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**Working Paper**

## Results from a stakeholder survey on bioeconomy monitoring and perceptions on bioeconomy in Germany

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# *UFZ Discussion Papers*

Department of Bioenergy

8/2021

## **Results from a Stakeholder Survey on Bioeconomy Monitoring and Perceptions on Bioeconomy in Germany**

*Walther Zeug, Forrest Rafael Kluson, Nora Mittelstädt,  
Alberto Bezama, Daniela Thrän*

November 2021

## Results from a Stakeholder Survey on Bioeconomy Monitoring and Perceptions on Bioeconomy in Germany

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### Abstract:

Our current economic systems are transgressing planetary boundaries globally and yet societal needs are not sufficiently and equally fulfilled. Fostering the bioeconomy as an economy based on renewable resources can be a transformation towards a sustainable future, to fulfill societal needs within planetary boundaries. However, sustainability is not intrinsic to the bioeconomy and consequently advanced and comprehensive monitoring systems on a national scale are needed. In the systemic modeling and monitoring of the German bioeconomy (SYMOBIO) a comprehensive national monitoring framework in the context of global dynamics was developed, and a first pilot report of monitoring results was published and presented to the public in June 2020. Stakeholder participation plays a role in informing monitoring from the beginning. Consequently, in this study we aim at evaluating the pilot report and monitoring as well as the general perception of the bioeconomy by an open survey. We collected approximately 100 responses, mainly from the stakeholder group "science". Most stakeholders are moderately satisfied with the monitoring and reporting. However, social aspects of the bioeconomy like hunger, poverty and inequalities are considered to be underrepresented, and the socio-economic perspective is viewed as too narrow. Future monitoring efforts should be oriented more on international agreed frameworks like the SDGs and be comparable to other monitoring systems and levels. Regarding general perceptions of the bioeconomy, a majority of stakeholders have a vision of a socio-ecological transformation, in contrast to German and European strategies which are seen as business-as-usual capitalism using additional renewable resources. Even though most stakeholders see the current development of bioeconomy critically, they consider the future development as open and encourage a sustainable bioeconomy that creates sustainable consumption and production patterns, global responsibility and compliance with planetary boundaries, as well as economic and ecological justice and participation shaping the overall economy. Our analysis underpins previous perspectives from stakeholder workshops and is embedded in increasingly polarizing societal mentalities of transformations.

**Keywords:** bioeconomy; sustainability; monitoring; stakeholder participation;

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## 1 Introduction

The increasing and complex ecological, social and economic challenges can be characterized as a need of double decoupling: a decoupling of increasing satisfaction of societal needs from an otherwise ever greater production of material goods, as well as a decoupling of production of goods from growing negative ecological, social and economic effects (Zeug et al., 2021). On this background various expectations are associated with possible alternatives like a bio-based economy. In the dominant discourse, on one hand, the unsustainable use of fossil fuel raw materials is to be reduced in the interests of climate protection. On the other hand, national economies, rural areas and investors hope for an economic strengthening and the economic sectors, from agriculture and forestry to chemical industry, hope for “green growth”. Although an absolute decoupling of economic growth and ecological impacts seems to be implausible even with bioeconomy (Parrique T., 2019) (Ward et al., 2016). At the same time, it has become clear in recent years that increasing demand for renewable raw materials cannot be met from within Germany alone (Budzinski et al., 2017) and that Germany's imports in the regions of origin can contribute to exacerbating environmental as well as social problems (Backhouse et al., 2021). The production and consumption of food and feed, as well as bioenergy and renewable raw materials, determines the security of biomass supply, further structural change and the degree of sustainability achieved with regard to resource use and climate change. Therefore, the federal government has initiated a comprehensive bioeconomy monitoring (SYMOBIO), which has the task of observing, measuring and evaluating the transformation process towards a sustainable, bio-based and natural cycle-oriented economy (Bringezu et al., 2020).

Stakeholder participation has been incorporated as a part of the SYMOBIO project from the beginning, with stakeholder expectations of a bioeconomy monitoring being recorded in stakeholder workshops in 2017 (Zeug et al., 2019). The first main results revealed that nearly all SDGs and dimensions of sustainability are important to consider, i.e. considerations stretch far beyond local ecological concerns. The awareness of global shifts and big societal challenges (hunger, poverty, and inequality) is rising. In the public discourse around bioeconomy there is a strong influence of narratives affecting policy processes and public opinions. Specifically, different and partly opposed interests of stakeholders, e.g. universal interests of science and society, particular interests of business stakeholders, maintain a decisive, influential role. Overall, the relationships between social, economic and ecological aspects (synergies, trade-offs, contradictions) characterize not only the interpretation of sustainability in general, but are also very relevant towards monitoring and further discussion regarding the development of the bioeconomy. Participation becomes particularly important when, as in Germany and the bioeconomy discourse in recent years, socio-ecological conflicts intensify and discussions, attitudes and mentalities become increasingly polarized (Eversberg, 2020).

During the last months of the SYMOBIO project, the established monitoring system was presented to stakeholders from the fields of business, science and society and opened for discussion. In January 2020, a further stakeholder workshop served to develop and underline the conceptual framework of the BÖM and its indicators or to question it. The aim of the workshop was to enable bioeconomy stakeholders in Germany to participate in the further development and design of the federal government's bioeconomy monitoring. The majority of the stakeholders were in favor of the bioeconomy monitoring being used primarily in politics, business, science and in public discourse. The monitoring serves as the basis for the discussion of conflicting goals and environmental problems. Within politics, the monitoring primarily should fulfill the function of evaluating the national bioeconomy strategy and its implementation. In addition, the monitoring can be used for comparisons at European and international level. Within science, monitoring can help to forecast the future of bioeconomy, to record trends and to create scenarios. However, only with an informed public discourse the development of the bioeconomy can lead to a societal change that favors the achievement of a sustainable bioeconomy. Throughout all workshop sections, the participants advised that bioeconomy monitoring must be holistically oriented by illuminating systematic interrelationships instead of focusing on specific sectors. In other words, the limits of the bioeconomy should be shown by means of the monitoring. In several places, the desire for accessible and transparent data as well as the need for comparable and harmonized indicators were emphasized. It

remains to be seen on which points the national bioeconomy monitoring will agree with that of the EU. According to the participant stakeholders, the bioeconomy monitoring should be continuous and contribute to developing possible future images of the bioeconomy. Developing future visions and narratives of a sustainable bioeconomy, knowledge transfer and discourse towards societal change was evaluated as major challenges in the future. We cluster additional feedbacks from the workshop of 2020 (Figure 1), as we use them to derive further considerations and questions relevant for this study.



Figure 1, Clustered feedback from stakeholders in the SYMOBIO workshop 2020

In June 2020, the pilot report on bioeconomy monitoring "Pilotbericht zum Monitoring der deutschen Bioökonomie" (Bringezu et al., 2020) was presented to the public and is available online (<https://kobra.uni-kassel.de/handle/123456789/11591>). The pilot report shows the first aggregated results of the monitoring on material flows of the German bioeconomy, socioeconomic developments, trends and drivers, as well as ecological footprints of the German bioeconomy. The final task of Working Package 5.1 "Stakeholderbefragung zum Pilotbericht" was therefore to evaluate how the report was understood and received, to what extent important questions could be adequately answered and whether important questions remained open. In this regard, this report presents the results of an online survey carried out within the activities of WP5.1. The aim of the stakeholder survey for the pilot report was to systematically record, analyze and structure the different perceptions of the pilot report by the stakeholders and to additionally evaluate the aspects given by the stakeholder's feedback.

