



Perceptions on the Bioeconomy in Castilla y León

Results from a regional survey targeted at government and industry

In collaboration with:



Red de
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de Castilla y León



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

The Bioregions Facility launched its Bioeconomy Perceptions Regional Survey in Castilla y León in the period May – June 2022 in the local language, Spanish. The Survey was targeted at different groups within government and industry, to understand how they perceive the bioeconomy, its benefits, and its challenges. A typical respondent to the Survey is aged in between 35 and 54, living and working in Castilla y León, living in an urban area and with a high bioeconomy familiarity. 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 six key highlights, one per target outcome, of the Survey in Castilla y León.

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, 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, sustainable land management and sustainable consumption**.
- Castilla y León business and policy actors suggest that **bioenergy** is the bioeconomy sector with **highest potential for growth in Castilla y León**. Food & gastronomy and nature-based tourism are in a second and third place.
- **Lack of supportive & legislative environment** and **limited co-operation among different stakeholders** (policy, business, etc.) are perceived as the most important **barriers for bioeconomy development**. **Investment in innovation** and the **availability of scientific information** are perceived the most important **supporting conditions**.
- **Industry and government** respondents indicated **very high willingness to develop the bioeconomy**.
- **Government and industry respondents felt similar about who is responsible for different tasks in moving the bioeconomy in Castilla y León forward**. Respondents indicated that government and industry are more or less equally responsible for investments in research, development, and innovation. Both government and industry reported that government is slightly more responsible for ensuring positive environmental and social impacts. In addition, both groups emphasised that the government is more responsible in communicating and promoting the bioeconomy among the general public.
- According to respondents, **bioeconomy has strongest goal alignment with circular economy**. Respondents also reported strong goal alignment with environment related policy areas, such as clean energy, climate change mitigation and biodiversity conservation. Other policy areas with very high overlap with bioeconomy are rural development and technological innovation.

2. Regional context

The Autonomous Community of Castilla y León is located in the northwest of Spain, with a population of approximately 2.4 million inhabitants living in an area of 94,223km² (National Institute of Statistics of Spain 2021)¹.

The region is aligned with Spain's bioeconomy strategy, where the bioeconomy itself is defined as the set of economic activities that obtain products and services, generating economic value, using as fundamental elements resources of biological origin in an efficient and sustainable manner. The strategy establishes as the objective of the national bioeconomy the production and commercialisation of food, as well as forest products, bioproducts and bioenergy, obtained through physical, chemical, biochemical, or biological transformations of organic matter not destined for human or animal consumption and which involve environmentally friendly processes, as well as the development of rural environments (Ministry of Agriculture, Fisheries and Food)².

The bioeconomy in Castilla y León is based on the sustainable use and transformation of biological resources, including agriculture, livestock and forestry. A large part of the bioeconomy is dedicated to the production of healthy foods, biofuels, renewable chemicals and other bioproducts. There are initiatives to encourage research and innovation in this field, promoting the circular economy and waste reduction.

The RIS3 of Castilla y León is the smart specialization strategy aimed at promoting economic development and competitiveness of the region through the identification and enhancement of its strengths and opportunities. In the RIS3 of Castilla y León, forest bioeconomy stands out as one of the main thematic areas. Forest bioeconomy focuses on the sustainable use of forest resources, generating economic value and promoting innovation and technological development in the forest and biomass sector. The strategy aims to increase the efficiency and competitiveness of the sector, foster job creation, and improve the quality of life in rural areas of the region.

The forestry sector plays an important role in the economy of Castilla y León, with a multifunctional exploitation of its forests, driven by a consolidated local processing industry. It is a region whose forest wealth is based on its more than 5 million hectares of forest, of which almost 65% are wooded. With these figures, Castilla y León is one of the most forested regions in the European Union (Castilla y León Forestry Data Portal 2022)³.

Wood is one of the main products of the forest bioeconomy in Castilla y León, used in the manufacture of traditional products such as furniture and paper, as well as in innovative products such as bioenergy and sustainable construction.

