs by embedding sustainability into their core operations, strategies, and value chains. As drivers of innovation and economic growth, businesses are essential to global efforts in addressing environmental, social, economic, and circular challenges. In this regard, scorecards are valuable tools that provide a structured framework for performance assessment and synthesize complex data into actionable insights, offering companies a clear, measurable way to track progress towards a specific goal.

A key approach in supporting relevant stakeholders (e.g. companies) collaborating with the BioRADAR project is through the different tools under development, which will be part of the overall project’s outcomes. Among these, the Implementation Scorecard (IS), is specifically tailored to assist SME’s and start-ups producing innovative bio-based products in three well defined sectors: textiles, packaging and fertilisers. The IS aims to **evaluate the sustainability** of these companies by applying indicators aligned within the 17 Sustainable Development Goals (SDGs) and providing them with a comprehensive score that illustrates how their operations contribute to the different SDG across four pillars of sustainability: economic, environmental, social and circularity. In addition, the **IS will provide feedback and relevant recommendations** that can assist the company to improve its performance in these four pillars.

The final version of the Implementation Scorecard will be included along with the other digital tools developed by the project within the BioRADAR Replication Facility. However, in order to be aligned with other tools and the BioRADAR

Facility development, the “BioRADAR Implementation Scorecard” will be available online once the Facility and other tools are finalised (M30). Accordingly, the Task leader (HAW) and the project Coordinator (YAGHMA) have agreed with the Project Officer that part of this deliverable (concept and methodology) will be delivered in M18 of the project, in order to be assessed by the reviewers and the Project Officer during the 1st Technical Report. Therefore, this deliverable has been prepared as a report, describing the work done and the steps planned in the next 12 months of the project (by M30).

The aim of this report is to provide a comprehensive overview of the process and methodology used for the development of the BioRADAR Implementation Scorecard. This report includes detailed information about the purpose of the BioRADAR Implementation Scorecard, as well as some background information of the scorecards currently available and how its application is linked and relevant for the bio-based industry. The report describes in detail how the Implementation Scorecard could be applied to estimate contribution of small and medium enterprises (SMEs) operating within bio-based industry (with special focus on textiles, packaging and fertilisers) to the SDGs and the dimensions of sustainability (economic, environmental, social and circular). The report provides a description of the methodology developed as well as detailed steps needed to be implemented to obtain the final product which will be finalised by M30 of the project and will be available for public usage via BioRADAR Replication Facility. However, since the development of the Implementation Scorecard (IS) closely depends on other Work Packages and activities of the project, this report has the purpose to describe the process and method that will be used within the IS, as well as to illustrate how the final IS will be established within the Replication Facility. Additionally, it serves to highlight the content contributed by project partners, detailing the enrolment process and outlining the intended usage of the final version of the IS.

1.2 WPS AND TASKS RELATED WITH THE DELIVERABLE

This deliverable refers to Task 4.2 “Elaboration of the BioRADAR Implementation Scorecard” included in WP4: Benchmarking, Upscaling and Replication. Although the D4.1 is a direct outcome of the work developed within the Task 4.2, it is also closely connected with the Task 4.1 “Set up of the BioRADAR Replication Facility” which is the platform where the BioRADAR Implementation Scorecard will be available.

2 BACKGROUND ON SCORECARDS AND SUSTAINABILITY

Scorecards are a measuring tool to measure, evaluate and optimize the performance of businesses. The balanced scorecard was conceptualized by Kaplan and Norton (1992), combining financial and operational measurements into one tool. It encompasses 4 main perspectives:

1. Financial perspective
2. Customer perspective
3. Internal business perspective
4. Innovation and learning perspective

For each perspective, specific measures that reflect the company's mission are formulated (Kaplan & Norton, 1992). The balanced scorecard was established since traditional management tools had previously been focused on financial output measures. However, other performance factors, such as customer satisfaction, image and societal impact have become more and more important for the success of a business.

In today's society, where challenges such as climate change, pollution of natural resources, etc. are increasingly pressing, sustainability has become an important factor of success for corporate organizations. Environmental and social issues such as CO₂ emissions, pollution, diminishing resources, child labour and the division between rich and poor are not only limiting factors for a business' success, but also create social pressure and expectations from customers, investors, employees and other stakeholders.