## 2 Methods

The online survey was conducted using [soscisurvey.de](https://www.soscisurvey.de) and structured in a way that qualitative questions and data were collected and processed, although subsequent quantification for better interpretation and presentation of the results is afterwards possible. It was not possible to aim for representativeness, as the relationships between the population and the sample is unknown. The results of the second stakeholder workshop of 2020 serve as the content basis for the implicit hypotheses of the questions in section of the more explorative questionnaire (for original questionnaire see Appendix A). All other questions are derived from the project objectives and internal discussions in the project network. The online survey was divided into the following headings (Table 1). Each section is subdivided into thematic questions with a specific question type<sup>1</sup>. Depending on the question type, different selection options must be defined for answering the questions. We used only nominal and ordinal scales which were quantified by a rating scale (see chapter 3) and consequentially no statistical methods can be applied to the results. The definitions of terms were explained in the questionnaire and the survey was entirely held in German. In the following presentations of results, we show aggregated quantitative results for all stakeholder groups and present and discuss qualitative answers, comments and additions from stakeholders.

Table 1. Structure and headings of the online survey

Position		Label	Section Headings
1		SPR	Structure of the pilot report for monitoring of the German bioeconomy
2		CPR	Contents of the pilot report and the monitoring of the German bioeconomy
3		CBM	Challenges in the bioeconomy and monitoring
4		CMR	Communication of the monitoring reports and results
5		CTM	Context of the monitoring

The survey distribution relied solely on email communications in order for potential participants to access the survey online. Bioeconomy stakeholder email contact information was collected from online public sources, and requests were sent to relevant bioeconomy-related email newsletters to distribute the survey to newsletter recipients. The collected stakeholder contact information was categorized into five categories within the bioeconomy, i.e., science, business, government, NGO, and citizens; and all stakeholders were contacted with a request to participate in the survey, as well as an introductory text briefly describing the context of the survey and the SYMOBIO research project. Email distribution of the survey occurred in three waves, in which over 400 bioeconomy stakeholders were contacted directly and three bioeconomy-related email newsletters were used to reach stakeholders. We did not collect and store any person-specific data.

<sup>1</sup> Overview of question types and corresponding methodology <https://www.soscisurvey.de/help/doku.php/de:create:questions>

### 3 Results

From about 400 stakeholders we addressed through the distribution of the survey, we gained in total 105 responses, which are valid cases in terms of answering a minimum of questions in a sufficient manner (Figure 2). As the largest share, 53 % of them assigned themselves to the stakeholder group science, followed by 7.62 % from NGOs, 6.67 % from business and some minor shares from government citizens. Moreover, 23.81 % of the respondents did not assign themselves to a specific group.

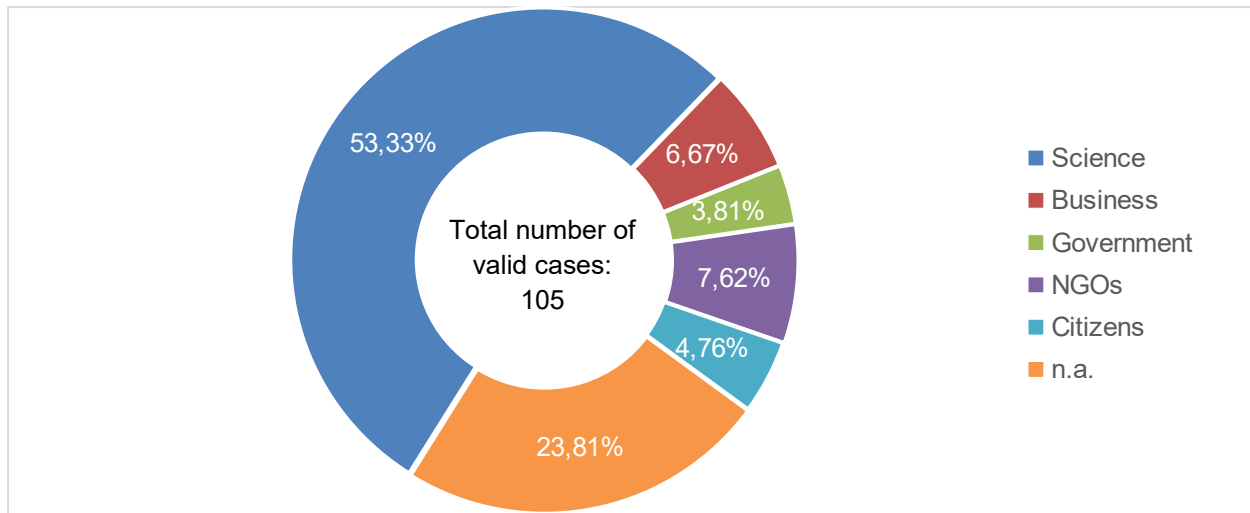


Figure 2, Share of Stakeholder groups in % and total number of valid cases of the online survey

Consequently, the overall response-rate is comparably good. However, this study and its results should not be misinterpreted as representative for the population, mainly because of the number of total cases and the unequal share of stakeholder-groups. The survey was online for three months from May till July 2021 and we directly invited specific stakeholder and interest groups to participate, and we took it offline when the desired number of approximately 100 answers was reached and not significant amount of further responses could be expected. In the following, we present the average results among all stakeholder groups, but give additional information if differences between groups are significant. We do not discuss each of the questions and results from the tables, but rather the ones with high significance and/or very good or bad scores. All suggestions in the following chapters for improving SYMOBIO from the perspective of stakeholders have to be taken seriously, but also need to be discussed internally on if and how they can be implemented in a practical monitoring.

#### 3.1 Evaluation of the Pilot Report on Bioeconomy Monitoring

Most of the respondents heard about the pilot report in June and July 2020, shortly after its publication, and then read it promptly. In the first section, SPR, and second section, CPR, we asked about the general satisfaction with the pilot report and bioeconomy monitoring, with an overall average score of 3.23 on a scale from 1 (very unsatisfied) to 5 (very satisfied) (Table 2). The pilot report specific sections of the survey were almost only answered by stakeholders from sciences.

Table 2, Average results amongst all stakeholder groups from the "Structure of the pilot report for monitoring of the German bioeconomy" section of the survey, very good or bad scores marked respectively in green and orange

Label	Question	Answer Supplement to the Question	Response Option Scale	Ø Results
SPR02_01	In general, how satisfied are you with the pilot report on	General satisfaction	1 - very dissatisfied 5 - very satisfied	3.38
SPR02_02		Comprehensibility		3.71
SPR02_03		Transparency		3.57
SPR02_04		Accuracy		3.57



SPR02_05	monitoring the German	Precision		3.38
SPR02_06		Scope		3.52
SPR02_07		Factual orientation		3.85
SPR03_01	Which bullet points of the pilot report on monitoring the German bioeconomy are particularly relevant to you?	Executive Summary	1 - irrelevant 5 - relevant	3.81
SPR03_02		Introduction		3.25
SPR03_03		Biogenic material flows		4.19
SPR03_04		Socio-economic development		4.24
SPR03_05		Development of trends and drivers		4.24
SPR03_06		The ecological footprint		4.19
SPR03_07		Conclusion		3.81
SPR04_01	Are the indicators of the pilot report for monitoring the German bioeconomy broken down and presented in sufficient detail?	Quantitative indicators and data	1 - Indicators not shown at all 2 - Indicators present but no data 3 - Indicators present but insufficient data 4 - Indicators present and sufficient data 5 - Indicators present but too much data	3.40
SPR04_02		Qualitative indicators, data and analyses		3.11
SPR05_01	Can you extract essential information from the summary of the pilot report for monitoring of the German bioeconomy and draw appropriate conclusions for yourself?		1 - no conclusions possible 5 - sufficient conclusions possible	3.55

According to the large share of readers from science, introductions and conclusions are relevant, but presenting data in the actual chapters of results with sufficient detail is of high relevance for the readers (SPR03, SPR04). All aspects of the general structure of the pilot report are sufficient, but have room for improvement (SPR02, SPR05).

This presentation structure is also the case when it comes to the alignment of the content (Table 3) of the pilot report and monitoring with frameworks like the SDGs or strategies like DNS and the New European Green Deal (CPR01). In terms of content, it has to be emphasized that structural insufficiencies exist for the field of social and socio-economic aspects and indicators like poverty, inequalities, working conditions, hunger, health, education, gender equality, clean water and sanitation as well as sustainable cities and communities (CPR04, CPR08). Those aspects are relevant for most of the respondents, but are missing in the report and not part of the quite narrow socio-economic view. Some respondents suggested that a global view for social problems should be taken for environmental footprints, since imports of biomass can externalize and/or induce negative social and economic impacts in other countries. Further suggestions are to expand the economic perspective and measurements beyond (neo-)classical approaches and to implement indicators for sufficiency, working conditions and inequalities.