Forty-six percent of the timber industry is located in rural municipalities of less than 2,000 inhabitants, which demonstrates the rural nature of this activity and its importance in economic development, employment generation and population fixation in these areas where there are not many other job opportunities. In addition to the long timber tradition, supported by more than 219 million m³ of wood

¹ National Institute of Statistics of Spain 2021: <https://www.ine.es>

² Ministry of Agriculture, Fisheries and Food: <https://miteco.gob.es>

³ Castilla y León Forestry Data Portal 2022.1: <https://datos.pdfcy.l.es>

stock, there is also the exploitation of non-timber forest products such as resin, chestnuts, pine nuts and mushrooms, among others. The sector maintains about 10,000 jobs; 22% are dedicated to forestry activities, 41% to the wood industry, 22% to paper and 15% to furniture. Indirect employment has been estimated at 54,000 people and the sector itself has estimated almost 1,300 companies and a production value of more than two billion euros per year (Economic and Social Council of Castilla y León)⁴.

The region has a rich natural heritage, with 26.13% of its territory included in the Natura 2000 Network. Ecosystem services related to carbon sequestration, biodiversity conservation, soil and water protection, play a fundamental role in regional forest management. Other uses linked to the bioeconomy, no less important from a cultural and economic point of view, are recreational activities in the natural environment, such as hunting, fishing and active tourism.

Castilla y León is a Spanish region with a long agricultural and livestock farming tradition. Its agri-food sector is one of the most important, with a diverse production that includes arable crops, vineyards, fruit trees and extensive livestock. It also has a wide variety of high-quality products, such as beef and lamb, cheese, wine, and olive oil. Agriculture is a key activity for the economy and employment in the region and has evolved towards more sustainable and technological models.

Some examples of the agricultural bioeconomy in Castilla y León are the production of functional and high-quality foods, research in agricultural biotechnology, the application of precision agriculture technologies and the promotion of circular economy models in agri-food production.

Finally, another activity included in the regional bioeconomy is the energy use of both agricultural and forestry biomass. The data on the total consumption of residual biomass in Castilla y León provides a figure in the order of 400 thousand tons of oil equivalent (toe), 14% from the industrial sector and 85% from the domestic sector. Of this high potential, only a part is likely to be obtained under adequate technical and economic conditions. According to the Plan for the Promotion of Renewable Energies (PFER), Castilla y León is Spain's Autonomous Community with the highest contribution.

In conclusion, the bioeconomy in Castilla y León is approached in a holistic manner, taking advantage of renewable biological natural resources with high added value. It seeks to preserve biodiversity, restore ecosystems and promote the circularity of processes. The model is built on existing capacities, the knowledge of relevant stakeholders and communities, and requires the shared commitment of all stakeholders, especially the public administration. People are at the centre, and the aim is to guarantee gender equality, territorial cohesion, training and dignified working conditions (Bioeconomy Forum of Castilla y León)⁵.

⁴ Economic and Social Council of Castilla y León: <https://www.cescyl.es/es/publicaciones/informes-iniciativa-propia/sector-forestal-castilla-leon>

⁵ Bioeconomy Forum of Castilla y León: <https://forobioeconomia2021.com/>

3. Results

3.1. About the respondents

We targeted groups working within government and industry in Castilla y León. 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.

Due to survey dissemination methods, it is not possible to estimate accurately the number of people who received the survey. A total of 79 people responded to the survey, 33 respondents said to be from Government (or related public sector) (42%), 32 from Industry (or related private sector) (41%) and 14 respondents identified themselves as not being part of government or industry but rather of another field (18%) (Figure 1). These 14 respondents specified very varied fields in which they work, ranging from education and research to tertiary sector.

The majority of respondents were male (58%) (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. The vast majority of respondents belong to the 35-44 age group (47% of respondents) and 45-54 age group (32%). Most respondents (63%) both live and work in Castilla y León, but there were also those who only live in the region (24%) or only work in the region (13%). Most respondents live in urban areas (52%), in comparison with those who live in rural (29%) or semi-rural/suburban (19%) areas.