To address this issue, a turn towards sustainability as a core factor of the mission of many businesses, several authors have since built upon the original concept of the balanced scorecard to integrate sustainability. For example, Figge et al. (2002) proposed three different approaches to link sustainability to the balanced scorecard:

1. Environmental and social factors could be included in the four already existing perspectives of the balanced scorecard,
2. an additional 'non-market' perspective is added to the existing perspectives, to include sustainability factors (see also Epstein & Wisner, 2001),
3. a separate environmental and social scorecard is derived in addition to the balanced scorecard (Figge et al., 2002).

More recently, the circular economy has been gaining attention as a sustainable economic system. Economic growth is separated from the use of resources, through reduction, re-use and recirculation of natural resources. The circular economy is often quoted as the most suitable way to sustainable development (Corona et al., 2019). Therefore, nowadays it is more and more common to listen about four pillars of sustainability circular, economic, environmental and social, instead of only three (economic, environmental and social) as initially introduced.

Driven by the urgent need to switch to sustainable practices, the United Nations introduced the 17 Sustainable Development Goals (SDGs) in 2015 as part of the 2030 Agenda for Sustainable Development. These goals aim to foster global peace and prosperity (United Nations, 2023). To achieve this, a total of 169

targets were identified, supported by a global indicator framework comprising 248 indicators for measuring progress (United Nations, 2024). While these indicators were defined at the international level, regional and national indicators were to be developed by member states.

The Global Reporting Initiative (GRI) developed specific indicators for the corporate level, offering a tool to companies to include sustainability aspects in their progress reports (GRI & UNGC, 2022).



Figure 1. Sustainable Development Goals (United Nations, 2023)

3 THE BIORADAR IMPLEMENTATION SCORECARD: PURPOSE, DESCRIPTION AND USAGE

3.1 PURPOSE

The goal of the BioRADAR Implementation Scorecard (IS) is to establish a comprehensive and collaborative framework that enables companies in the bio-based sector to systematically assess the sustainability impact of their operations through the lens of the SDGs.

The IS will use a tailored methodology for quantitatively assessing the effectiveness of companies within the bio-based industry sector in contributing to the Sustainable Development Goals (SDGs). Finally, the IS will streamline the evaluation process for companies, enabling them to assess their impact and contributions to the SDGs effectively. By establishing a standardized methodology, the IS will also facilitate promote consistent external benchmarking of contributions across the different project use-cases (textile, fertilisers and packaging) within the EU bio-based sector.

3.2 DESCRIPTION

BioRADAR Implementation Scorecard (IS) offers an innovative approach for evaluating the contribution of companies (start-ups and SMEs in the bio-based sector) to the SDGs, providing a standardized, comparable and accessible assessment framework. For this purpose, the IS employs an easy-to-apply methodology that integrates KPIs and targets identified for the SDGs, tailored to the unique challenges and opportunities within the bio-based industry (*for more information go to the Section 4 “Methodological Development”*).

3.3 USAGE

3.1.1 Who should use the BioRADAR Implementation Scorecard?

The **BioRADAR Implementation Scorecard (IS)** is a practical tool designed to evaluate sustainable practices and measure the contributions of companies to relevant Sustainable Development Goals (SDGs). This tool specifically addresses the needs of small to medium-sized enterprises (SMEs), which often lack the resources and frameworks available to larger corporations for sustainability reporting.

Based on the results obtained from the stakeholder mapping conducted within WP5 and the insights gathered during the internal co-creation workshop held with project partners, it was identified that the BioRADAR IS would be particularly useful for smaller businesses in the bio-based industry. Therefore, **the targeted users** for this tool are:

- Small start-ups
- SMEs
- Other companies without sustainability plan

Start-ups, SMEs, and small-scale companies typically focus on delivering local impact by prioritizing their community, supply chains, and cost-benefit balance. Unlike large

enterprises that operate on a global scale, these companies often measure success in terms of regional outcomes, such as creating local jobs, fostering circular economy practices within their communities, and reducing environmental impacts at a smaller scale.

The BioRADAR IS aims to fill this critical gap in sustainability reporting for SMEs in bio-based sectors. While large-scale corporations have access to established frameworks and tools, smaller organizations often struggle to find simplified, practical solutions to assess and enhance their sustainability performance. SMEs in the bioeconomy are particularly underrepresented in sustainability reporting, despite their collective economic significance and potential to drive local and regional impact.