Ecological impacts and their measurement are considered as mostly sufficient (CPR06), excluding the case of biodiversity, which is insufficiently represented (CPR06\_05). In this regard, stakeholders suggested to make more use of the concept of planetary boundaries, which considers biodiversity, and to include measures to preserve or increase biodiversity, agricultural land with a high natural value, urban greenery, awareness of biodiversity and climate change, ecosystem services, soil properties and air pollution. Stakeholders seem to miss innovative ideas in the report, also regarding measurements, which leads to less alternative courses of action that should be able to be concluded from the monitoring (CPR11). From a stakeholder perspective, besides presenting the status quo, future monitoring should also address historical trends and (alternative) future scenarios (CPR12).

Table 3, Average results amongst all stakeholder groups from the "Contents of the pilot report and the monitoring of the German bioeconomy" section of the survey, very good or bad scores marked respectively in green and orange

Label	Question	Answer Supplement to the Question	Response Option Scale	Ø Results
CPR01_02	Is the pilot report for monitoring the German bioeconomy sufficiently, strongly aligned with frameworks that are relevant to you?	... is aligned with the Sustainable Development Goals (SDGs)	1 - insufficient 5 - sufficient	3.11
CPR01_04		... is aligned with the German Sustainability Strategy (DNS)NS)		3.00
CPR01_06		... is aligned with the German Bioeconomy Strategy		3.47
CPR01_08		... is aligned with the European Green New Deal		2.76
CPR04_01	Which social topics of the bioeconomy do you consider to be sufficiently represented in the pilot report for monitoring of the German bioeconomy, or where do you still see potential for expansion?	Social aspects in general	1 - insufficiently represented 5 - sufficiently represented	2.44
CPR04_02		Poverty		2.17
CPR04_03		Hunger		2.22
CPR04_04		Health		2.17
CPR04_05		Education		2.61
CPR04_06		Gender equality		2.18
CPR04_07		Clean water and sanitation		2.69
CPR04_08		Sustainable cities and communities		2.22
CPR04_09		Your own addition: Which indicators would you like to use?		3.00
CPR06_01	Which ecological topics of the bioeconomy do you consider to be sufficiently represented in the pilot report for monitoring of the German bioeconomy, or where do you still see potential for expansion?	Ecological aspects in general	1 - insufficiently represented 5 - sufficiently represented	3.26
CPR06_02		Climate impact		3.47
CPR06_03		Aquatic ecosystems		3.21
CPR06_04		Terrestrial ecosystems		3.32
CPR06_05		Biodiversity		2.32
CPR06_06		Your own addition: Which indicators would you like to use?		3.00
CPR08_01	Which economic topics of the bioeconomy do you consider to be sufficiently represented in the pilot report for monitoring of the German bioeconomy, or where do you still see potential for expansion?	Economic aspects in general	1 - insufficiently represented 5 - sufficiently represented	3.05
CPR08_02		Energy		2.84
CPR08_03		Working conditions		2.15
CPR08_04		Economic growth		2.79
CPR08_05		Innovations & Infrastructure		3.00
CPR08_06		Inequalities		1.85
CPR08_07		Sustainable consumption and production patterns		2.47
CPR08_08		Global cooperation, partnerships, institutions		2.21
CPR08_09		Your own addition: Which indicators would you like to use?		2.00
CPR10_01	Are the central statements of the pilot report for monitoring of the German bioeconomy sufficiently concrete for you?	Material flows of the bioeconomy	1 - no statement recognizably pointed out 2 - statement very general 3 - statement without possible conclusion 4 - statement and possible conclusions	3.53
CPR10_02		Value creation and jobs in the bioeconomy		2.89
CPR10_03		Agricultural drivers		3.39
CPR10_04		Consumer behavior		3.16
CPR10_05		Food waste		3.11
CPR10_06		Energy use		3.74
CPR10_07		Material use		3.84

CPR10_08		Technological development	too complex 5 - statement well elaborated and conclusion possible	3.28
CPR10_09		Material footprint		3.89
CPR10_10		Forest footprint		3.74
CPR10_11		Agricultural footprint		3.74
CPR10_12		Water footprint		3.79
CPR10_13		Climate footprint		3.84
CPR11_01	Does the pilot report for monitoring of the German bioeconomy reveal alternative courses of action?	... directly from the pilot report	1 - not recognizable 5 - recognizable	2.42
CPR11_02		... on the basis of the pilot report		3.11
CPR12_01	How do you consider the use of the pilot report for monitoring of the German bioeconomy useful, and for which actors?	Political decision makers	1 - not useful 5 - useful	3.67
CPR12_02		Business community		3.06
CPR12_03		Public and social discussion		3.79
CPR12_04		Science		3.89
CPR12_05		NGOs		4.00
CPR12_06		Citizens		3.11
CPR12_07		Monitoring should assess business-as-usual trends (ex ante)		3.78
CPR12_08		Monitoring should evaluate alternative scenarios (ex ante)		4.00
CPR12_09		Monitoring should assess historical trends (ex post)		4.06

### 3.2 Future Monitoring and Reports

All of the following sections were answered by all stakeholder groups and we present the results for the most important ones: science, business and NGOs. Future monitoring and reporting on the German bioeconomy (Table 4) should be done in a long term and reported annually (CMR02, CMR03). This report then should be published as a standalone nation-wide report, but be additionally integrated in a European bioeconomy monitoring (CMR04).

Table 4, Average results amongst all stakeholder groups from the "Communication of the monitoring reports and results" section of the survey (Sci – Science, Bus– Business, NGO – Non Governmental Organizations)

Label	Question	Answer Supplement to the Question	Response Option Scale	Ø Results	Sci	Bus	NGO
CMR02_01	For how long should bioeconomy monitoring reports be published?		1 - one-time 2 - until 2022 3 - until 2025 4 - until 2030 5 - long-term monitoring	4.62	4.75	4.14	4.83
CMR03_01	At what interval should bioeconomy monitoring reports be published?		1 - Every 5 years 2 - Every 2 years 3 - Annually 4 - Semiannually 5 - Real time	2.62	2.53	2.57	2.83
CMR04_01	In what framework should bioeconomy monitoring reporting take place?	Stand-alone nationwide report as in pilot report	1 - not applicable 5 - applicable	4.28	4.25	4.14	4.33
CMR04_02		Nationwide (for each federal state)		3.13	3.04	1.67	4.00
CMR04_03		In the progress reports on the national sustainability		3.60	3.60	3.29	3.50

		strategy					
CMR04_04		Monitoring of the 2030 Agenda (SDGs) by the Federal Statistical Office		3.63	3.61	3.33	3.67
CMR04_05		At European level		4.13	4.13	4.00	3.83
CMR04_06		United Nations		3.48	3.57	3.67	3.17

The alignment and comparability of the German bioeconomy monitoring with other monitoring systems and political strategies is of high importance for all stakeholder groups (Table 5), especially the SDGs and DNS (CTM09). Intersections with other monitoring systems should receive manifold attention with a focus on biodiversity and raw material flows (CTM01).