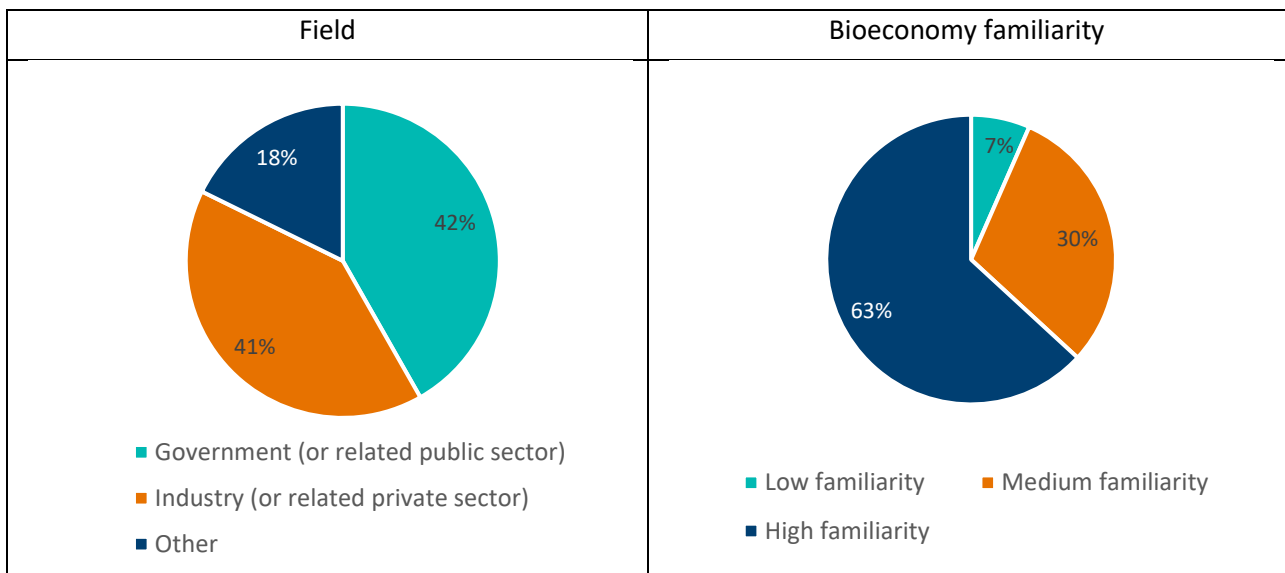


Figure 1: Characterisation of respondents according to field and bioeconomy familiarity. Additional charts related to the characterisation of the respondents can be found in Annex 1.

Most respondents reported good familiarity with the bioeconomy, with 63% indicating high familiarity and 30% indicating they had medium familiarity with the bioeconomy (Figure 1). 7% 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.

Sustainable land management (by 92% of respondents) and *Circular use of resources* (by 89% of respondents) were most understood to be a part of the bioeconomy (Figure 2). *Sustainable consumption* (82%), *Nature-based solutions* (78%), *Use of biomass* (77%), *Carbon neutrality* (72%) and *Ecosystem services* (59%) were indicated by the majority of respondents to be a part of the bioeconomy. Interestingly, concepts such as *Technological advancement* (42%), *Economic prosperity* (41%), *Community resilience* (41%) and *Degrowth* (28%), were less considered by respondents to be a part of the bioeconomy.

Summarising, respondents see sustainability, circularity and nature-based solutions most linked to the bioeconomy. On the other hand, the bioeconomy is considered less relevant for economic and technological development.