3.1.2 How can the BioRADAR Implementation Scorecard help the targeted companies?

Since the tool must be generalised to accommodate the needs for the different bio-based producers within the textile, fertilisers and packaging sectors, the resulting assessment may lack precision and detailed insights. However, this generalisation enables greater comparability among companies, which can be highly beneficial for marketing purposes. The final assessment provides a visual representation of each company's SDG scores, facilitating easy comparison across businesses. Additionally, it serves as a communication tool to demonstrate to the customers that, while a fully developed sustainability plan may not yet be operational, the company is actively taking initial steps towards a more sustainable business model.

Finally, the usage of the BioRADAR Implementation Scorecard will help the companies to:

1. Become BioRADAR stakeholder and assist in the co-creation of the IS
2. Estimate sustainability and circularity of the company
3. Estimate its contribution to the SDGs
4. Straighten collaboration with other companies contributing to the project, especially Bio-based Industry Consortium (BIC) Members since the indicators for the IS will be identified through co-creation with the relevant companies from the identified sectors (textile, packaging, fertilisers within the bio-based industry)

4 METHODOLOGICAL DEVELOPMENT

The methodological approach has been designed to ensure consistency, clarity, and actionability of the BioRADAR IS. It consists of five key stages:

1. identifying relevant KPIs,
2. developing sector-specific questionnaires,
3. implementing a scoring system,
4. aggregating and visualizing the results,
5. providing feedback and recommendations.

4.1 IDENTIFYING RELEVANT KPIS

The first step in developing the BioRADAR Implementation Scorecard (IS) is identifying and selecting the Key Performance Indicators (KPIs) aligned with specific SDGs. To ensure these KPIs are effective, they should be selected collaboratively with companies and should represent their key sustainability dimensions (circular, environmental, economic, and social) while also aligning with the company's operations and strategic objectives.

Whenever possible, KPI should be linked to a measurable target to facilitate tracking and evaluate long-term impacts of the sustainability initiatives. This approach ensures that the KPIs are not only passive performance indicators, but actionable tools that provide valuable insights for continuous improvement and strategic alignment with sustainability goals.

Criteria for KPI selection

This step is the most complex, as the KPIs need to be broad enough to fit the needs of the various bio-based producers while also being tailored to the specific needs of the three bioeconomy sectors: textiles, packaging, and fertilizers.

For each of the 17 SDGs, four KPIs will be identified, following the criteria outlined below:

a. Relevance to SDGs and bioeconomy sector

Each KPI should directly address a specific SDG while aligning with the company's sustainability priorities and its relevance to the bioeconomy sector.

EXAMPLE:

The textile industry is among the most water-intensive sectors. In the EU, the average textile consumption per person requires approximately 9m³ of water, placing textiles water consumption in third place after food and recreation (EEA, 2023). According to the Water Watch CDP Impact Index, which ranks industrial activities based on their potential impact on water quantity and quality, the textile and fabric goods industries are rated with an overall water impact score of 18—classified as critical (CDP, 2022). This underscores the sector's significant effects on both water availability and quality. Textile manufacturing is particularly water-intensive, requiring substantial clean water for production processes and generating large volumes of wastewater. This highlights the critical need for the sector to adopt water conservation and management strategies. As such, for the textile industry, water footprint would be a highly relevant KPI linked to SDG 12, focusing on responsible consumption and production.

KPIs like these would serve as a bridge between the company's sustainability objectives and its business strategy, ensuring both alignment with SDGs and measurable impact.

b. Measurability

The selected KPIs should be clear, quantifiable, and trackable over time. This allows companies to monitor progress effectively and compare performance at different stages.

EXAMPLE:

Instead of a broad KPI such as "Increased use of Renewable Energy," a measurable alternative would be "Percentage of total energy consumption from renewable sources."

c. Actionability

Effective KPIs should drive action. They should reflect aspects of the business that can be directly influenced through operational improvements, technological innovations, or strategic initiatives. Additionally, the targets for the selected KPIs should be realistic and achievable within a set timeframe, motivating companies to implement actionable steps.

d. Alignment with Sustainability Dimensions

Each KPI should be aligned with one of the four sustainability dimensions:

Circular: Focuses on material reuse, recycling, and regeneration. Relevant KPIs under the Circular dimension could include “Percentage of materials reused or recycled”.