Table 5, Average results amongst all stakeholder groups from the "Context of the monitoring" section of the survey, (Sci – Science, Bus– Business, NGO – Non Governmental Organizations)

Label	Question	Answer Supplement to the Question	Response Option Scale	Ø Results	Sci	Bus	NGO
CTM09_01	Should aspects of bioeconomy monitoring be aligned with sustainability policies that are relevant to you?	Bioeconomy monitoring: alignment and frameworks: ... should be aligned with the Sustainable Development Goals (SDGs)	1 - should not be aligned 5 - should be aligned	4.36	4.40	4.14	4.57
CTM09_03		Bioeconomy monitoring: Alignment and Frameworks: ... should be aligned with the German Sustainability Strategy (DNS)		4.15	4.24	3.57	4.50
CTM09_05		Bioeconomy monitoring: Alignment and Frameworks: ... should be aligned with the German Bioeconomy Strategy (DNS)		4.06	4.04	4.43	4.17
CTM09_07		Bioeconomy Monitoring: Alignment and Frameworks: ... should be aligned with the European Green New Deal		3.81	3.76	4.00	4.67
CTM01_01	Which of the following national monitoring systems should receive attention in bioeconomy monitoring due to content-related intersections ?	Raw Materials Monitoring	1 - not applicable 5 - applicable	4.39	4.42	4.17	4.33
CTM01_02		Country Initiative Core Indicators		3.34	3.35	2.67	3.83
CTM01_03		Energy transition monitoring ("Energy of the future")		4.18	4.32	2.60	4.33
CTM01_04		Ecosystem monitoring (Biodiversity monitoring)		4.23	4.38	3.33	4.67
CTM01_05		Monitoring of agricultural areas with high nature value (High Nature Value Farmland-Indicator)		3.74	3.78	2.83	4.33
CTM01_06		Bird monitoring, report according to Birds Directive, monitoring of common breeding birds		3.40	3.40	3.00	3.50
CTM01_07		Monitoring according to the Fauna-Flora-Habitat (FFH) Directive		3.45	3.47	3.00	3.83
CTM01_08		Monitoring of genetically modified organisms		3.43	3.46	2.83	3.67

CTM01_09	National monitoring of biodiversity in agricultural landscapes	3.97	4.08	3.17	4.50
CTM01_10	Monitoring of soil organisms	3.75	3.87	2.83	4.17
CTM01_11	Monitoring of small water bodies (under construction)	3.24	3.33	2.67	4.00
CTM01_12	Vegetation monitoring (under construction)	3.28	3.38	2.83	4.17
CTM01_13	Monitoring of urban green spaces (under construction)	3.08	3.25	2.83	3.33
CTM01_14	Soil permanent monitoring	3.85	4.12	2.67	4.17

### 3.3 Perceptions of Bioeconomy

In order to grasp and map the stakeholders' perceptions of bioeconomy and corresponding narratives and visions, we adopted the widely known techno-political option space of the bioeconomy (Hausknost et al., 2017). The respondents mapped their own vision of a desirable bioeconomy and where they see the German and European bioeconomy strategy in four quadrants (Figure 3):

- A "Green" capitalism (technology-driven transition to a (global) bioeconomy and the continuation of capitalist growth as continuous expansion and accumulation of (natural) capital, business as usual)
- B Ecological growth (simultaneous agro-ecological practices and growth-based capitalist economy, visions of ecological entrepreneurship, agro-ecological innovation, smallholder practices and a regional instead of global focus)
- C Ecocentric degrowth (agro-ecological practices geared towards socio-economic sufficiency, comprehensive socio-ecological transition to "near-natural" production without large-scale industrial technologies)
- D Socio-ecological transformation (industrial biotechnology and sufficiency through coordinated state action, comprehensive socio-economic change towards a sufficiency perspective that satisfies human needs within planetary boundaries using advanced & large-scale industrial technologies)

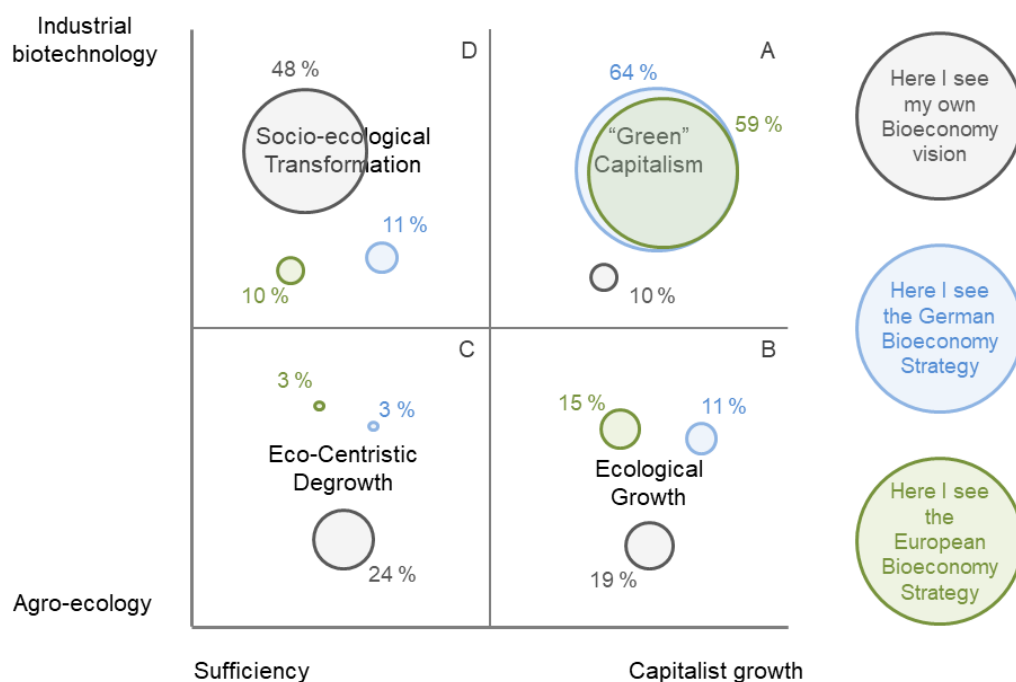


Figure 3. Shares of responses the questions "Where do you see your own bioeconomy vision?", "Where do you see the German Bioeconomy Strategy?", "Where do you see the European Bioeconomy Strategy?" (question label CBM01, Sci – Science, Bus– Business, NGO – Non Governmental Organizations)

As results, a majority of stakeholders see their own bioeconomy vision in a socio-ecological transformation, followed by an eco-centric vision of degrowth. In contrast, the German and European bioeconomy strategies are mostly seen as narratives of a “green” capitalism. Having a look at the own visions of different stakeholder groups (Table 6), it is noticeable that the stakeholder group “business” tends more towards A than all other groups, whereas “NGOs” preferences are balanced across all quadrants. Moreover, “science”, “government” and citizens tend mostly towards a socio-ecological transformation.

Table 6, Shares of responses the questions “Where do you see your own bioeconomy vision?”, “Where do you see the German Bioeconomy Strategy?”, “Where do you see the European Bioeconomy Strategy?” across all stakeholder groups in % (dominant share in bold, Sci – Science, Bus– Business, Gov – Government, NGOs – Non-Governmental Organizations, Cit - Citizens)

Label	Question	Answer Supplement to the Question	Ø	Sci	Bus	Gov	NGOs	Cit
CBM01	Here I see my own Bioeconomy vision	A - “Green” capitalism	10	6	<b>40</b>	25	13	0
		B - Ecological growth	19	20	20	0	25	25
		C – Eco-centrist degrowth	24	22	0	25	<b>38</b>	25
		D – Socio-ecological Transformation	<b>48</b>	<b>53</b>	<b>40</b>	<b>50</b>	25	<b>50</b>
	Here I see the German Bioeconomy Strategy	A - “Green” capitalism	<b>64</b>	<b>67</b>	20	<b>75</b>	<b>75</b>	<b>50</b>
		B - Ecological growth	11	10	<b>40</b>	0	0	25
		C – Eco-centrist degrowth	3	2	20	0	0	0
		D – Socio-ecological Transformation	11	12	20	25	0	25
	Here I see the European Bioeconomy Strategy	A - “Green” capitalism	<b>59</b>	<b>63</b>	<b>40</b>	<b>75</b>	<b>63</b>	<b>50</b>
		B - Ecological growth	15	14	20	0	0	25
		C – Eco-centrist degrowth	3	2	0	0	0	25
		D – Socio-ecological Transformation	10	12	20	25	0	0

When it comes to the societal discussion on bioeconomy (Table 7), from the perspective of stakeholders bioeconomy is oriented mostly on previous goals, reproducing existing structures and determined by only a few actors, but most stakeholders see future discussions as relatively open (CBM02). This perspective gets underpinned by assessing the development of the bioeconomy as a continuation of the structural status quo: only individual sectors are changing, and corporations and industry induce mainly a technological change driven by growth and competition (CBM03). However, global value chains may tend to get more regional (CBM03\_05). According to the openness of the discussion and in contrast to the past development of the bioeconomy, most stakeholders prefer a rather economy and society overarching societal transformation, in which environmental and social changes are main drivers and small and medium enterprises play a bigger role (CBM04). In this sense, most stakeholder groups strongly encourage a sustainable future bioeconomy to entail sustainable consumption and production patterns, global responsibility and compliance with planetary boundaries, substitution of fossil fuel materials by a sufficient and efficient circular economy with the use of residual and waste materials, more sustainable agriculture that integrates ecosystem services, as well as economic and ecological justice and participation that shapes the overall economy (CBM06).

