



BIOregions

Forest bioeconomy in action

Perceptions on the Bioeconomy in Catalonia

Results from a regional survey targeted at government and industry

In collaboration with:



Generalitat de Catalunya
**Departament d'Acció Climàtica,
Alimentació i Agenda Rural**

Contents	Survey report: Government and industry perceptions on the Bioeconomy in Catalonia
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1. Executive summary

The BioRegions Facility launched its Bioeconomy Perceptions Regional Survey in Catalonia in the period 29 September – 1 December 2022 in the local language, Catalan. The Survey was targeted at different groups within government, industry and research, to understand how they perceive the bioeconomy, its benefits, and its challenges. More specifically, the Survey aims at achieving six target outcomes: i) understand how business and policy actors perceive the bioeconomy; ii) revisit value chain priorities and related communication efforts; iii) identify barriers & supporting conditions; iv) assess “willingness to engage” with the bioeconomy; v) get insights on how to improve collaboration with government & industry and; vi) find key leverage points for bioeconomy development by identifying overlaps with other policy areas. Here we present seven key highlights of the Survey in Catalonia.

- Respondents generally perceived **bioeconomy as a promising economic model**, highly related to circular economy, and providing several environmental benefits. Respondents see the contribution to circularity, a low-carbon economy, biodiversity conservation and provision of renewable materials as the most relevant positive impacts of the bioeconomy.
- Bioeconomy is perceived to be highly linked to **circularity, biomass use for multiple purposes, and sustainable land management**.
- Catalan business and policy actors suggest that **bioenergy** is the bioeconomy sector with **highest potential for growth in Catalonia**. Bioplastics and food & gastronomy are in a second and third place.
- **Lack of agility in administrative procedures, lack of supportive policy & legislative environment, and limited co-operation among different stakeholders** are perceived as the most important **barriers for bioeconomy development**. **Investment in innovation, availability of scientific information, and adequate regulation** are perceived the most important **supporting conditions**.
- **Catalan stakeholders indicated very high willingness to develop the bioeconomy**.
- **Government, industry and research respondents felt very similar about who is responsible for different tasks in moving the bioeconomy in Catalonia forward**. Respondents indicated that: government and industry are more or less equally responsible for investments in research, development, and innovation; government is slightly more responsible for ensuring positive environmental and social impacts; and government is significantly more responsible in communicating and promoting the bioeconomy among the general public.
- According to respondents, **bioeconomy has strongest goal alignment with climate change mitigation & adaptation, circular economy, clean energy, and rural development**. Other policy areas with very high overlap with bioeconomy are technological innovation and biodiversity conservation.

2. Regional context

Catalonia, situated in the north-east of Spain, is a region that is densely populated in and around the capital, Barcelona. About 5.2 million of the 7.5 million inhabitants of Catalonia live in the Urban Region of Barcelona. The total surface area of Catalonia is 32,113.86 km², comparable to the size of Belgium. Except for the mountainous areas, Catalonia has a Mediterranean climate.

Catalonia is a region with high economic importance in Spain as it is among the top Spanish regions in terms of total GDP and GDP/capita. The strongest industrial sectors of Catalonia are construction, metal industries, machinery, food industries and chemical industries¹. The primary sector represents 0,90% of the GDP and 1,7% of the total employment.

Almost two-thirds (64.6%) of the Catalan surface is forest area (Catalan Forest Observatory²). Ownership of the forest is fragmented with 76% of the forest area being in the hands of private forest owners and 24% being public forest. Average forest ownership is around 30 ha, with a large majority of ownerships below 25 ha. Historically, Catalonia has not always been covered with so many forests. There used to be a lot more agricultural lands before they were abandoned during the last few decennia. As a result, tree species started to dominate again but in many cases these “new” forests have not been managed which implicates increased risks of disturbances such as wildfires. The main species in Catalan forests in terms of wood volume are Scots pine, white pine and oak (Catalan Forest Observatory).

Catalan landscapes have been experiencing challenges such as high urbanisation rates, intensive agriculture, agricultural abandonment, wildfires, and mass tourism. The Catalan government is strongly vouching for the circular, territorial bioeconomy as the future for a sustainable economy in Catalonia through the Catalan Bioeconomy Strategy 2030³. The Catalan Bioeconomy Strategy 2030 aims to strengthen the growth and sustainable development of the Catalan economy by promoting the production of biological resources as well as local and renewable processes. The First Action Plan 2022-2024 of the Strategy contemplates 15 Transformative Actions with a funding of more than €200 million. In the same Plan, four value chains have been prioritised, which are: 1) improvement in forest management and the use of forest resources, 2) creation of resilient agroforestry landscapes and the sustainable provision of ecosystem services, 3) recovery of coproducts and by-products from the food chain, and 4) resource recovery from livestock waste and organic waste.

Regarding the value chains in the forestry area, the first value chain sets a specific milestone in this area: To increase the use of forest resources by 30% for the year 2030. In relation to the second priority value chain, especially important due to the type of landscape in Catalonia, the Catalan Bioeconomy Strategy is promoting a multifunctional landscape perspective with an emphasis on the agroforestry mosaic, to create and maintain more cohesive and more resilient landscapes, which allow biodiversity to be preserved and promote economic and social development. Finally, the Catalan Bioeconomy Strategy 2030 (EBC2030) is a cross-cutting, forward-looking strategy that aims to improve the sustainability and

¹ Data obtained from regional benchmarking tool on smart specialisation platform (<https://s3platform.jrc.ec.europa.eu/regional-benchmarking>).

² Catalan Forest Observatory: <https://www.observatoriforestal.cat/resum-del-sector/>

³ Catalan Bioeconomy Strategy 2030: https://ruralcat.gencat.cat/documents/20181/9479472/EBC2030_EN.pdf/51d819d9-b139-4fb9-b297-278344bf72ea

competitiveness of every sector involved, with special attention to the primary sector. It focuses on underdeveloped value chains, and it uses knowledge generation as a driver for change. The creation of quality jobs and anchoring population to the rural environment are also fundamental pillars of the Strategy.

3. Results

3.1. About the respondents

We targeted groups working within government and industry in Catalonia. More specifically, we were interested in the perceptions of intermediate and high-level managers / decision-makers within municipal and regional governance, and local industry and business leaders, entrepreneurs, clusters, local industry associations and membership groups, farmer/forester associations, land managers and cooperatives within the private sector. Additionally, the survey was adapted to allow for respondents from research and civil society to reflect their viewpoints.

Due to survey dissemination methods, it is not possible to estimate accurately the number of people who received the survey. A total of 154 people responded to the survey, 44 respondents said to be from Government (or related public sector) (29%), 66 from Industry (or related private sector) (43%), 25 from Research institutes and universities (16%), 5 from Civil society and voluntary/civic sector (3%), and 14 respondents identified themselves as not being part of any of the predefined fields. When analysing what the 14 others wrote to specify their field, we could reallocate all 14 respondents to one of the predefined fields. One person was reallocated to Government (or related public sector) as the person said to work in public administration; four persons were reallocated to Civil society and voluntary/civic sector as they mentioned non-profit organisation, voluntary sector and retired; the nine other persons were reallocated to Industry (or related private sector) as they mentioned to work in different private sectors. Resultingly, we executed the analysis with 45 respondents belonging to Government (or related public sector) (29%), 75 respondents belonging to Industry (or related private sector) (49%), 25 from Research institutes and universities (16%) and 9 from Civil society and voluntary/civic sector (6%) (Figure 1).

There was a rather even gender distribution of respondents with 48% female, 50% male and 2% preferring not to say (Annex A1). Responses were received from all age groups but only 1 response from the 18-24 age group – likely due to the survey's aim of reaching industry leaders and mid-to-high-ranking government officials. Respondents were rather evenly distributed among the age classes 25-34, 35-44, 45-54 and 55-64, ranging from 20% to 29% of respondents in each of those age classes. Most respondents (68%) both live and work in Catalonia, but there were also those who only live in the region (32%). Most respondents live in urban areas (49%), in comparison with those who live in rural (27%) or semi-rural/suburban (23%) areas.

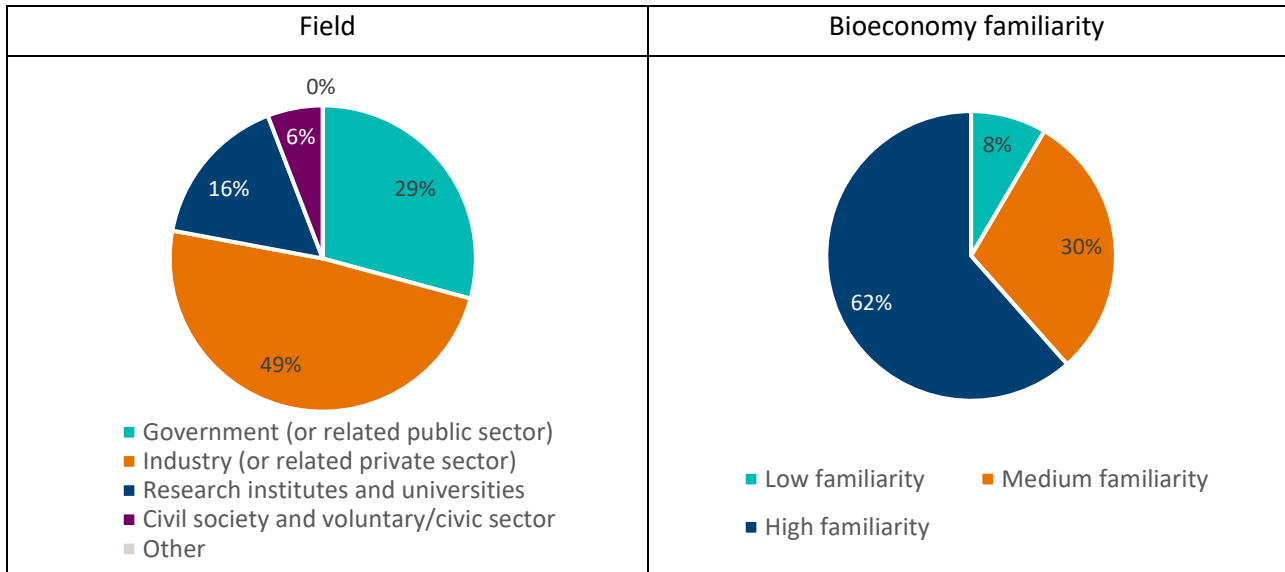


Figure 1: Characterisation of respondents according to field and bioeconomy familiarity. Additional charts related to the characterisation of the respondents can be found in Annex 1.