Environmental: Assesses the environmental impact of operations, including energy consumption, emissions, and waste management. KPIs falling in this dimension could include “Carbon emissions per unit of production” or “Reduction of energy consumption in percentage”.

Economic: This dimension focuses on the financial performance related to sustainability, including cost savings, revenue from sustainable products, or profitability of sustainable practices. A relevant KPI could focus on “Financial benefits from using renewable materials”

Social: Covers the labour practices of the company, community engagement, and broader societal contributions. This could include KPIs related to worker conditions, diversity or social initiatives promoting sustainability, such as “Percentage of employees receiving sustainability training”.

e. Simplicity and Clarity

The selected KPIs should be straight forward and simple enough for SMEs to understand and measure their implementation and progress to sustainability, avoiding overly complicated or technical indicators that may discourage adoption. Therefore, clear definitions and simple metrics ensure acceptability and usability for businesses with limited resources or technical expertise.

To maintain focus and manageability, a maximum of four KPIs will be identified for each SDG relevant to the company’s operations. This streamlined approach avoids unnecessary complexity and facilitates effective implementation. *Annex 1* of the document provides possible examples of KPIs aligned with SDG12 – Responsible Consumption and Production.

IMPORTANT: The KPI selection process will involve consultations with SMEs and key stakeholders of the BioRADAR project to ensure that the indicators selected are relevant to the bio-based sectors of textiles, packaging and fertilisers. This collaborative approach will align the KPIs with both sector-specific needs and broader business goals, ensuring that the selected metrics accurately reflect priorities of the industry and are practical for companies to implement.

4.2 DEVELOPMENT OF TARGETED QUESTIONNAIRES

The next key step in developing the BioRADAR IS involves creating comprehensive questionnaires tailored to the specific sectors under evaluation. These questionnaires aim to collect data on the sustainability practices from companies operating in the **bioeconomy** sector, with a focus on their contributions to the Sustainable Development Goals (SDGs). The three use-cases analysed within the project—**Textiles**, **Packaging**, and **Fertilisers**—will be the foundation for evaluating product production within these industries.

Therefore, three questionnaires (Figure 2) will be specifically designed to address the unique sustainability challenges and opportunities relevant to each sector, ensuring a targeted and actionable approach. The questionnaires will be aligned with the relevant SDGs, targeting circular, environmental, economic, and social dimensions. Each question will correspond to measurable Key Performance Indicators (KPIs) that reflect the sustainability performance of the SME within the relevant bio-economy sector.

The questionnaires will address the specific challenges, practices, and opportunities associated with the bioeconomy sectors of textiles, packaging, and fertilisers. Although these industries are all part of the bioeconomy, they have different circular, environmental, economic, and social goals and impacts that can vary significantly. Therefore, the questionnaires will assess the specific sustainability aspects of each sector.