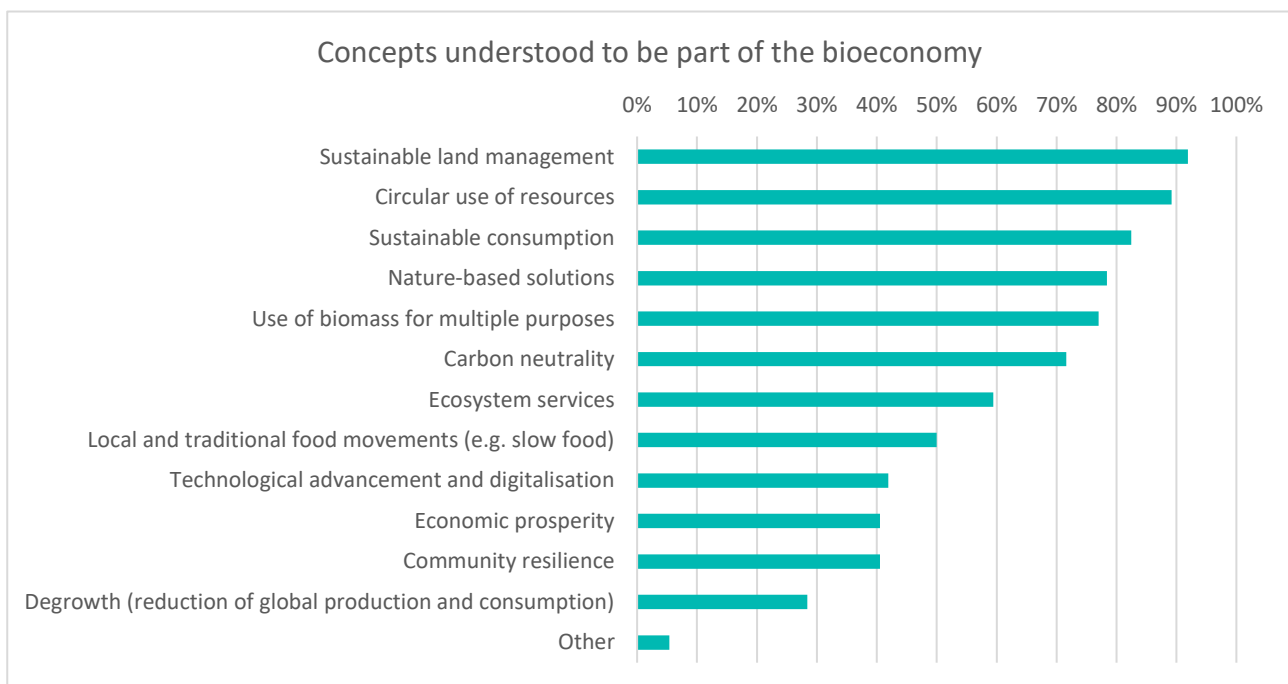


Figure 2: Proportion of survey respondents that understand certain concepts to be part of the bioeconomy. Respondents were allowed to select as many concepts as desired. Proportion is expressed as percentage of respondents.

In terms of primary production, bioeconomy is perceived to be more linked with *Agriculture* (93%) and *Forestry* (89%) than with *Fisheries and aquaculture* (77%) (Figure 3). A very high proportion of respondents consider *Waste management* (91%) as part of the bioeconomy. Also 54% of respondents consider *Biotechnology and pharmaceutical* sectors as part of the bioeconomy.

Among downstream sectors, *Energy* (85%) and *Food and gastronomy* (82%) receive by far most consideration. *Chemistry* (55%), *Health and wellbeing* (50%), *Textiles* (50%) and *Construction* (50%) are other secondary sectors perceived by half or more than half of respondents to be part of the bioeconomy.

Tourism and recreation (43%) and *Machine industry* (30%) are among the sectors least considered to be a part of the bioeconomy. In addition, 7% of respondents defined *Other* sectors that they understand to be part of the bioeconomy. Some suggestions include that bioeconomy can and should be a biologisation of all existing sectors.