Most respondents reported good familiarity with the bioeconomy, with 62% indicating high familiarity and 30% indicating they had medium familiarity with the bioeconomy (Figure 1). 8% of the respondents reported having low familiarity with the bioeconomy.

3.2. Understand how business and policy actors perceive the bioeconomy

Respondents were asked which concepts and sectors they see as part of the bioeconomy, what are the main benefits and risks of the bioeconomy in their region, and what is the perceived level of public awareness.

Circular use of resources was most understood to be a part of the bioeconomy (by 97% of respondents), followed by *Use of biomass for multiple purposes* (88%) and *Sustainable land management* (87%) (Figure 2). *Sustainable consumption* (78%), *Carbon neutrality* (72%), *Nature-based solutions* (65%), *Ecosystem services* (65%), *Technological advancement* (58%), and *Community resilience* (58%) were also indicated by the majority of respondents to be a part of the bioeconomy. Interestingly, *Economic prosperity* (45%), was less considered by respondents to be a part of the bioeconomy.

Summarising, respondents see circularity, biomass use and sustainability most linked to the bioeconomy. On the other hand, the bioeconomy is considered less relevant for economic development.

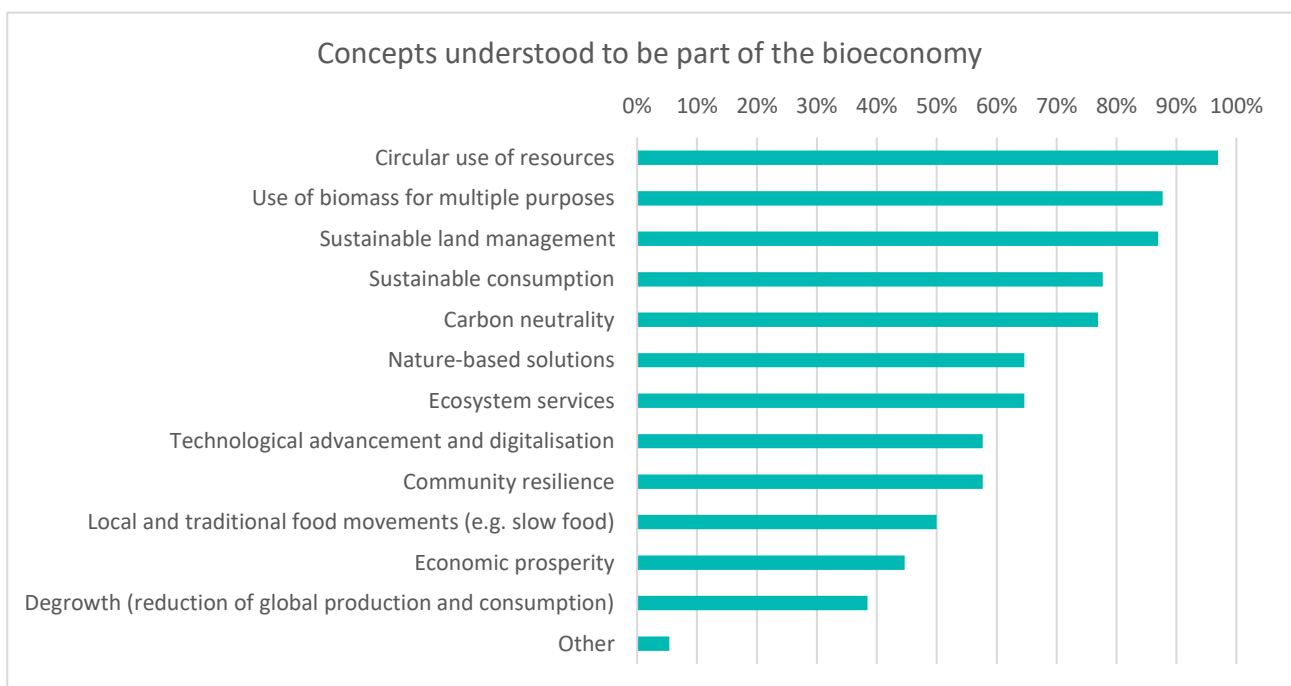


Figure 2: Proportion of survey respondents that understand certain concepts to be part of the bioeconomy. Respondents were allowed to select as many concepts as desired. Proportion is expressed as percentage of respondents.

In terms of primary production, bioeconomy is perceived to be more linked with *Agriculture* (95%) than with *Forestry* (82%) and *Fisheries and aquaculture* (81%) (Figure 3). A very high proportion of respondents consider *Waste management* (93%) as part of the bioeconomy. Also 75% of respondents consider *Biotechnology and pharmaceutical sectors* as part of the bioeconomy.

Among downstream sectors, *Energy* (88%) and *Food and gastronomy* (85%) receive by far most consideration. *Chemistry* (65%), *Construction* (61%), *Textiles* (58%) and *Health and wellbeing* (52%), are other secondary sectors perceived by more than half of respondents to be part of the bioeconomy. *Tourism and recreation* (44%) and *Machine industry* (44%) are among the sectors least considered to be a part of the bioeconomy. It has to be noted that even these sectors are considered by nearly half of the respondents, indicating that respondents understand all predefined sectors as linked to the bioeconomy. In addition, 8% of respondents defined *Other* sectors that they understand to be part of the bioeconomy. Several suggestions include that bioeconomy should encompass all existing sectors.

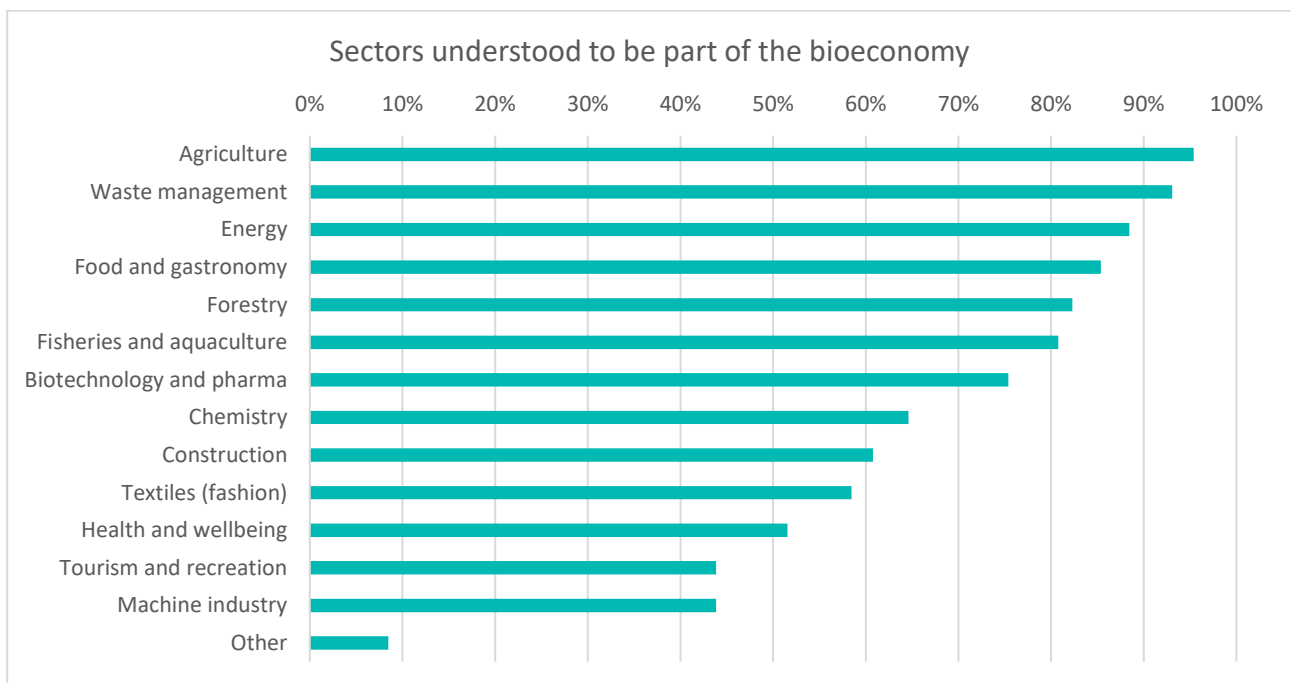


Figure 3: Proportion of survey respondents that understand certain sectors to be part of the bioeconomy. Respondents were allowed to select as many sectors as desired. Proportion is expressed as percentage of respondents.

As shown in Figure 4 below, based on true/false statements, the vast majority of respondents (>90%) agreed on nearly all the positive impacts of the bioeconomy, e.g., that the bioeconomy provides business and innovation opportunities, contributes to sustainable economic growth, provides benefits to rural areas, helps mitigate climate change, creates new jobs, and reduces our dependency on fossil fuels. Three quarters of respondents consider that bio-based products are easily recycled into new products and materials at their end-of-life. On the other hand, a very low proportion of respondents do perceive some risks of the bioeconomy as inducing *stress on natural systems* (3%), *contributing to deforestation* (6%) and *not enough biomass to implement the bioeconomy* (7%).