Table 7, Average results amongst all stakeholder groups from the “Challenges in the bioeconomy and monitoring” section of the survey (Sci – Science, Bus– Business, NGO – Non Governmental Organizations)

Label	Question	Answer Supplement to the Question	Response Option Scale	Ø Results	Sci	Bus	NGO
CBM02_01	How do you assess the status of the societal discussion on the bioeconomy?		1 - closed	4.33	4.43	4.00	4.67
CBM02_01			5 - relatively open	2.69	2.71	2.50	2.00



02			structures 5 - promoting new structures				
CBM02_03			1 - determined by a few actors 5 - including many actors	2.33	2.36	2.00	1.83
CBM02_04			1 - oriented to previous goals 5 - oriented to new goals	2.70	2.82	2.57	2.00
CBM02_05			1 - continuous development 5 - dynamic development	2.98	2.98	3.00	2.20
CBM03_01			1 - individual sectors 5 - economy & society overarching	2.72	2.63	3.86	2.43
CBM03_05			1 - regional 5 - global	3.22	3.20	4.14	3.43
CBM03_06	According to your assessment, how do you think the bioeconomy will develop?		1 - corporations & industry 5 - small and medium enterprises	2.65	2.75	2.29	2.29
CBM03_07			1 - technological change 5 - social transformation	2.41	2.41	2.86	1.86
CBM03_08			1 - growth & competition as drivers 5 - environmental and social changes as drivers	2.72	2.77	3.14	2.57
CBM04_01			1 - individual sectors 5 - economy & society overarching	4.52	4.63	4.00	4.63
CBM04_05			1 - regional 5 - global	3.55	3.68	3.71	3.14
CBM04_06	According to your expectations, how should the bioeconomy develop?		1 - corporations & industry 5 - small and medium enterprises	3.04	3.13	2.43	3.29
CBM04_07			1 - technological change 5 - social transformation	3.75	3.82	3.14	4.14
CBM04_08			1 - growth & competition as drivers 5 - environmental and social changes as drivers	3.88	4.00	2.50	4.29
CBM06_01	What do you think is needed for a sustainable bioeconomy?	... sustainable consumption patterns ...	1 - not required 3 - neutral 5 - required	4.43	4.54	3.57	4.50
CBM06_02		... sustainable production patterns ...		4.62	4.73	4.00	4.63
CBM06_03		... Germany's global responsibility ...		4.25	4.36	3.71	4.50
CBM06_04		... compliance with planetary boundaries ...		4.53	4.59	4.33	4.88
CBM06_05		... Substitution of fossil raw materials ...		4.35	4.48	4.14	3.88
CBM06_09		... Circular economy and cascade use ...		4.75	4.80	4.33	4.63
CBM06_06		... the use of residual and waste materials ...		4.70	4.75	4.29	4.63
CBM06_07		... an agricultural turnaround towards sustainable agriculture ...		4.45	4.66	3.43	4.38
CBM06_08		... the integration of ecosystem services ...		4.07	4.15	3.43	4.25

CBM06_12	... coherent and assertive policies ...	4.45	4.43	4.14	4.75
CBM06_10	... sufficiency ...	3.98	3.98	3.43	4.25
CBM06_11	... subsistence ...	3.54	3.42	3.50	3.88
CBM06_13	... resource efficiency ...	4.61	4.59	4.71	4.63
CBM06_14	... economic and ecological justice ...	4.29	4.34	3.57	4.63
CBM06_15	... transdisciplinarity ...	4.25	4.20	4.43	4.50
CBM06_16	... participation/citizen science ...	3.92	3.91	3.43	4.38
CBM06_17	... Inclusion of art and culture ...	3.07	3.07	2.57	3.25
CBM06_18	... strong differentiation between bioeconomy and overall economy	2.05	1.96	2.00	2.29

Finally, some respondents commented at the end of the survey on general aspects of bioeconomy. It was suggested that the term bioeconomy should be clearer and more tangible, and that is unclear why a large part of “gastronomy” is counted in the bioeconomy. When it comes to defining the term, there is an impression that industry is in the lead, but linking with politics and society would be urgently needed for success and a positive perception of bioeconomy. In terms of methodologies, life-cycle-oriented assessments should be taken more into account, and a better transparency of data was requested for in order to be able to make assumptions of if and how the Paris climate goals can be met through bioeconomy development. Furthermore, the results of the bioeconomy monitoring should be put more into context and be compared to general economic reports, climate data, monitoring of circular economy and monitoring of forestry and agriculture. For a future online implementation, it was suggested to adopt EU bioeconomy monitoring and its dashboard. Additionally, stakeholders suggested political measures which should be considered, e.g. an absolute limitation of inputs of fossil fuel, mineral and biogenic raw materials for the economy; stronger international framework conditions, e.g. due diligence; more democratic and inclusive decision-making processes about economic course-setting; a comprehensive catalog of measures which continuously records development status; checking the consistency of the various strategies to avoid opposing orientations and fields of action and the insurance of policy consistency as well as congruence of measures.



## 4 Discussion & Conclusions

We state from the results that the pilot report and the German bioeconomy monitoring in general is perceived as meaningful and valuable for most of the stakeholders. However, when SYMOBIO is continued, implemented and steadied, certain aspects should be revised and further developed. In line with the results from our workshops in 2017 and 2020, social implications of the bioeconomy are of high and equal importance for the stakeholders and still underrepresented in the current monitoring framework. Still, there is a predominant socio-economic perspective in monitoring, which narrows societal well-being to growth and job creation and assumes that further positive social impacts correlate and will “trickle down” from them. Despite that this can be questioned in general (Fanning and O'Neill, 2019) (Postone, 1993), stakeholders like to know explicitly of implications of the bioeconomy on social aspects like poverty, hunger, health, gender equality and economic inequalities, as well as working conditions, especially when it comes to global effects and externalization of negative impacts (cf. (Backhouse et al., 2021)). Taking up additional indicators and systemic quantitative and qualitative analyses, which are oriented on internationally agreed and comparable frameworks like the SDGs (Zeug et al., 2019) (Zeug et al., 2020), can not only improve the monitoring itself, but also offer clarification to the conflicting discourses around bioeconomy. A developing monitoring system such as SYMOBIO should also stay flexible to integrate aspects which are partly hard to monitor at the moment, but where significant progress can be expected in the near future, e.g., biodiversity monitoring. Since bioeconomy is and will be mainly restricted by sustainably available renewable resources within planetary boundaries (Lindqvist et al., 2019), absolute sustainability assessments (O'Neill et al., 2018) (Sala et al., 2020) can complement national bioeconomy monitoring efforts by creating absolute rather than relative statements on achieving sustainability.

Although bioeconomy monitoring should aim for informing an interested public, this pilot report and the monitoring itself is mainly received by scientists, which is also represented by the shares of stakeholder groups that responded to this survey. To address the different needs of different stakeholders on information, SYMOBIO should on the one hand provide more research data on an additional website (as it is already foreseen), and on the other hand strengthen its endeavors to build up a more comprehensive and inclusive science, politics and public knowledge transfer. Besides the actual monitoring reports and conclusions which are drawn in science, politics and industry, the perceptions and public opinions are very likely to significantly shape the future of the bioeconomy.