3 QUESTIONNAIRES

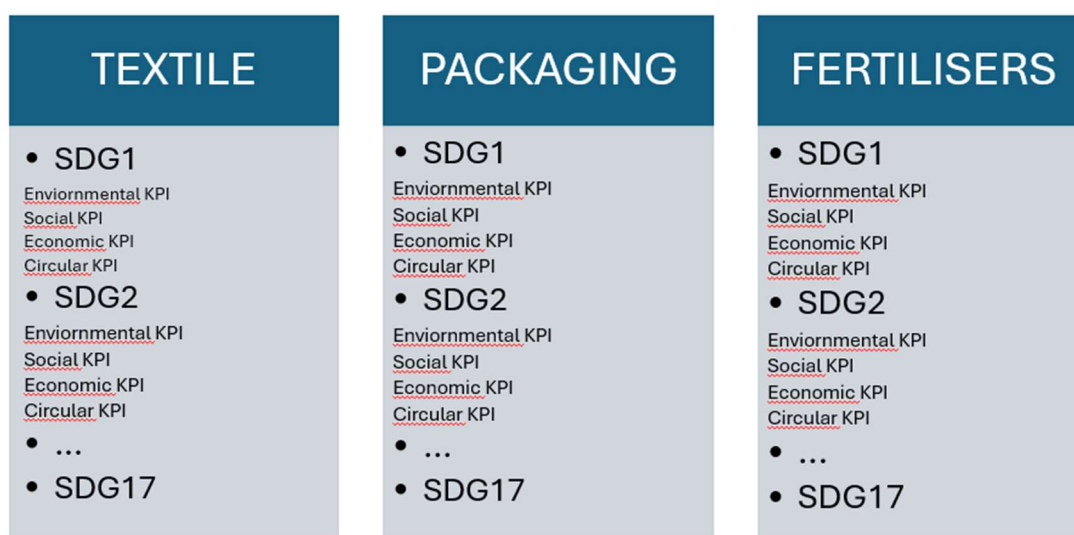


Figure 2. Visualisation of the questionnaire's structure

4.3 IMPLEMENTING A SCORING SYSTEM

To be able to effectively estimate the sustainability performance of SMEs, design of the questionnaires incorporates a measurable scoring system. This system ensures that the responses to the questions are quantifiable, allowing the companies to evaluate their

current performance, identifying their current strengths and highlighting areas for potential improvement.

The scoring system assign points based on the company’s performance level for each KPI, using a 1-5 scale that reflects the implementation progress. The final purpose of the scoring is to identify the readiness level to conduct sustainable actions.

Score	Performance Level	Description
0	Not applicable	The KPI is not relevant or applicable to the company’s operations or products.
1	Issue identified, but no plans for further actions	No improvement in sustainability practices. The company identifies the issue, and it is aware of it, but has no plans for further actions.
2	Issue identified, starts planning further actions	Small improvements in sustainability, with initial steps identified, but no clear plan established.
3	Action plan with clear targets and deadlines in place	Moderate improvement towards sustainability. The company is aware of the issue, with a detailed action plan and clearly identified targets in place.
4	Action plan operational – some progress in established targets	Significant improvement in sustainability practices. First progress in reaching the targets achieved.
5	Action plan operational – achieving the target set	Leading sustainability performance. Action plan is operational, and the targets set are met.

This scoring scale will allow SMEs to assess their performance and sets clear, measurable targets for future improvements.

4.4 AGGREGATING AND VISUALIZING RESULTS

Once the responses are scored on the 1–5 scale, the next step is to aggregate the results. For each sustainability dimension (Social, Economic, Environmental, Circular), the scores from the individual KPIs will be averaged to create an overall score for each dimension. This will provide a balanced view of the SME's performance across the selected indicators.

By averaging KPI scores, this ensures that each sustainability dimension reflects the SME’s overall performance in a consistent and comparable way across all dimensions.

Annex I provides a table as an example. NOTE: this is still not a final version, since it must be developed with the companies during the co-creation workshops) of the KPIs identified for SDG12. There is one table for each sector (textile, packaging and fertilisers) and in each table there are 4 KPIs covering each sustainability dimension (circular, environmental, economic and social). In addition, it consists of targets linked to the KPI, question, scoring system, references and notes.

Visualization of the Results

The results will be visualized in a **circular diagram** (Figure 3) that allows quick identification of the areas where the SME is performing well and areas that need improvement.



Figure 3. Visualization of Results: Circular Diagram

Here is how the diagram is structured:

- **SDG Segments (Outer Circle):** The outer part of the circular diagram will be divided into **17 segments**, each representing one of the **UN SDGs**. Each segment will use the official **UN SDG logo** to indicate which goal is being visualized.
- **Bars Inside each SDG Segment:** Inside each SDG segment, there will be **four bars** representing the performance of the SME across the four **sustainability dimensions** (social, economic, environmental, circular). The **length of each bar** will reflect the SME's score for each KPI within the respective dimension.

For each relevant SDG, the scores of individual KPIs will be calculated separately to provide detailed insights into the SME's performance across all sustainability dimensions. Four KPIs will be selected for each SDG, focusing on the most critical and impactful sustainability aspects of that goal. The overall SDG score will not be averaged or aggregated; instead, each KPI will retain its individual score, ensuring detailed and actionable insights. This approach allows transparency and granularity in understanding the SME's performance, ensuring that each KPI is addressed independently while

aligning with broader SDG goals. Further details on how these scores will be represented and visualized are provided in a subsequent section.