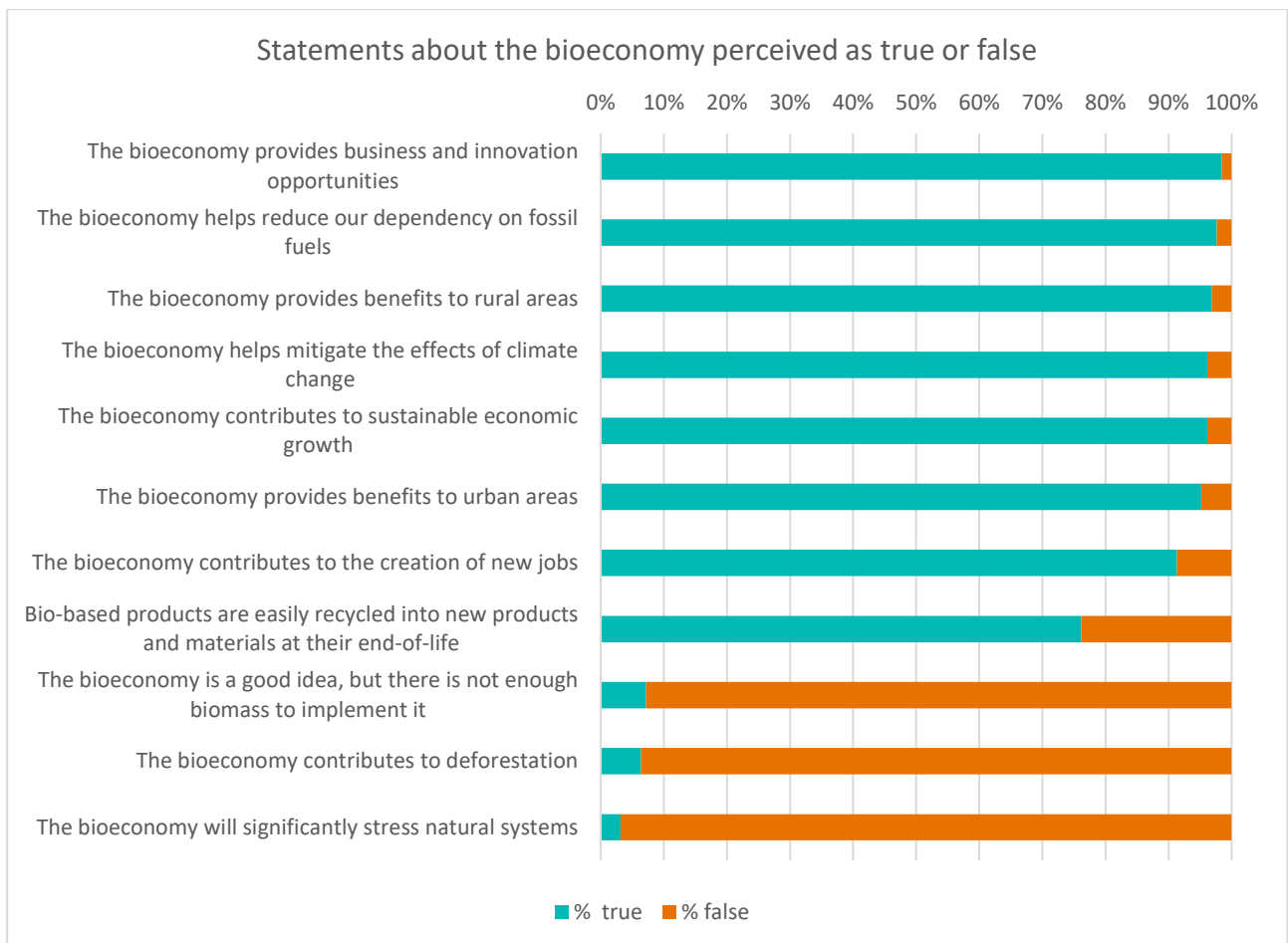


Figure 4: Proportion of survey respondents that marked bioeconomy statements as true (blue) or false (orange). Proportion is expressed as percentage of respondents.

When asked about the single most important benefit of the bioeconomy, *Reduced material consumption and waste, increased reuse and recycling* emerges as the most frequent answer (36%), followed by *Transition to a low-carbon economy* (18%) and *Helping conserve biodiversity and ecosystem services* (18%) (Figure 5). *Providing renewable alternatives to non-renewable materials* was selected by 12% of respondents. Several benefits were considered most important by a very low proportion of the respondents: *Renewable energy to replace fossil fuels* (6%), *Job creation and economic growth* (4%), *Fostering technological innovation* (3%), *Providing wellbeing for people* (2%), *Fostering technological innovation* (3%), *Providing wellbeing for people* (2%).

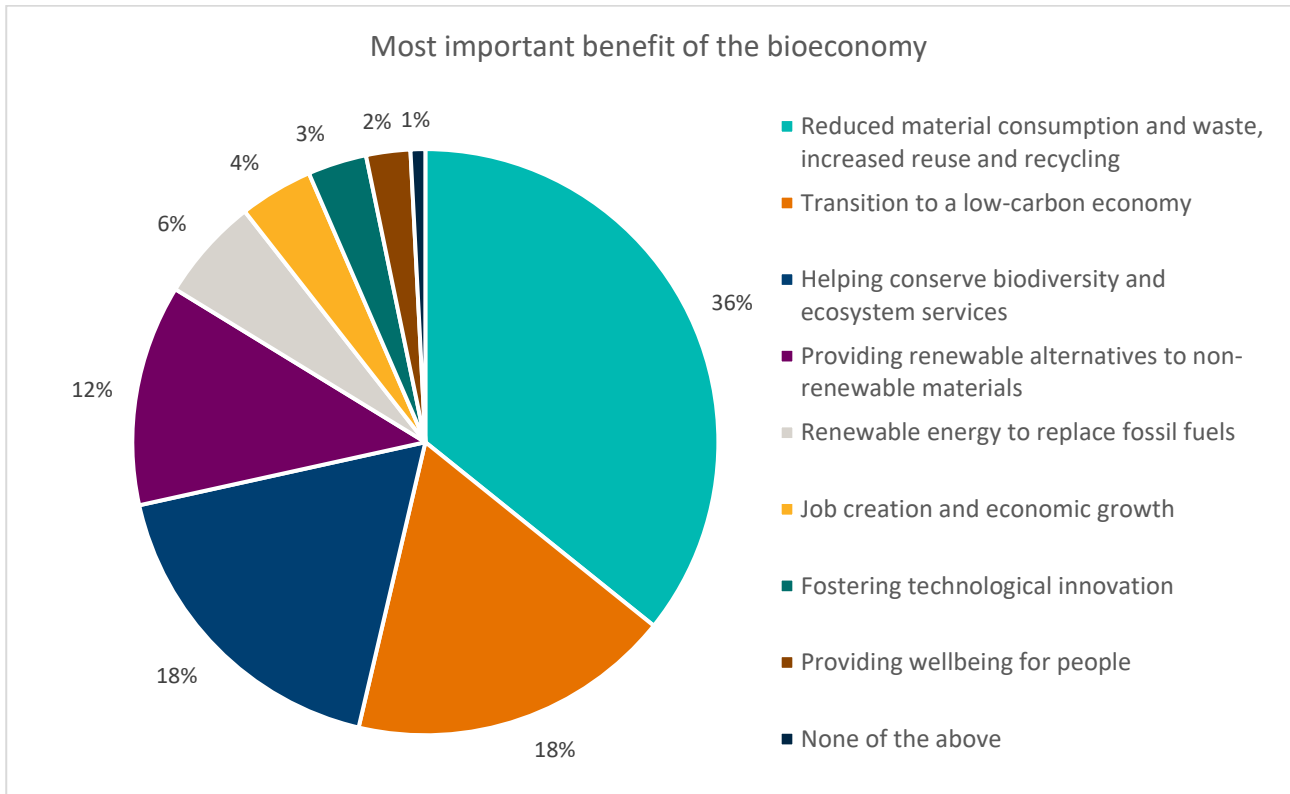


Figure 5: Proportion of respondents that perceived benefits of the bioeconomy as being the most important benefit out of eight predefined benefits. Respondents were limited to select only one benefit. Proportion is expressed as percentage of respondents.

When asked about the single most important risk of the bioeconomy, respondents selected “None” of the predefined risks as the most frequent answer (26%) (Figure 6). From the predefined risks, *Higher cost of essential goods (e.g., food, water, shelter)* (22%) and *Dangerous impacts on developing countries* (18%) were considered most important. Three other risks were selected by about a tenth of the respondents each: *Impacts on ecosystem services* (11%), *Increasing biomass costs* (11%) and *Impacts on poverty or food sovereignty* (11%). Least respondents considered *Not enough biomass to supply the bioeconomy* (3%) as most important risk.