The most significant bias of our survey may not be its inability to address all stakeholder groups equally, regarding our categorization of stakeholder groups, but rather its inability to reach people who actually do not have any contact to bioeconomy discourses or those people who reject or disagree with such kinds of transformations in general. In this regard, even though our study is one of the most comprehensive bioeconomy specific surveys carried out thus far, it still cannot be considered as representative of the German population.

Discussing our results on perceptions, visions and narratives of bioeconomy in the context of representative studies on societal mentalities on sustainability transformations and the bioeconomy (Eversberg, 2020) is therefore useful. The German and European strategies like most bioeconomy strategies in general correspond to “green capitalism” or “sustainable capital” (Hausknost et al., 2017), and most respondents categorized them likewise. The preference of business stakeholders for this vision was as well the case in our previous workshops and coincides with liberal growth-oriented mentalities of rather socially privileged men, which make up about 27% of the German population (Eversberg, 2020). In these perceptions of bioeconomy the idea of permanent unlimited growth on a bio-based basis seems plausible, and at least rhetorically by means of permanent innovation within planetary boundaries (ibid.). In contrast, there are no significant empirically cases of “socio-ecological transformations“, combining sufficiency and innovative technologies to fulfill societal needs within planetary boundaries guided by deliberative and democratic state-driven transformations (Hausknost et al., 2017). It was suspected that such a vision would be primarily

encouraged from tendentially more educated groups of an eco-social-active middle class, with support for far-reaching changes and more universalistic than narrow interest-oriented viewpoints, which make up about 25 % of the German population (Eversberg, 2020). On the basis of our results we can confirm this assumption, most respondents from the stakeholder group science encourage this vision, disagree with current developments, but as active carriers and advocates of ongoing social change hope for a more social and ecological sustainable bioeconomy and societal transformation. We conclude that according to most of the respondents, for a bioeconomy to be socially assertive and a successful sustainability transformation, it needs to go beyond business-as-usual and claim a global responsibility to provide a good life for all within planetary boundaries (Zeug et al., 2020) (O'Neill et al., 2018). Even though this will lead to inevitable conflicts with a regressive-authoritarian social camp making up 17 % of the German population (Eversberg, 2020), which will probably resist any progressive transformation and doubt about climate change in order to be able to maintain certain identities and lifestyles. However, it is important to note that for the actual environmental impacts of peoples consumption and lifestyles, not primarily their mentalities, but their income is most significant (ibid) (Eversberg and Holz, 2020). And even consumption and lifestyles have a limited impact, since capitalism can be understood primarily as a societal relation of production and subsequently of consumption (Postone, 1993).

We recommend to adapt the future German modeling and monitoring of the bioeconomy according to the suggestions which stakeholders gave in this study, respectively to include difficult to implement aspects at least in qualitative discussions. A therefore even more generally accepted and valued monitoring can contribute towards informing the upcoming societal discourse as well as enabling the development of advanced political strategies and measures for a sustainable developing bioeconomy.

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### Stakeholderbefragung zum Pilotbericht von SYMOBIO

Liebe Teilnehmende,

das vom Bundesministerium für Bildung und Forschung (BMBF) geförderte Forschungsprojekt [SYMOBIO](#) (Systematisches Monitoring und Modellierung der Bioökonomie) soll im Rahmen des Konzepts „Bioökonomie als gesellschaftlicher Wandel“ die wissenschaftlichen Grundlagen für ein systemisches Monitoring und Modellierung der Bioökonomie in Deutschland unter Berücksichtigung nationaler und internationaler Aspekte erarbeiten. Im Juni 2020 wurde ein [Pilotbericht zum Monitoring der deutschen Bioökonomie](#) veröffentlicht, welcher einen ersten Überblick über wesentliche Merkmale und Trends der deutschen „biobasierten Ökonomie“ im nationalen und internationalen Kontext gibt. Um die zukünftige Berichterstattung zum Monitoring der Bioökonomie zu optimieren und ihre Wahrnehmungen der Bioökonomie zu erfassen, bitten wir Sie sich 15 Minuten Zeit zu nehmen und den nachfolgenden Fragebogen vollständig zu beantworten.

Alle erhobenen Daten werden vollständig anonymisiert und im Einklang mit der DSGVO verarbeitet. Mit ihrer Teilnahme stimmen Sie der anonymisierten Auswertung und Veröffentlichung der Ergebnisse zu. Bitte sehen Sie aus datenschutzrechtlichen Erwägungen von der Angabe personenbezogener Daten in jeglicher Form ab.

Wir bitten Sie den Fragebogen auch an weitere interessierte Menschen weiterzuleiten und zu verbreiten. Ein lernendes und optimiertes Monitoring der Bioökonomie kann als Datengrundlage wesentlich dazu beitragen, die gesellschaftlichen Diskussion und zukünftige Entscheidungen im Sinne eines nachhaltigen gesellschaftlichen Wandels hin zu einer zukunftsfähigen Wirtschaft voranzutreiben.

Vielen Dank für Ihre Teilnahme im Voraus

**Haben Sie den o.g. Pilotbericht zum Monitoring der deutschen Bioökonomie bereits gelesen?**

- ☒ Gelesen
- ☐ Nicht gelesen

## 1. Aufbau des Pilotberichts zum Monitoring der deutschen Bioökonomie

1. Wann haben Sie das erste Mal vom Pilotbericht zum Monitoring der deutschen Bioökonomie erfahren und wann haben Sie den Pilotbericht das erste Mal gelesen?

Das erste Mal habe ich vom Pilotbericht erfahren am  (MM.YYYY)

Das erste Mal habe ich den Pilotbericht gelesen am  (MM.YYYY)

2. Wie zufrieden sind Sie ganz allgemein mit dem Pilotbericht zum Monitoring der deutschen Bioökonomie?

	sehr unzufrieden				sehr zufrieden
Allgemeine Zufriedenheit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verständlichkeit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nachvollziehbarkeit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Richtigkeit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Präzision	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Umfang	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sachorientiertheit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Welche Gliederungspunkte des Pilotberichts zum Monitoring der deutschen Bioökonomie sind für Sie besonders relevant?

	irrelevant				relevant
Executive Summary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Einleitung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biogene Stoffströme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sozioökonomische Entwicklung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Entwicklung von Trends und Treibern	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Der ökologische Fußabdruck	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fazit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Sind die Indikatoren des Pilotberichts zum Monitoring der deutschen Bioökonomie ausreichend ausführlich aufgeschlüsselt und dargestellt?

	Indikatoren gar nicht aufgezeigt	Indikatoren vorhanden aber keine Daten	Indikatoren vorhanden aber nur unzureichende Daten	Indikatoren vorhanden und ausreichende Daten	Indikatoren vorhanden aber zu viele Daten
Quantitative Indikatoren und Daten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Qualitative Indikatoren, Daten und Analysen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**5. Können Sie der Zusammenfassung vom Pilotbericht zum Monitoring der deutschen Bioökonomie...**

keine  
Schlussfolgerungen  
möglich

ausreichend  
Schlussfolgerungen  
möglich

... wesentliche Informationen entnehmen und  
entsprechende Schlussfolgerungen für sich  
ziehen?



## 2. Inhalte des Pilotberichts und des Monitorings der deutschen Bioökonomie

### 6. Ist der Pilotbericht zum Monitoring der deutschen Bioökonomie ausreichend stark an für Sie relevanten Frameworks ausgerichtet?