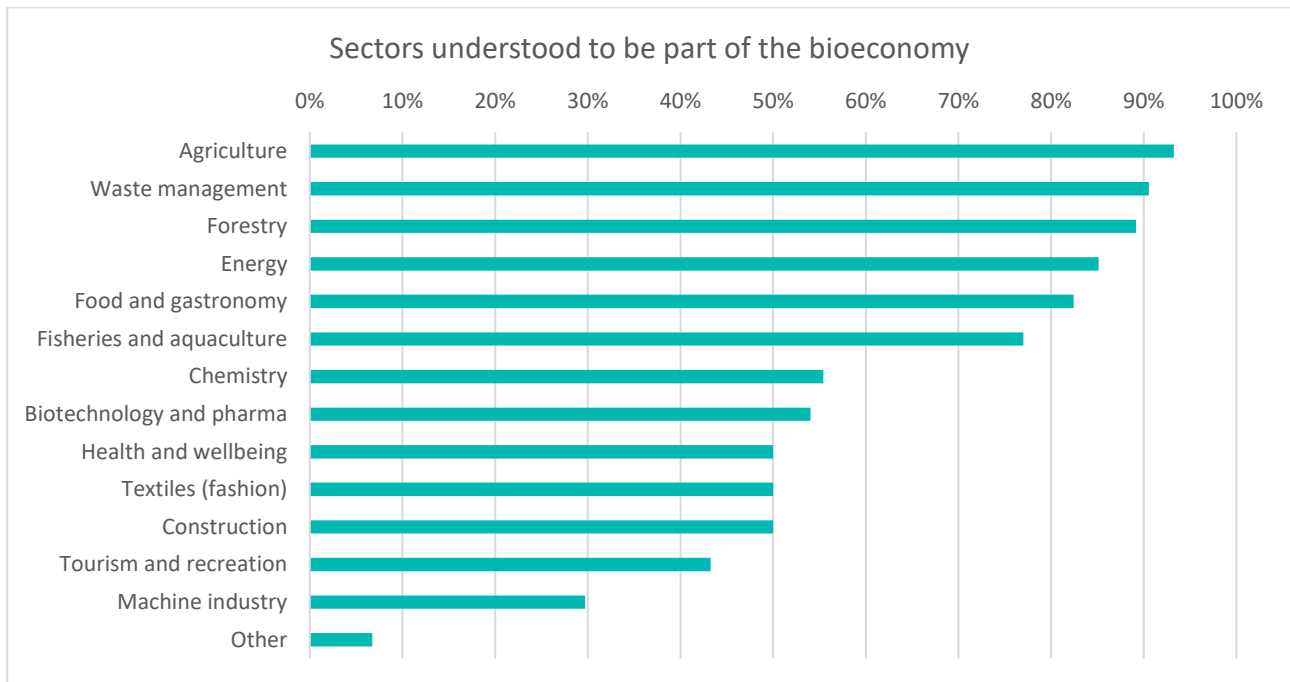


Figure 3: Proportion of survey respondents that understand certain sectors to be part of the bioeconomy. Respondents were allowed to select as many sectors as desired. Proportion is expressed as percentage of respondents.

As shown in Figure 4 below, based on true/false statements, the vast majority of respondents (>80%) agreed on 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. On the other hand, a very low proportion of respondents do perceive some risks of the bioeconomy as inducing *stress on natural systems* (9%), and *not enough biomass to implement the bioeconomy* (7%). None of the respondents considered that bioeconomy contributes to deforestation.