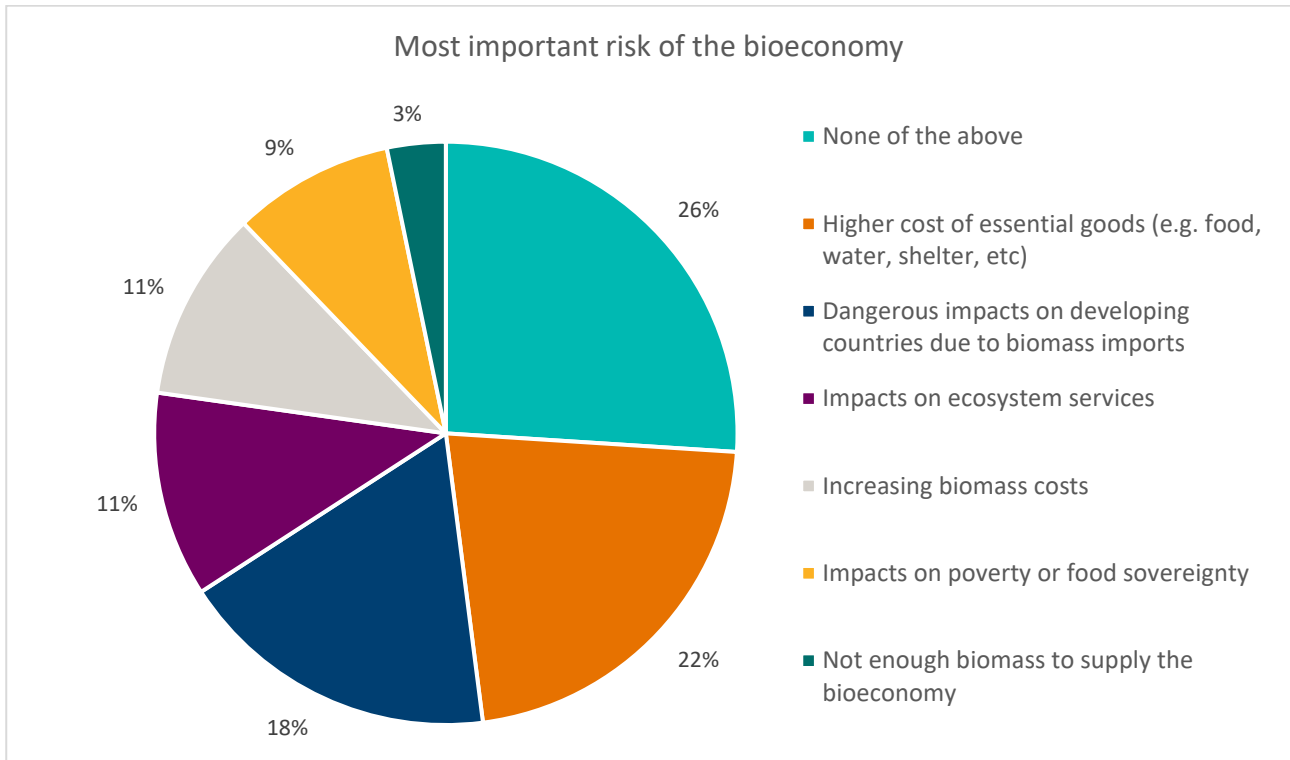


Figure 6: Proportion of respondents that perceived risks of the bioeconomy as being the most important risk out of six predefined risks. Respondents were limited to select only one risk. Proportion is expressed as percentage of respondents.

When asking about public awareness, 97% of respondents overall felt that the general public was not sufficiently informed on the bioeconomy. Although the variety in responses from different target groups is small, respondents from research institutes and universities were most optimistic with 5% claiming that the general public is sufficiently informed, in contrast to respondents from civil society and voluntary/civic sector with none of them considering that the general public is sufficiently informed.

3.3. Revisit communication strategies and value chain priorities

Respondents were asked how prepared their region is for the transition from a conventional economy to a circular bio-based economy, to indicate which bioeconomy sectors have the highest potential for growth, and to what extent different sectors could replace their conventional materials with bio-based materials in the region by 2050. The responses allow to revisit value chain priorities and related communication efforts, compare with current bioeconomy sectors and compare with bioeconomy strategies.

When asking the respondents how they consider the readiness of Catalonia for the transition from a conventional economy to a circular bio-based economy, the majority of respondents answered low readiness (39% of respondents) and medium readiness (43% of respondents) (Figure 7). 7% of respondents considered Catalonia to have very low readiness but also 12% of the respondents reported a high readiness. None of the respondents (0%) considered a very high regional readiness to transition to a circular bio-based economy.

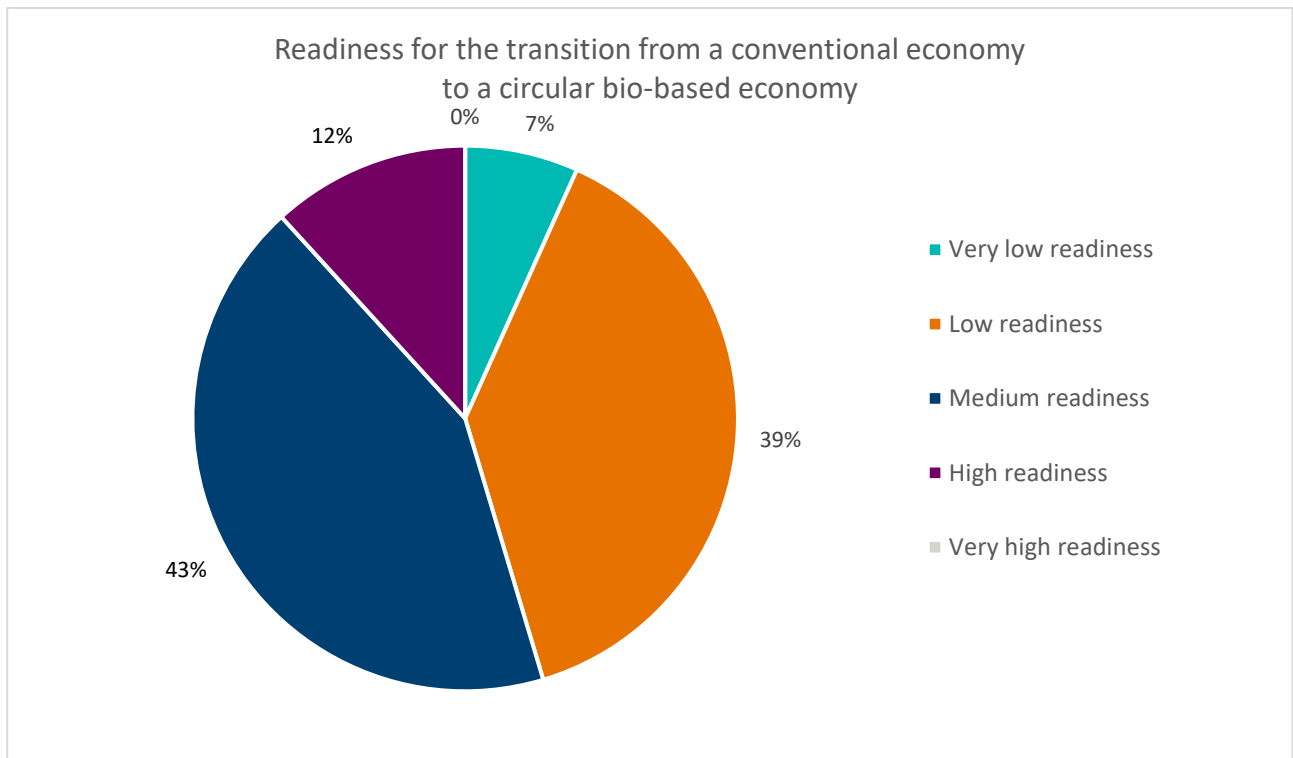


Figure 7: Proportion of respondents that consider different readiness levels of Catalonia to transition from a conventional economy to a circular bio-based economy.

Respondents perceived by-far that *Bioenergy* (72%) is the bioeconomy sector with highest potential for growth in Catalonia (Figure 8). *Bioplastics* (40%), *Food and gastronomy* (40%) and *Green chemistry* (31%) are also considered by more than a quarter of respondents. The high proportion that mentions Bioplastics and Green chemistry can be related to Catalonia's well-developed conventional chemistry and packaging sectors. *Advanced new materials* (25%), *Wood construction* (24%) and *Nature-based tourism* (20%) were considered sectors with a high potential by a fifth to a quarter of respondents. The sectors least considered to have a high potential for growth in Catalonia are *Wood-based materials* (15%), *Textiles & fashion* (10%), *Non-wood forest products* (9%) and *Pulp & paper* (3%) (Figure 8).

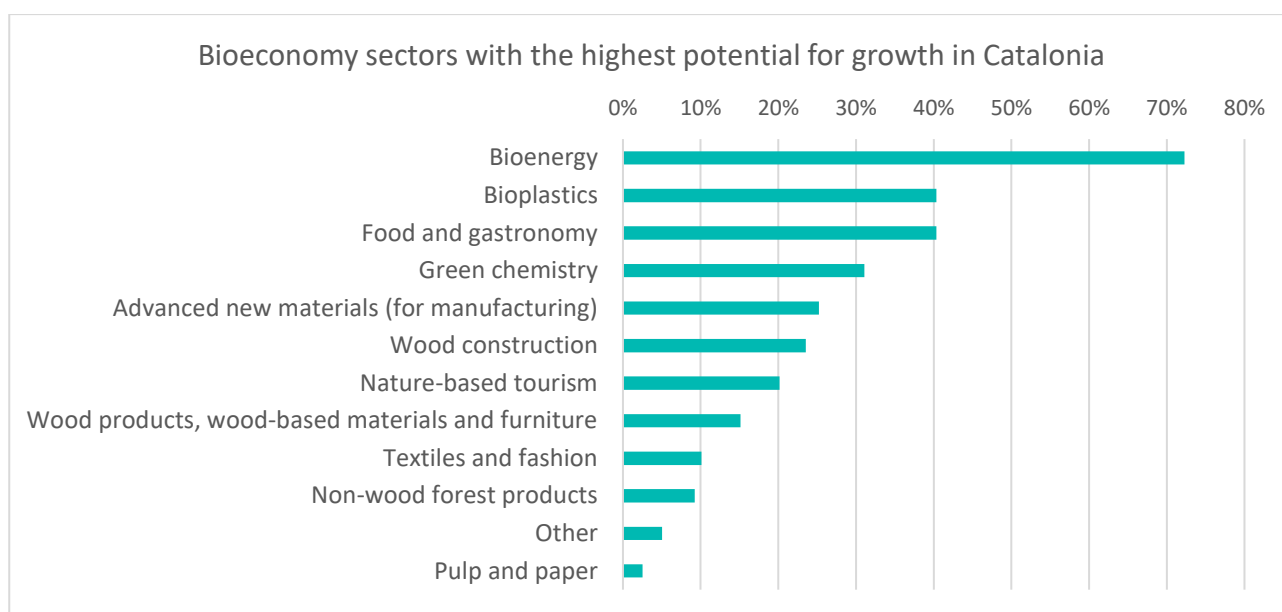


Figure 8: Proportion of respondents that selected bioeconomy sectors to have the highest potential for growth in Catalonia. Respondents were allowed to choose up to three sectors. Proportion expressed as percentage of respondents.