Der Pilotbericht von SYMOBIO. . .

	unzureichend	ausreichend
... ist an den Sustainable Development Goals (SDGs) ausgerichtet	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
... ist an der Deutschen Nachhaltigkeitsstrategie (DNS) ausgerichtet	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
... ist an der Deutschen Bioökonomiestrategie ausgerichtet	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
... ist am Europäischen Green New Deal ausgerichtet	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>

### 7. Welche sozialen Themenfelder der Bioökonomie sind für Sie im Pilotbericht zum Monitoring der deutschen Bioökonomie ausreichend dargestellt bzw. wo sehen Sie noch Ausbaupotenzial?

	unzureichend dargestellt					ausreichend dargestellt				
Soziale Aspekte allgemein	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Armut	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hunger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gesundheit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bildung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Geschlechtergleichstellung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sauberes Wasser und Sanitärversorgung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nachhaltige Städte und Gemeinden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eigene Ergänzung: Welche Indikatoren würden Sie gerne verwenden?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eigene Ergänzung										

### 8. Welche ökologischen Themenfelder der Bioökonomie sind für Sie im Pilotbericht zum Monitoring der deutschen Bioökonomie ausreichend dargestellt bzw. wo sehen Sie noch Ausbaupotenzial?

	unzureichend dargestellt	ausreichend dargestellt
Ökologische Aspekte allgemein	<input type="radio"/>	<input type="radio"/>
Klimabelastung	<input type="radio"/>	<input type="radio"/>
Aquatische Ökosysteme	<input type="radio"/>	<input type="radio"/>
Terrestrische Ökosysteme	<input type="radio"/>	<input type="radio"/>
Biodiversität	<input type="radio"/>	<input type="radio"/>
Eigene Ergänzung: Welche Indikatoren würden Sie gerne verwenden?	<input type="radio"/>	<input type="radio"/>
Eigene Ergänzung		

**9. Welche ökonomischen Themenfelder der Bioökonomie sind für Sie im Pilotbericht zum Monitoring der deutschen Bioökonomie ausreichend dargestellt bzw. wo sehen Sie noch Ausbaupotenzial?**

	unzureichend dargestellt	ausreichend dargestellt
Ökonomische Aspekte allgemein	<input type="radio"/>	<input type="radio"/>
Energie	<input type="radio"/>	<input type="radio"/>
Arbeitsbedingungen	<input type="radio"/>	<input type="radio"/>
Wirtschaftswachstum	<input type="radio"/>	<input type="radio"/>
Innovationen & Infrastruktur	<input type="radio"/>	<input type="radio"/>
Ungleichheiten	<input type="radio"/>	<input type="radio"/>
Nachhaltige Konsum- und Produktionsmuster	<input type="radio"/>	<input type="radio"/>
Globale Kooperation, Partnerschaften, Institutionen	<input type="radio"/>	<input type="radio"/>
Eigene Ergänzung: Welche Indikatoren würden Sie gerne verwenden?	<input type="radio"/>	<input type="radio"/>
Eigene Ergänzung		

**10. Sind die zentralen Aussagen des Pilotbericht zum Monitoring der deutschen Bioökonomie für Sie ausreichend konkret herausgearbeitet?**

	keine Aussage erkennbar	Aussage sehr allgemein	Aussage ohne mögliche Schlussfolgerung	Aussage und mögliche Schlussfolgerungen zu komplex	Aussage gut herausgearbeitet und Schlussfolgerung möglich
Stoffströme der Bioökonomie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wertschöpfung und Arbeitsplätze in der Bioökonomie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Landwirtschaftliche Treiber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Konsumverhalten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nahrungsmittelabfälle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energetische Nutzung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stoffliche Nutzung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologische Entwicklung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Materialfußabdruck	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Forstfußabdruck	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agrarfußabdruck	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wasserfußabdruck	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Klimafußabdruck	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**11. Werden Handlungsalternativen durch den Pilotbericht zum Monitoring der deutschen Bioökonomie erkennbar?**

**Handlungsalternativen ...**

... direkt aus dem Pilotbericht

nicht  
erkennbar



erkennbar



... auf Basis des Pilotberichts

nicht  
erkennbar



erkennbar



**12. Für welche Akteure und wie erachten Sie die Verwendung des Pilotbericht zum Monitoring der deutschen Bioökonomie als nützlich?**

	nicht nützlich	nützlich
Politische Entscheidungsträger_innen	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Wirtschaft	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Öffentliche und gesellschaftliche Diskussion	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Wissenschaft	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
NGOs	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Bürger_innen	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Das Monitoring sollte business-as-usual Trends bewerten (ex ante)	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Das Monitoring sollte alternative Szenarien bewerten (ex ante)	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Das Monitoring sollte historische Trends bewerten (ex post)	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>

### 3. Herausforderungen in der Bioökonomie und dem Monitoring

#### 13. Wo verorten Sie diverse Bioökonomieverständnisse bzw. Visionen?

A – „Grüner“ Kapitalismus: technologiegeleiteter Übergang zu einer (globalen) Bioökonomie und die Fortsetzung kapitalistischen Wachstums als kontinuierliche Expansion und Akkumulation von (Natur-)Kapital; Business as Usual

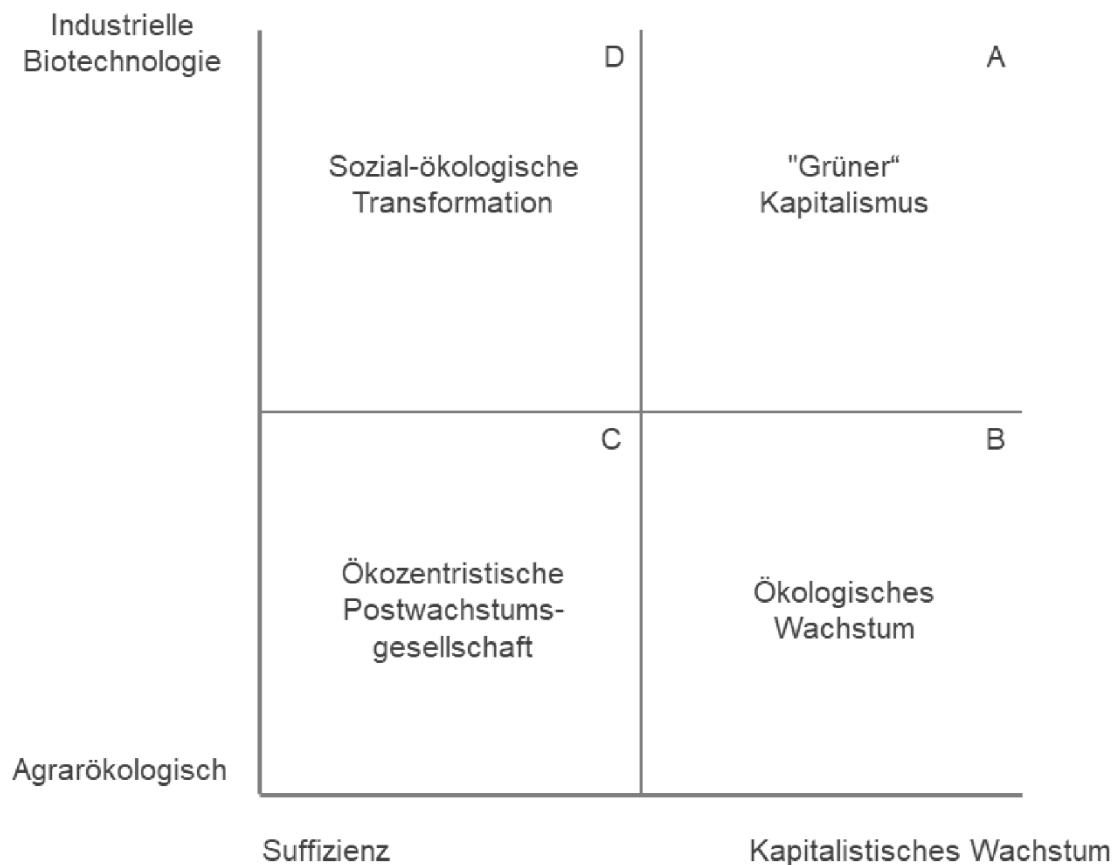
B – Ökologisches Wachstum: gleichzeitige agro-ökologische Praktiken und wachstumsbasierte kapitalistische Wirtschaft; Visionen von ökologischem Unternehmertum, agro-ökologischer Innovation, kleinbäuerlichen Praktiken und einem regionalen statt globalen Fokus

C – Ökozentristische Postwachstumsgesellschaft: agrar-ökologische Praktiken mit Ausrichtung an sozioökonomischen Suffizienz; umfassender sozio-ökologischer Übergang zu einer „naturnahen“ Produktion ohne industrielle Großtechnologien

D – Sozial-ökologische Transformation: Industrielle Biotechnologie und Suffizienz durch koordiniertes staatliches Handeln; umfassender sozio-ökonomischer Wandel hin zu einer Suffizienzperspektive, die menschliche Bedürfnisse innerhalb der planetaren Grenzen unter Einsatz fortschrittlicher & großindustrieller Technologien befriedigt

nach Hausknost et al. 2017. A Transition to Which Bioeconomy? An Exploration of Diverging Techno-Political Choices. Sustainability, 9, 669.