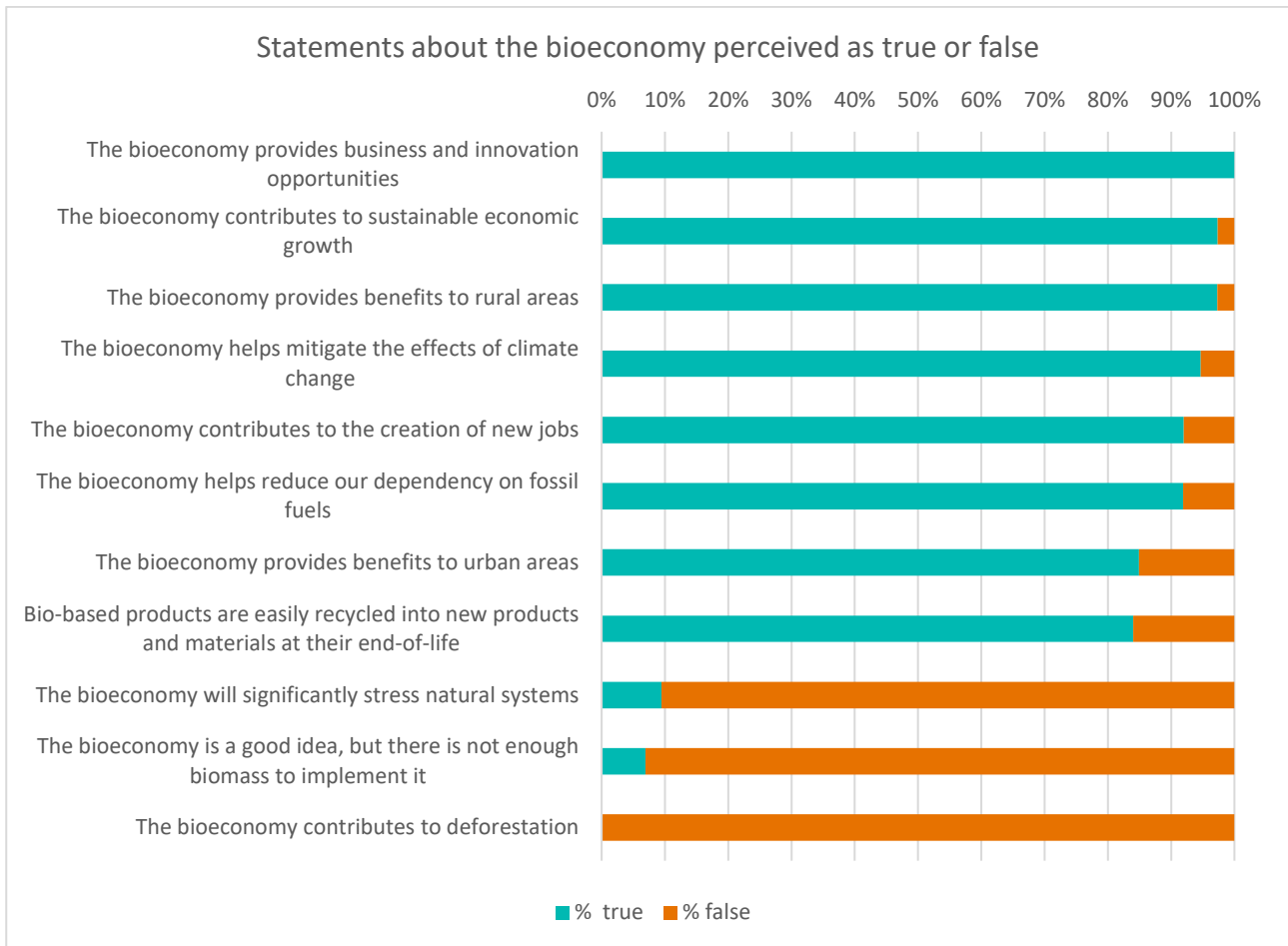


Figure 4: Proportion of survey respondents that marked bioeconomy statements as true (blue) or false (orange). Proportion is expressed as percentage of respondents.

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 (33%), followed by *Helping conserve biodiversity and ecosystem services* (14%) and *Providing renewable alternatives to non-renewable materials* (14%) (Figure 5). These benefits are followed by *Job creation and economic growth* (12%). The benefit *Fostering technological innovation* (4%) was least acknowledged.