When analysing this question separately for government and industry respondents, slight differences can be observed (Table 1). The main difference is that government respondents see a higher potential for growth in wood construction and industry respondents see a higher potential for growth in green chemistry.

Table 1: Five sectors with highest potential for growth in Catalonia for government and industry respondents respectively. The percentage reflects the proportion of respondents that selected those bioeconomy sectors. Respondents were allowed to choose up to three sectors.

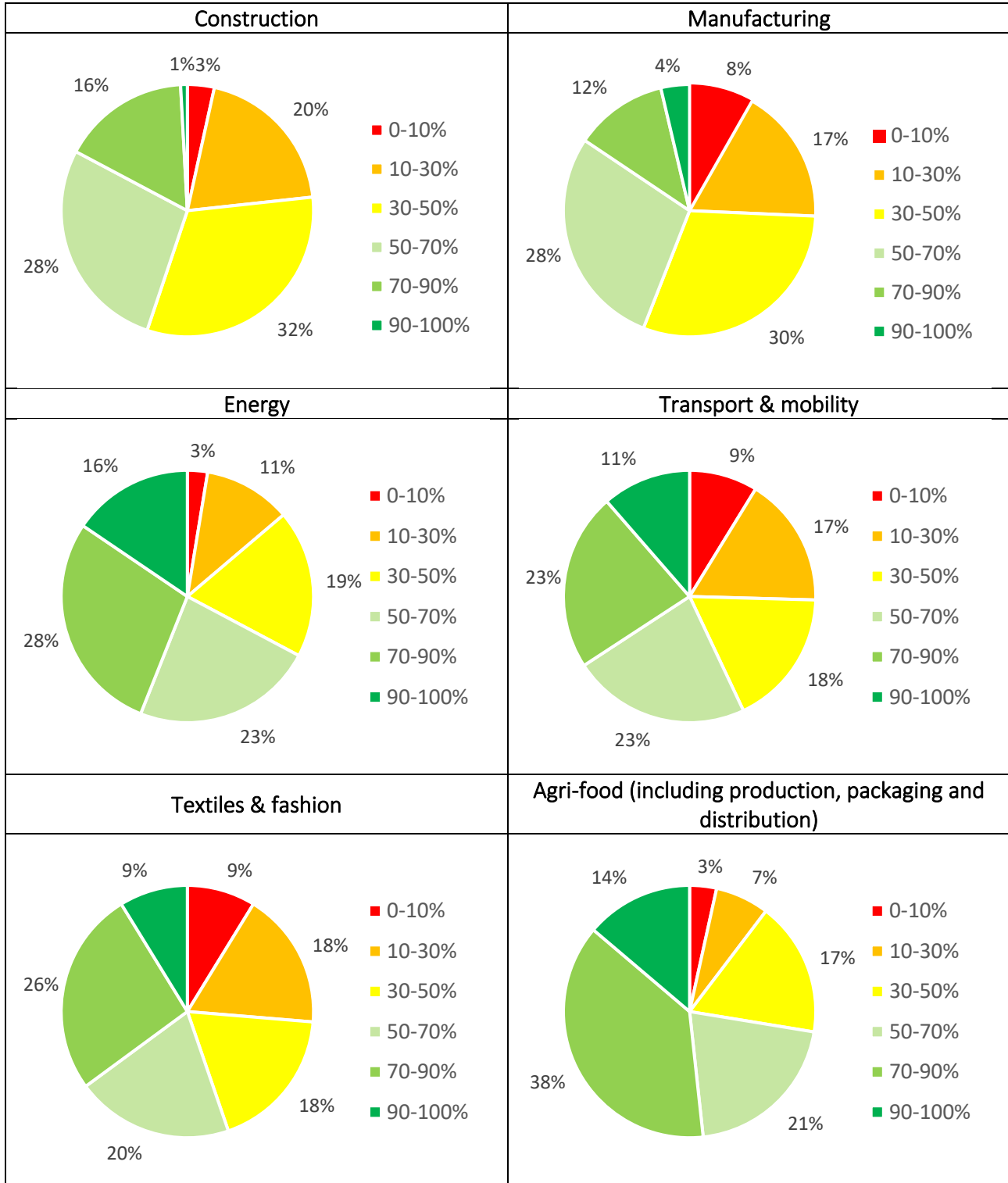
Government respondents	Industry respondents
1. Bioenergy (82%)	1. Bioenergy (78%)
2. Bioplastics (45%)	2. Bioplastics (46%)
3. Food & gastronomy (37%)	3 / 4. Green chemistry (35%) / Food & gastronomy (35%)
4. Wood construction (32%)	5 / 6. Wood construction (22%) / Advanced new materials (22%)
5. Green chemistry (26%)	

Respondents were asked to what extent six different sectors could replace their conventional (fossil-based) materials with bio-based materials by 2050 in Catalonia.

Table 2 shows that the majority (more than 50%) of respondents considered that within the sectors Energy, Transport & mobility, Textiles & fashion and Agri-food, more than 50% of the conventional materials/resources (50-70%, 70-90% and 90-100%; the three green parts in the pie chart) can be replaced with bio-based materials in 2050 in Catalonia. For the Energy and Agri-food sector, more than a third of respondents considered this. In the case of the sectors Manufacturing and Construction, less than half of the respondents believed that more than 50% of the conventional materials/resources (50-70%, 70-90% and 90-100%) can be replaced with bio-based materials in 2050 in Catalonia.

By using the average values in the ranges of predefined proportions (e.g., assuming that respondents who selected 10-30% believe on average that about 20% of the conventional materials can be replaced), we can estimate an average proportion of the conventional materials that can be replaced with bio-based materials. This exercise gives as result that the Agri-food sector is on average estimated to be the sector with highest potential to replace conventional resources with bio-based resources in 2050 in Catalonia, namely 64% of resources is estimated to be replaceable. The second sector with highest proportion of resources that can be replaced is the Energy sector, with 61%. In third and fourth place, come the Transport & mobility sector, with 54% of conventional resources that are replaceable, and Textiles & fashion sector, with 53%. The sectors in Catalonia that are expected to have lowest proportion of resources to be replaceable are Construction and Manufacturing, with an estimated 47% and 46% respectively of their conventional resources replaced with bio-based resources by 2050.

Table 2: Proportion of respondents that considers the extent to which conventional materials can be replaced with bio-based materials by 2050 in six different sectors in Catalonia. Respondents were asked to estimate the proportion that can be replaced, choosing from six options: 0-10%; 10-30%; 30-50%; 50-70%; 70-90%; 90-100%.



3.4. Identify barriers & supporting conditions

Respondents were asked to indicate the importance of supporting conditions and barriers for bioeconomy development in Catalonia. This information allows to ensure that the most important supporting conditions are met and to strategise about how to overcome barriers for bioeconomy development.

Investment in innovation (4.62/5) was considered as the most important supporting condition for bioeconomy development, followed by *Availability of scientific information* (4.31/5) and *Adequate regulation* (4.27) (Figure 9). *Public procurement programmes* (3.93/5) and *Performance-based payments for carbon sequestration* (3.70/5) obtained scores close to or slightly below Important (4/5).

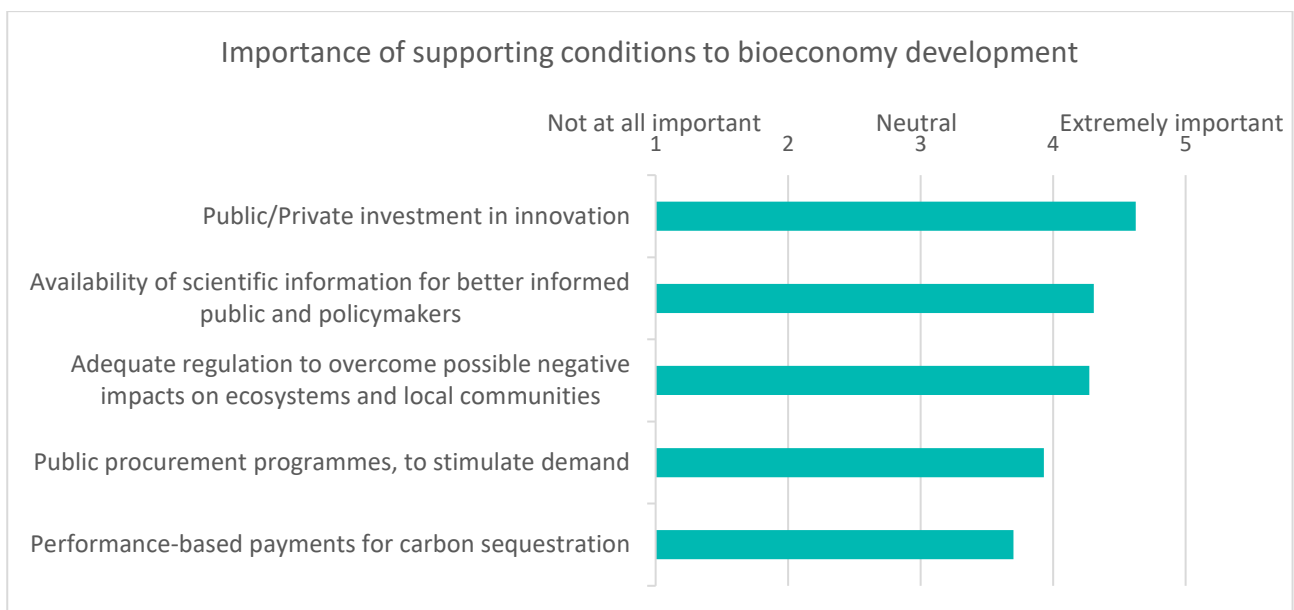


Figure 9: Importance of factors as supporting conditions for bioeconomy development in Catalonia. Respondents were asked to rank the factors from one (Not at all important) to five (Extremely important), the average value of the respondents' ranking is shown.