Size and Colouring of the Bars

The **size of the bars** directly corresponds to the aggregated KPI score, showing how well the SME is performing within each sustainability dimension. This will allow for a **visual comparison** of performance across the SDGs and sustainability dimensions.

The bars within each SDG segment will be **color-coded** to indicate performance levels:

- i) **Red bars** will show the SME's performance in the **Economic** dimension.
- ii) **Yellow bars** will reflect the **Circularity** performance.
- iii) **Green bars** will indicate the **Environmental** performance.
- iv) **Blue bars** will depict the **Social** dimension's performance.

EXAMPLE:

If the SME scores **4 under SDG13 for carbon emissions reduction** (Environmental), the **green bar** within the **Environmental** section of the SDG13 segment will extend accordingly, showing a score of **4** (out of 5).

Then, if the SME scores **2 under SDG12 for waste reduction** (Circular), the **yellow bar** inside the **Circular** section will reflect a score of **2** (out of 5).

Interpreting results

The circular diagram provides a clear, intuitive way for SMEs to interpret their sustainability performance and identify areas for improvement. By reviewing the length of the bars within each SDG segment, SMEs can easily spot areas of strength (e.g., a fully filled green bar indicating strong energy efficiency performance) and areas that require more attention (e.g., a short yellow bar signalling low performance in circular practices).

This design facilitates a quick comparison of the SME's performance across different SDGs and sustainability dimensions. It offers a visual overview, allowing SMEs to see at a glance where they are excelling and where targeted efforts are needed to improve their sustainability practices.

4.5 PROVIDING TAILORED FEEDBACK AND ACTIONABLE RECOMMENDATIONS

Depending on the overall performance of the company within each dimension (economic, social, environmental and circularity), tailored feedback will be provided with the potential areas for improvement. Along with the circular diagram, an SME will automatically receive a detailed report summarizing the results after using the BioRADAR IS, based on the inputs provided by the SME. The tool will process the following:

- Average scores for each sustainability dimension (social, economic, environmental, circular) to provide an overall view of performance across these four dimensions of sustainability.
- A breakdown of each KPI's scores to highlight specific strengths and areas for improvement.
- Actionable steps to improve performance in underperforming areas, such as investing in energy-efficient technologies (environmental), enhancing labour conditions (social), or implementing circular economy practices (circular).
- Specific targets for improvement in each sustainability dimension, enabling the SME to set realistic and measurable goals for the next assessment period.

This report will provide a short comprehensive and actionable roadmap for SMEs to enhance their sustainability efforts while aligning with the selected SDGs.

The final stage involves providing SMEs with actionable feedback based on their scorecard results. The recommendations will address general areas for improvement and highlight strengths, considering the specific bio-based sector (packaging, textile, or fertiliser) and the overall performance in each sustainability dimension (social, economic, environmental, circular).

5 IMPLEMENTATION TIMELINE

The first versions of the questionnaires will be prepared by HAW and will be used for the co-creation workshop with the SMEs from each of the three bio-based sectors. Feedback from the co-creation workshop will be used to refine the questions, ensuring clarity, relevance, and effectiveness. The final version will be adjusted to address any concerns raised during testing, optimizing the questionnaire for use in the broader rollout. The final versions of the questionnaires will be prepared by HAW and will be implemented as part of the Replication Facility Environment.

A detailed timeframe of the actions to be conducted is indicated in Table 1.

Table 1. Detailed timeframe for BioRADAR IS development

Task	Deadline	Details
Methodology Description	End of December 2024 (M18)	Submitted finalized methodology framework to the EU.
Develop Questionnaires	February 2025 (M20)	Design comprehensive questionnaires covering key sectors and sustainability aspects, in collaboration with BioRADAR stakeholders and project partners (co-creation).
Testing with SMEs	March 2025 (M21)	Co-creation workshop: Pilot the questionnaires with selected SMEs, refine it based on the feedback during the co-creation workshop.
Integration with Tools	June 2025 (M24)	Collaborate with partners to integrate the scorecard into existing digital tools.