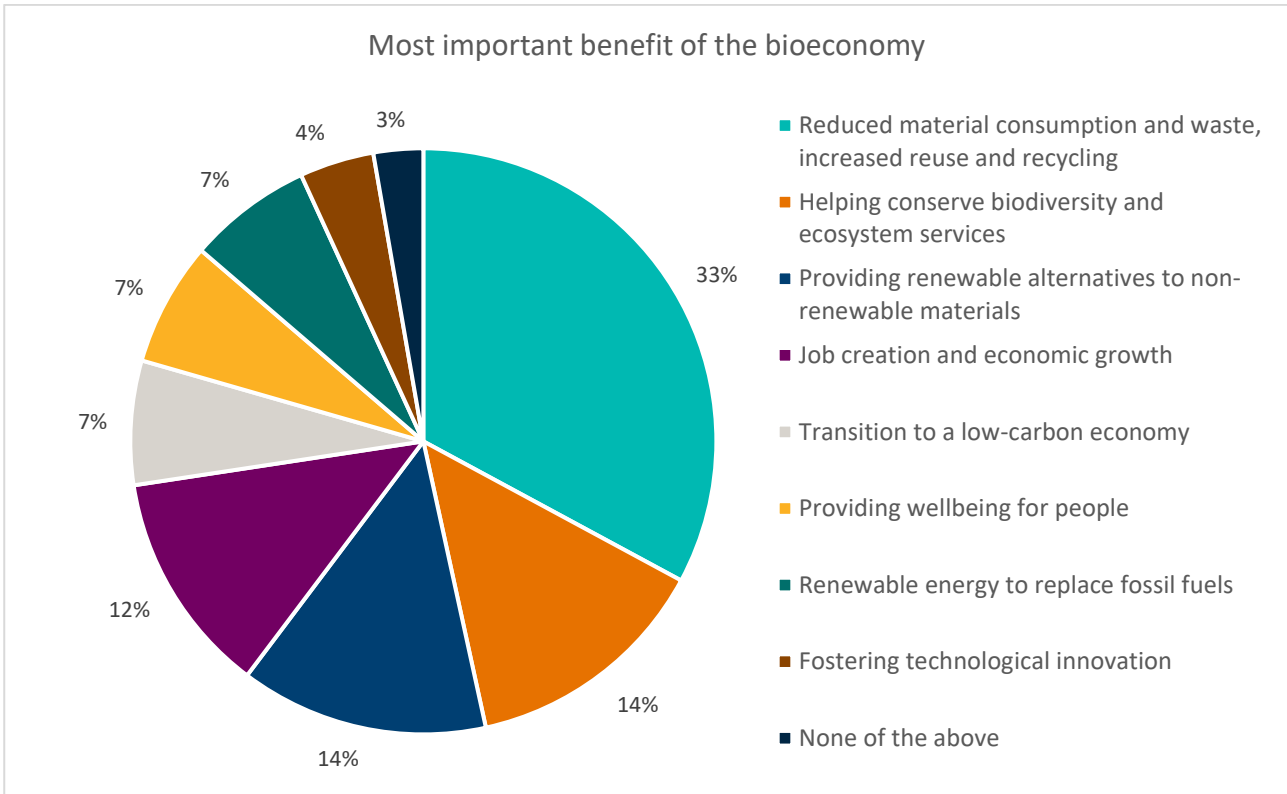


Figure 5: Proportion of respondents that perceived benefits of the bioeconomy as being the most important benefit out of eight predefined benefits. Respondents were limited to select only one benefit. Proportion is expressed as percentage of respondents.

When asked about the single most important benefit of the bioeconomy, *Higher cost of essential goods (e.g., food, water, shelter)* emerges as the most frequent answer (26%) (Figure 6). Another 26% of respondents indicated that none of the predefined risks is the most important. Otherwise, a considerable number of respondents considered *Not enough biomass to supply the bioeconomy* (17%) and *Impacts on ecosystem services* (14%). Fewer respondents considered *Increasing biomass costs* (8%), *Impacts on poverty or food sovereignty* (4%) and *Dangerous impacts on developing countries* (4%).