With regards to barriers, *Lack of agility in administrative procedures* (4.56/5) was perceived the most important barrier, followed by *Lack of supportive policy and legislative environment* (4.36/5) and *Lack of co-operation among different stakeholders* (4.36/5) (Figure 10). Nearly all other barriers were perceived close to Important (4/5): *Lack of profitability and market demand* (4.18/5); *Lack of balance between different uses of forest* (3.90/5); *Lack of skilled labour* (3.89); *Lack of technical feasibility and/or barriers to innovation* (3.89/5); and *Lack of in-house technology development* (3.85). *Lack of general social acceptance* (3.57/5) is perceived in between Neutral (3) and Important (4).

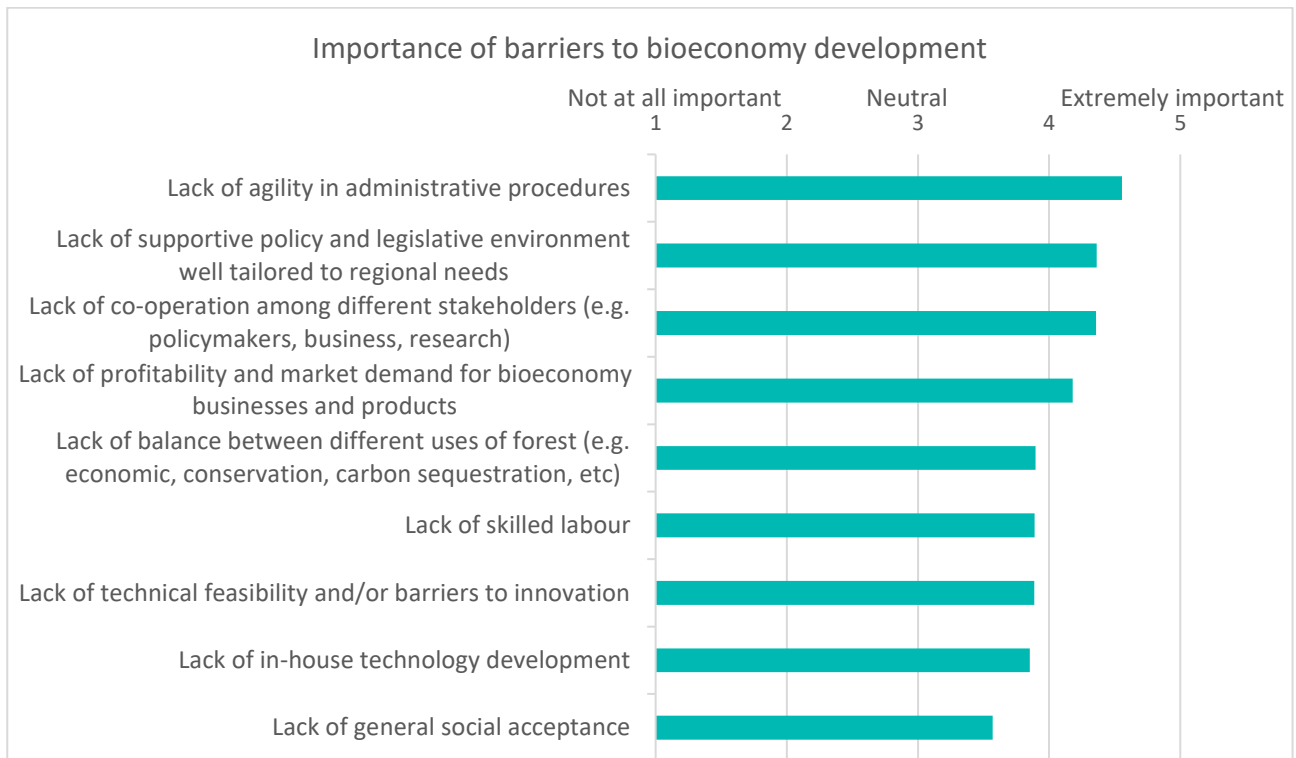


Figure 10: Importance of factors as barriers for bioeconomy development in Catalonia. Respondents were asked to rank the factors from one (Not at all important) to five (Extremely important), the average value of the respondents' ranking is shown.

3.5. Assess “willingness to engage” with the bioeconomy

Respondents were asked how willing their industry sector or research centre would be to developing the bioeconomy; if they had been involved in any investment projects, research projects or initiatives related to the bioeconomy; and what were the main reasons for involvement or the lack of it. Below we present the results of industry and research side by side. Due to a technical error in SurveyMonkey, the answers from Government respondents to this question were not captured.

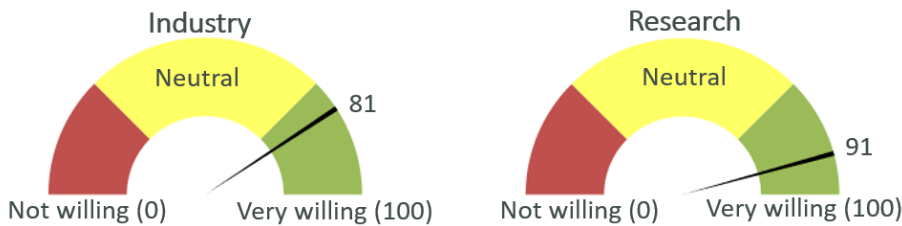


Figure 11: Willingness to develop the bioeconomy. Industry and research respondents were asked to rate how willing their industry sector/research centre or university is to develop the bioeconomy on a scale from zero (not willing) to hundred (extremely willing). Note: Due to a technicality in SurveyMonkey, the answers from Government respondents to this question were not captured.

Industry

Industry respondents were asked how willing they were to develop the bioeconomy on a scale from zero (not willing) to hundred (extremely willing). The average score was 81, meaning that the industry respondents are very willing to develop the bioeconomy (Figure 11). 50% of industry respondents said to have undertaken an investment project in the bioeconomy in the past.

The main reasons to have undertaken bioeconomy investment projects are *To take advantage of the existing market opportunities* (62% of industry respondents that have undertaken bioeconomy projects) and *To gain a competitive advantage in future markets* (38%). *To take advantage of government incentives* (29%) was mentioned by nearly a third of industry respondents who have undertaken bioeconomy projects. Nearly a fifth (19%) mentioned “Other” reasons, such as environmental awareness and performance.

High uncertainty in bioeconomy projects (45%) and *Lack of technical capacity* (40%) were mentioned most often as the main reasons to not have undertaken a bioeconomy project. A fifth of those respondents also selected *Unprepared market: too small and growing too slow* (20%), and *Low expected profitability* (20%). A quarter of respondents specified “Other” reasons, such as lack of ability to invest.

Research

Respondents from research centres and universities were asked how willing they were to develop the bioeconomy on a scale from zero (not willing) to hundred (extremely willing). The average score was 91, meaning that research respondents are extremely willing to develop the bioeconomy (Figure 11). Moreover, all research respondents (100%) said that their research institute or university has undertaken a research, development, or innovation project in the bioeconomy.

3.6. Improve collaboration with government & industry

Respondents were asked about the division of roles and responsibilities between the government and industry regarding communicating the bioeconomy to the public, investing in research, development, and innovation, and ensuring that the bioeconomy has a positive effect on the environment and the society. We compared results between the three sub-groups with more respondents, namely government, industry and research. Specific results for the fourth sub-group “Civil society and voluntary/civic sector” are not shown as the number of respondents from this group is too limited to be representative.

All three groups emphasised that the government is more responsible in communicating and promoting the bioeconomy among the general public (Figure 12). Regarding investments in research, development, and innovation, all three sub-groups perceived that Government and Industry are more or less equally responsible with government and industry respondents reporting a slightly higher responsibility for their own sub-group, although the difference is almost negligible. In relation to ensuring positive environmental and social impacts, all three groups indicated that Government is a bit more responsible with the opinion being most pronounced for the industry respondents.