Digitalization	November 2025 (M29)	Develop and launch a fully digitalized scorecard for SMEs to self-assess sustainability via SDGs.
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As indicated in Table 1, in the period between M19-M20 the methodology and tool will be shared with several volunteer companies, engaged stakeholders of the project, which will support the data collection and test the scorecard for different use-cases within the BioRADAR project (packaging, fertilisers and textiles). Finally, in M30 the BioRADAR IS will be available to external users (stakeholders) via Replication Facility.

6 FINAL OUTCOME

The final product of T4.2 will be the fully functional BioRADAR Implementation Scorecard, a practical tool designed to be used by the companies. This tool will be made accessible through the BioRADAR Replication Facility by M30 of the project (Figure 4).

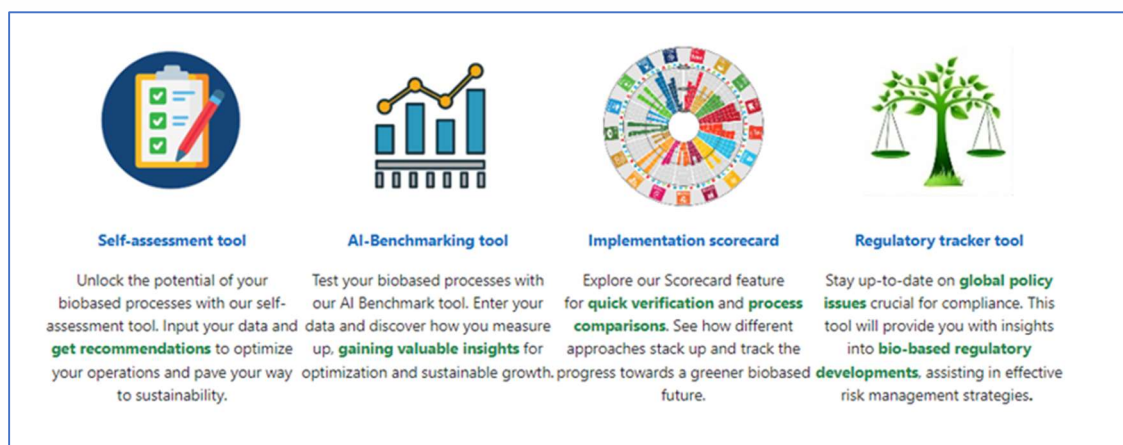


Figure 4. BioRADAR Replication Facility: BioRADAR IS alongside other tools.

7 CONCLUSION

This D4.1 provides a methodological framework for development of the BioRADAR IS, and also the further steps how the IS will be developed and finalised to form part of the BioRADAR Replication facility.

Deviation from the DoA:

The final product (Deliverable D4.1) will be incorporated within the BioRADAR Replication Facility, together with other tools. However, in order to be aligned with other tools and the Replication Facility, the D4.1 “BioRADAR Implementation Scorecard” will be available online once the Facility and other tools are finalised (M30). Accordingly, the Task leader (HAW) and the project Coordinator (YAGHMA) have previously agreed with the Project Officer that part of this deliverable (description and the methodology) will be delivered in M18 of the project and assessed during the 1st Technical Report. Therefore, the above deliverable has been prepared as a report at this stage, describing the workflow as well as identifying the steps planned in the following 12 months of the project (by M30).

8 REFERENCES

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9 ANNEX

9.1 ANNEX I. Example of KPIs and questions for SDG 12 for each of the sectors

Sector: TEXTILES							
SDG	SDG Target	Sustainability dimension	KPI	Question	Scoring	Source	Notes
12	12.1. Implement a framework of programs on sustainable production and consumption	Circularity	Post-consumer recycled content	Has the company assessed the level of post-consumer recycled content of its products and developed a plan to increase it?	0 = N/A 1 = Issue identified, but no plans for further actions 2 = Issue identified, starts planning further actions	European Parliament - The impact of textile production and waste on the environment.	Fast-fashion Paradox. Only 1% of used clothes are recycled. Link
	12.2 Achieve the sustainable management and efficient use of natural resources	Environmental	Water footprint	Has the company identified its water withdrawal and implemented a plan to reduce water consumption in its operations?	3 = Action plan with clear targets and deadlines in place 4 = Action plan operational – some progress in established targets	UN Global Compact 2022 Communication on Progress	EU: textiles require 9m ³ of water per person Link
	12.6 Encourage companies to adopt sustainable practices and to integrate sustainability	Economic	Financial reporting	Has the organization assessed the impact of ESG factors on its financial performance, and developed a plan to report this impact in	5 = Action plan operational – achieving the target set	SASB Sustainability Accounting Standards Board Guide	Environmental, social, and governance factors impact a company's financial performance

	information into their reporting cycle			its financial statements?			and long-term value alike. Link
	12.8 Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	Social	Communication programs and actions promoting social corporate responsibility	Has the company identified the social impacts of its operations and products, and developed a plan to promote social corporate responsibility?		Quick guide to the Aichi Biodiversity Targets	