<https://www.mdpi.com/2071-1050/9/4/669>



☐ Hier sehe ich meine  
eigene Bioökonomievision

☐ Hier sehe ich die  
Deutsche  
Bioökonomiestrategie

☐ Hier sehe ich die  
Europäische  
Bioökonomiestrategie

**14. Wie bewerten Sie den Stand der gesellschaftlichen Diskussion zur Bioökonomie?**

abgeschlossen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	relativ offen
vorhandene Strukturen reproduzierend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	neue Strukturen fördernd
von wenigen Akteuren bestimmt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	viele Akteure einschließend
an bisherigen Zielen orientiert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	an neuen Ziele orientiert
kontinuierliche Entwicklung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	dynamische Entwicklung

**15. Wie wird sich die Bioökonomie nach Ihrer Einschätzung entwickeln?**

einzelne Sektoren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Wirtschaft & Gesellschaft übergreifend
regional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	global
Konzerne & Industrie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	kleinere und mittlere Unternehmen
technologische Veränderungen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	gesellschaftliche Transformation
Wachstum & Wettbewerb als Treiber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	ökologische und soziale Veränderungen als Treiber

**16. Wie sollte sich die Bioökonomie nach Ihrer Erwartung entwickeln?**

einzelne Sektoren	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Wirtschaft & Gesellschaft übergreifend
regional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	global
Konzerne & Industrie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	kleinere und mittlere Unternehmen
technologische Veränderungen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	gesellschaftliche Transformation
Wachstum & Wettbewerb als Treiber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	ökologische und soziale Veränderungen als Treiber

17. Was ist für eine nachhaltige Bioökonomie Ihrer Meinung nach erforderlich?

	nicht erforderlich		neutral	erforderlich	
... nachhaltige Konsummuster ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... nachhaltige Produktionsmuster ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... globale Verantwortung Deutschlands ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Einhaltung planetarer Grenzen ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Substitution fossiler Rohstoffe ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Kreislaufwirtschaft und Kaskadennutzung ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... die Nutzung von Rest- und Abfallstoffen ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... eine Agrarwende hin zu einer nachhaltigen Landwirtschaft ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... die Integration von Ökosystemdienstleistungen ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... kohärente und durchsetzungsstarke politische Maßnahmen ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Suffizienz ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Subsistenz ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Ressourceneffizienz ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... ökonomische und ökologische Gerechtigkeit ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Transdisziplinarität ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Partizipation/Bürger_innenwissenschaften ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... Einbezug von Kunst und Kultur ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... starke Differenzierung zwischen Bioökonomie und Gesamtwirtschaft	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 4. Kommunikation der Monitoringberichte und Ergebnisse

### 18. Für welche Dauer sollten ...

	einmalig	bis 2022	bis 2025	bis 2030	Langzeit-Monitoring
... die Bioökonomiemonitoringberichte veröffentlicht werden?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 19. In welchem Intervall sollten ...

	aller 5 Jahre	aller 2 Jahre	Jährlich	Halbjährlich	Echtzeit
... die Bioökonomiemonitoringberichte veröffentlicht werden?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 20. In welchem Rahmen sollte die Berichterstattung des Bioökonomiemonitoring erfolgen?

	nicht zutreffend					zutreffend
Eigenständiger bundesweiter Bericht wie im Pilotbericht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
landesweit (für jedes Bundesland)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In den Fortschrittsberichten zur Nationalen Nachhaltigkeitsstrategie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring der Agenda 2030 (SDGs) durch das Statistische Bundesamt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Auf Europäischer Ebene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vereinte Nationen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 5. Kontexte des Monitorings

### 21. Sollten Aspekte des Bioökonomiemonitorings an für Sie relevanten Nachhaltigkeitspolitiken ausgerichtet sein?

Das Bioökonomiemonitoring. . .

	sollte nicht danach ausgerichtet sein					sollte danach ausgerichtet sein				
... sollte an den Sustainable Development Goals (SDGs) ausgerichtet sein	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... sollte an der Deutschen Nachhaltigkeitsstrategie (DNS) ausgerichtet sein	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... sollte an der Deutschen Bioökonomiestrategie ausgerichtet sein	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... sollte am Europäischen Green New Deal ausgerichtet sein	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Eigene Ergänzung

### 22. Welche der folgenden nationalen Monitoring-Systeme sollten aufgrund von inhaltlichen Schnittstellen im Bioökonomiemonitoring Beachtung finden?

	irrelevant					relevant				
Rohstoffmonitoring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Länderinitiative Kernindikatoren – LIKI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energiewende-Monitoring („Energie der Zukunft“)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ökosystem-Monitoring (Biodiversitätsmonitoring)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring von Landwirtschaftsflächen mit hohem Naturwert (High Nature Value Farmland-Indikator)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vogelmonitoring, Bericht nach Vogelschutz-Richtlinie, Monitoring häufiger Brutvögel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring nach Fauna-Flora-Habitat-(FFH)-Richtlinie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring gentechnisch veränderter Organismen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nationales Monitoring der biologischen Vielfalt in Agrarlandschaften	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring der Bodenorganismen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kleingewässer-Monitoring (im Aufbau)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vegetationsmonitoring (im Aufbau)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring des Stadtgrüns (im Aufbau)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boden-Dauerbeobachtung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eigene Ergänzung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 6. Abschluss

**23. Welcher Stakeholdergruppe der Bioökonomie ordnen Sie sich zu?**

[Bitte auswählen]

**24. Haben Sie noch weitere Kommentare und Anmerkungen zum Bioökonomiemonitoring?**



# Vielen Dank für Ihre Teilnahme!

## Treten Sie gerne mit uns in Kontakt

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Umsatzsteuer-Identifikationsnummer: DE 141507065

Vertretungsberechtigte Personen  
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Dr. Sabine König, Administrative Geschäftsführerin

Aufsichtsratsvorsitzende  
MinDirig'in Oda Keppler

Redaktionelle Verantwortung  
Walther Zeug

Redaktion  
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*Gesamtkoordination: Prof. Dr. Stefan Bringezu (CESR) in Kooperation mit Prof. Dr. Martin Banse (TI).*

*Herausgeber: Center for Environmental Systems Research (CESR), Universität Kassel.*

*Der Bericht kann wie folgt zitiert werden:*

*S. Bringezu, M. Banse, L. Ahmann, N. A. Bezama, E. Billig, R. Bischof, C. Blanke, A. Brosowski, S. Brüning, M. Borchers, M. Budzinski, K.-F. Cyffka, M. Distelkamp, V. Egenolf, M. Flaute, N. Geng, L. Gieseke, R. Graß, K. Hennenberg, T. Hering, S. Iost, D. Jochem, T. Krause, C. Lutz, A. Machmüller, B. Mahro, S. Majer, U. Mantau, K. Meisel, U. Moesenfechtel, A. Noke, T. Raussen, F. Richter, R. Schaldach, J. Schweinle, D. Thrän, M. Uglik, H. Weimar, F. Wimmer, S. Wydra, W. Zeug (2020): Pilotbericht zum Monitoring der deutschen Bioökonomie. Hrsg. vom Center for Environmental Systems Research (CESR), Universität Kassel, Kassel, doi:10.17170/kobra-202005131255.*

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