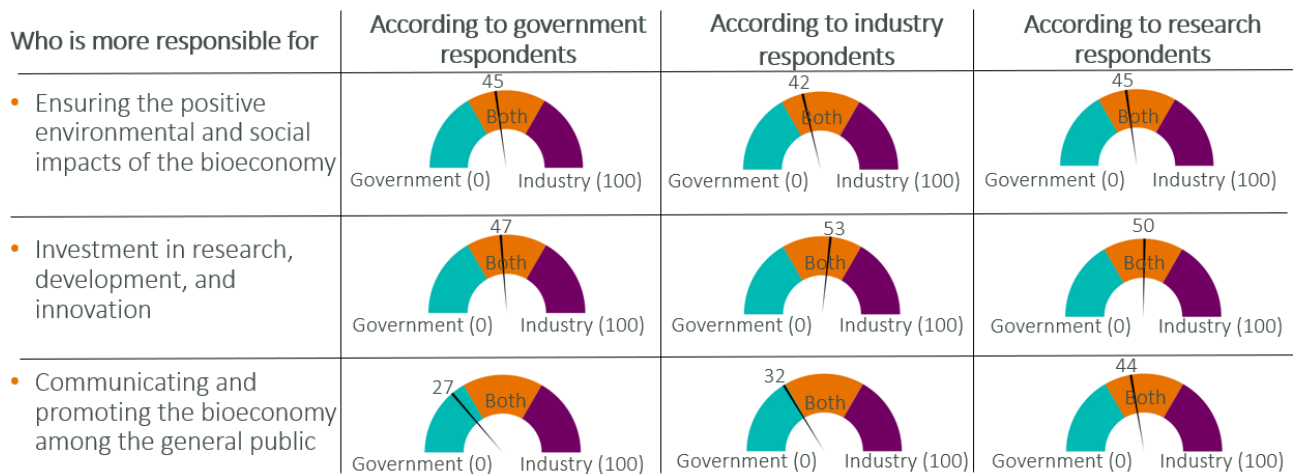


Figure 12: Division of roles and responsibilities between the government and industry regarding three different tasks in moving the bioeconomy in Catalonia forward. Industry, government and research respondents were asked to indicate who is more responsible for the three different tasks on a scale from zero (Only government responsible) to hundred (Only industry responsible).

3.7. Find key leverage points for bioeconomy development by identifying overlaps with other policy areas

Respondents were asked to identify any overlaps between the bioeconomy and other policy areas that are important to business and government to help Catalonia identify key leverage points for bioeconomy development in the region. It also expands our understanding of what kinds of goals are seen as important for the bioeconomy.

Climate change mitigation and adaptation was selected by 93% of respondents as having goal alignment with the bioeconomy, closely followed by *Circular economy* (89%), *Rural development* (88%), and *Clean energy* (88%) (Figure 13). Other policy areas with very high overlap with bioeconomy are *Technological innovation* (80%), *Biodiversity conservation* (78%) and *Job creation* (56%). *Social inclusion* (18%) and *Parks and recreation* (14%) were considered to have least goal alignment with the bioeconomy.

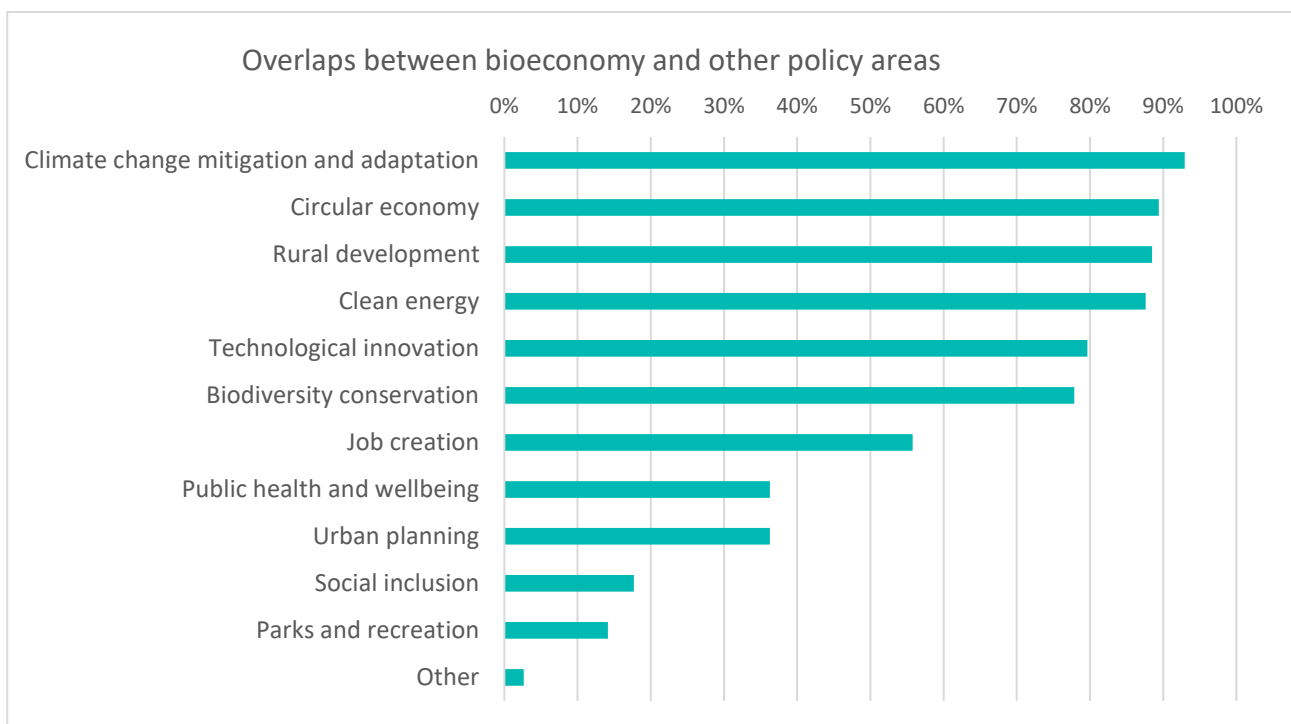


Figure 13: Proportion of respondents that understand certain policy areas to be related with the aims of the bioeconomy. Respondents were allowed to select as many policy areas as desired. Proportion expressed as percentage of respondents.

4. Conclusions

With a total of 154 responses, of which 29% from Government (or related public sector), 49% from Industry (or related private sector), 16% from Research and 6% from Civil society and voluntary sector, the survey results give an insight into how mid-to-high ranking government officials, local industry leaders and researchers perceive the bioeconomy, its benefits, and its challenges, in Catalonia. What we learn about the perceptions of these different groups can be essential to help prioritise regional bioeconomy actions and communications to maximise their impacts. Here we present eight key messages from the Survey.

Bioeconomy is highly linked to circularity, biomass use for multiple purposes, and sustainable land management.

Respondents consider circularity, biomass use for multiple purposes, and sustainable land management to be an integral part of the bioeconomy. Sustainable consumption and carbon neutrality were also understood by many respondents to be part of the bioeconomy. Interestingly, concepts such as community resilience, technological development, and local and traditional food movements were not most considered but still by half or more than half of respondents. Economic prosperity and degrowth were considered to be part of the bioeconomy by less than half of the respondents.

Bioeconomy is perceived to have a great potential to address environmental challenges, its potential to economic growth appears less prominently.

Business and policy respondents generally perceived bioeconomy as a promising economic model, highly agreeing on its positive impacts and disagreeing on its potential negative impacts. Bioeconomy is perceived specifically promising to address environmental challenges, with clear emphasis on its contribution to a circular economy. Conservation of biodiversity & ecosystem services and transition to a low-carbon economy were also considered important benefits of the bioeconomy. Although respondents do consider that the bioeconomy provides socio-economic benefits such as contributing to economic growth and the creation of new jobs, these benefits appeared less prominently as being most important. Summarising, respondents generally see the bioeconomy as strategic for generating environmental benefits, while also producing some positive economic outcomes, like sustainable economic growth and job creation.

There is a strong perception among government and industry that the public is not sufficiently informed on the bioeconomy.

97% of respondents think that the general public in Catalonia is not sufficiently informed on the bioeconomy. This highlights a clear need for communication and awareness raising among the general public.

Bioenergy is considered the most promising bioeconomy sector in Catalonia. Bioplastics and food & gastronomy are also considered to be promising.

Respondents perceive the bioeconomy to be highly linked to agriculture, to biological residues, and somewhat less to forestry and fisheries & aquaculture. Respondents do perceive it to be very linked to waste processing but slightly less to industrial biotechnologies. Among downstream sectors, bioenergy is perceived by-far the bioeconomy sector with highest potential for growth in Catalonia. Bioplastics and Food & gastronomy were also considered to be sectors with a high potential. It might surprise that wood construction and nature-based tourism were considered only by less than a quarter of respondents to have high potential for growth. Textiles & fashion, non-wood forest products and pulp & paper were least considered to have potential for growth in Catalonia.

Biologisation of existing sectors is perceived to be significant by 2050 in Catalonia.

Respondents believe that all six sectors, for which the information was asked, can replace significant proportions of their conventional (fossil-based) materials by bio-based materials by 2050 in the region, estimated proportions ranged from 46% to 64%, depending on the sector. The sectors with highest potential for biologisation (replacing conventional materials by bio-based materials) are Agri-food and Energy.

Investment in innovation, availability of scientific information, and adequate regulation are perceived as a key enablers of the bioeconomy; Lack of agility in administrative procedures, lack of supportive policy & legislative environment and limited co-operation among different stakeholders (policy, business, etc.) are considered the most important barriers.

Investment in innovation was considered the most important supporting condition for bioeconomy development in Catalonia, followed by availability of scientific information for better informed public and policymakers and adequate regulation to overcome possible negative impacts on ecosystems and local communities. There are four barriers perceived in between important and extremely important for bioeconomy development in Catalonia: Lack of agility in administrative procedures; lack of supportive policy & legislative environment well-tailored to the regional needs; limited co-operation among different stakeholders (policy, business, etc.); and lack of profitability and market demand for bioeconomy businesses and products. Lack of general social acceptance was considered the least important of the predefined barriers (still more important than Neutral).

Climate change mitigation & adaptation, circular economy, clean energy and rural development are the key policy areas perceived to have the strongest goal alignment with the bioeconomy.

Catalonia business and policy actors suggest that bioeconomy has strongest goal alignment with climate change mitigation & adaptation, closely followed by circular economy, clean energy, and rural development. Other policy areas with very high overlap with bioeconomy are technological innovation and biodiversity conservation. Bioeconomy was considered by less than half of respondents to have goal alignment with health & wellbeing, urban planning, social inclusion, and recreation.