Sector: PACKAGING							
SDG	SDG Target	Sustainability dimension	KPI	Question	Scoring	Source	Notes
12	12.5 Substantially reduce waste generation through prevention, reduction, recycling and reuse	Circularity	Circular Packaging Rate	To what extent does your organization have a clear plan and progress toward ensuring that your total packaging materials are reused, recycled, or composted through a circular system?	0 = N/A 1 = Issue identified, but no plans for further actions 2 = Issue identified, starts planning further actions	GRI 301: Materials, Disclosure 301-1, 301-2, 306-2, Ellen MacArthur Foundation's New Plastics Economy, ISO 14021, UNEP's Guidelines for	

					3 = Action plan with clear targets and deadlines in place	Sustainable Consumption	
	12.2 Achieve the sustainable management and efficient use of natural resources	Environmental	Percentage of Bio-based certified Materials Used	To what extent does your organization have a clear plan and progress toward increasing the percentage of packaging made from bio-based certified materials?	4 = Action plan operational – some progress in established targets 5 = Action plan operational – achieving the target set	ISO 14021: Environmental Labels and Declarations. GRI 301 – Materials. GRI 306 - Waste	The percentage of packaging produced that is not only bio-based but also certified as compostable, recyclable, or made from sustainable feedstocks.
	12.6 Encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle	Economic	Price Competitiveness of Bio-based Packaging	Has your organization addressed the cost difference between bio-based packaging materials and conventional plastic materials in production?		GRI 308: Supplier Environmental Assessment Ellen MacArthur Foundation	Encourages SMEs, to adopt sustainable practices and reduce costs while using environmentally friendly materials.
	12.8 Ensure that people everywhere have the relevant information	Social	Consumer perception and satisfaction	Has your organization addressed consumer satisfaction with the environmental impact of your bio-based packaging, and the		GRI 413: Local Communities	Emphasizes the importance of consumer education and awareness of sustainability.

	and awareness for sustainable development and lifestyles in harmony with nature			specific aspects of its sustainability?			
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Sector: FERTILISERS							
SDG	SDG Target	Sustainability dimension	KPI	Question	Scoring	Source	Notes
12	12.5 Substantially reduce waste generation through prevention, reduction, recycling and reuse	Circularity	Nutrients from recovered or waste-based sources in production	Is the company sourcing part or all of the nutrients used in the production process from recovered or waste-based sources, and has implemented a plan to increase the ratio?	0 = N/A 1 = Issue identified, but no plans for further actions 2 = Issue identified, starts planning further actions 3 = Action plan with clear targets and deadlines in place 4 = Action plan operational – some progress in established targets 5 = Action plan operational – achieving the target set		
	12.4 Achieve the environmentally sound management of chemicals and all wastes throughout their lifecycle, in accordance with agreed international	Environmental	Freshwater/Sea water eutrophication impact	Has the company identified the impact on freshwater/seawater eutrophication their product is having, and developed a plan to manage it?			

<p>frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment</p>						
<p>12.4 Achieve the environmentally sound management of chemicals and all wastes throughout their lifecycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their</p>	<p>Economic</p>	<p>Percentage of product that is slow-releasing fertilizer</p>	<p>Is the fertilizer slow-releasing, and has the company implemented a plan to increase the percentage of the company's portfolio of (bio-based) slow-releasing product?</p>			

	adverse impacts on human health and the environment						
	12.4 Achieve the environmentally sound management of chemicals and all wastes throughout their lifecycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	Social	Implementation status of chemical management procedures to protect employees	Has the company implemented comprehensive chemical management procedures to protect employees' health and safety, and are they monitoring the adherence to the procedures?		UNCTAD core indicators on the SDGs	