Catalan stakeholders show a high willingness to develop the bioeconomy and are well aligned in their perceptions on the responsibilities.

Respondents indicated that they are willing to develop the bioeconomy. In addition, government, industry and research respondents felt very similar about who is responsible for different tasks in moving the bioeconomy in Catalonia forward. All three sub-groups indicated that government and industry are more or less equally responsible for investments in research, development, and innovation. All sub-groups agree that government is slightly more responsible for ensuring positive environmental and social impacts, and, government and industry respondents agree that government is significantly more responsible for communicating and promoting the bioeconomy among the general public.

5. Discussion points for improved communication on the bioeconomy

All bioeconomy stakeholders are invited to reflect upon the results of this survey and use them to design or revisit communication strategies and actions. In this respect, some issues that may be considered are proposed below.

- Improve the bioeconomy awareness of the general public
 - o “Prepare Catalan society for the change toward the circular bioeconomy” is strategic Goal 7 of the Catalan Bioeconomy Strategy 2030.
 - o Government and industry respondents agreed that the government is more responsible for communicating and promoting the bioeconomy among the general public.
 - o The vast majority of respondents feel that the general public in Catalonia is not sufficiently informed on the bioeconomy.
 - o Further investigate concerns on social awareness of the bioeconomy as a necessary step to improve communication; Proposed research question: In which ways is the general public in Catalonia not sufficiently informed? How does the general public and specific target groups (e.g., students) perceive bioeconomy? How do they see bioeconomy-related business opportunities?
- Emphasise the economic and social dimensions of bioeconomy
 - o Environmental benefits are widely acknowledged. Potential risks are minimised or not perceived as such.
 - o Contributions and policy overlaps with economic development, job creation, innovation, etc. appear less prominently.
- Highlight the potential of a variety of bioeconomy sectors
 - o The Catalan government has a holistic view on the bioeconomy and aims to promote a variety of bioeconomy sectors. Strategic Goal 3 of the Catalan Bioeconomy Strategy 2030 states “Encourage the use and consumption of bioproducts, bioenergy and biomaterials on the market”.
 - o Two out of four value chains that gear the Action Plan 2022–2024, are related to forest bioeconomy: 1) improvement in forest management and the use of forest resources, 2) creation of resilient agroforestry landscapes and the sustainable provision of ecosystem services.
 - o Bioenergy, bioplastics and food & gastronomy are widely recognised by the respondents as bioeconomy sectors with a high potential for growth in Catalonia. Anyhow, there are other potentially interesting bioeconomy sectors, that are recognised to a lower extent, such as wood construction, nature-based tourism, textiles & fashion, non-wood forest products and pulp & paper. This information can be valuable when communicating about the bioeconomy.
 - o Bioenergy was considered by-far the bioeconomy sector with highest potential for growth. Anyhow, biomass material of sufficient quality can have several other uses of high added value before being used as a bioenergy source at the end of its lifetime. This is in line with the Catalan government’s vision on priority value chains. It is important to include circularity, cascade use and material efficiency aspects of bioenergy in

communication policies, as well as its synergy with material uses and existing knowledge on the actual contribution to climate change mitigation of the different technologies.

6. About the Bioregions Facility and the survey

The Bioregions Facility, launched in 2020, is a transregional cooperation network that supports innovation, networking, and policy learning related to the development of a sustainable forest bioeconomy. Consisting of forward-thinking regions across Europe, it aims to unlock regional potential through international exchange on forest circular bioeconomy issues. In 2023, the member regions are Catalonia (Spain), North Karelia (Finland), the Basque Country (Spain), and North Rhine-Westphalia (Germany), with the European Forest Institute holding the Secretariat for the Facility.

The Bioregions Facility seeks to support regional level policymakers to take advantage of strong regional policy tools and global best practices, create mutually beneficial partnerships with the private sector, and deeply understand the unique regional challenges and supporting conditions for the bioeconomy. The bioeconomy perceptions survey is an important part of this work, and it is implemented in all the member regions and beyond with the aim of gathering insights from regions across Europe for a large-scale comparative study.

Target outcomes of the Bioeconomy Perceptions Regional Survey:

- Understand how business and policy actors perceive the bioeconomy
- Revisit value chain priorities and related communication efforts
- Identify barriers & supporting conditions
- Assess “willingness to engage” with the bioeconomy
- Improve collaboration with government & industry
- Find key leverage points for bioeconomy development by identifying overlaps with other policy areas

7. Survey methodology

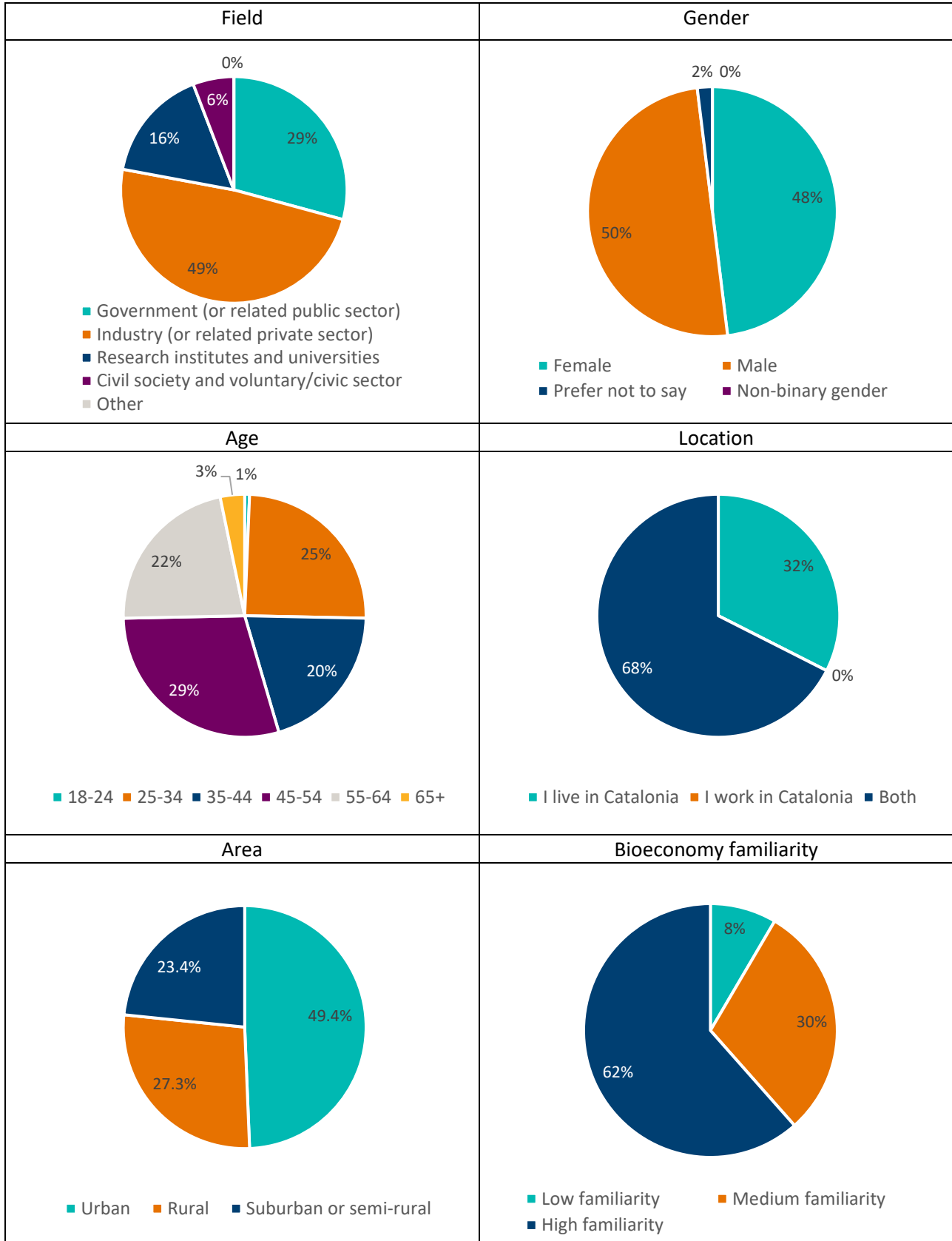
The Survey is provided in the form of a toolkit to a regional partner organisation that takes care of identifying and contacting potential respondents. The toolkit is designed and adapted to the regional context by the Bioregions Facility. Consequently, the regional partner organisation is able to launch and disseminate the Survey in the region at their own pace, with support of the Bioregions Facility Secretariat.

The Survey toolkit consists out of 5 items: 1) Deployment checklist and timetable; 2) Pamphlet on goals and expected outcomes; 3) Survey invitation email; 4) Survey pre-formatted in SurveyMonkey; 5) Guide for identifying and contacting survey participants. All materials reaching the potential respondents are adapted to the local language, in this case Catalan. The Deployment checklist and timetable document serves to keep track of responsibilities and timelines. The Guide for identifying and contacting survey participants defines in more detail how to identify survey target groups and what to consider in the survey launch and dissemination stages.

After the closure of the Survey, the Bioregions Facility Secretariat takes the lead in creating three deliverables. These include a report on the results (this document), a PowerPoint with summarised results and a social media kit with a number of social media cards. The report includes a section on the Regional context and a section with Conclusions & recommendations. The regional partner organisation is closely involved in the writing of those two sections.

In the case of Catalonia, the Ministry of Climate Action, Food and Rural Agenda of the Catalan government identified target participants and disseminated the survey. The Bioeconomy Perceptions Regional Survey was open to answers during the period 29 September – 1 December 2022 and the analysis and report writing took place between December 2022 – February 2023.

A1. Characterisation of the respondents



A2. Survey questions

[Survey pre-formatted in SurveyMonkey: Catalan](#)