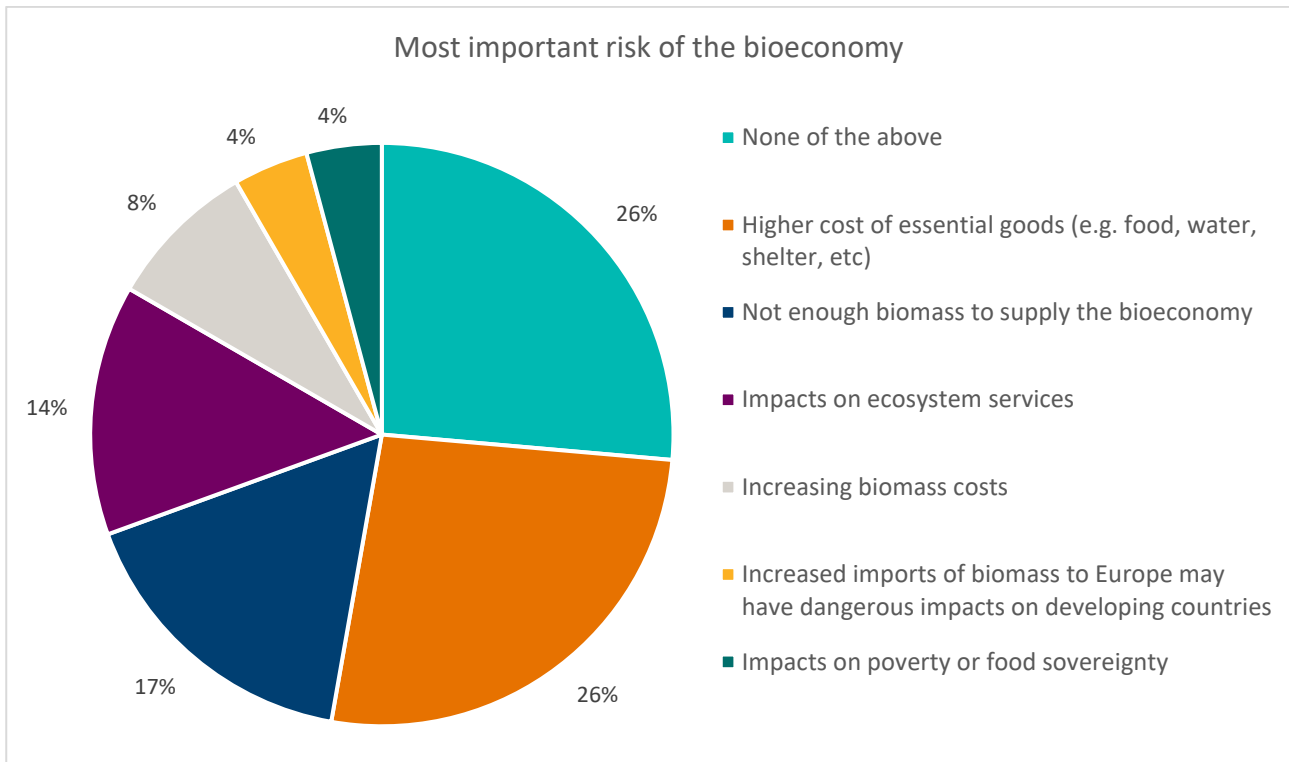


Figure 6: Proportion of respondents that perceived risks of the bioeconomy as being the most important risk out of six predefined risks. Respondents were limited to select only one risk. Proportion is expressed as percentage of respondents.

When asking about public awareness, 97% of respondents overall felt that the general public was not sufficiently informed on the bioeconomy. All industry respondents (100%) felt the general public was not sufficiently informed, while slightly less government respondents (96%) and other respondents (91%) felt the general public was not 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 Castilla y León for the transition from a conventional economy to a circular bio-based economy, the majority of respondents answered low readiness (47% of respondents) and medium readiness (37% of respondents) (Figure 7). 7% of respondents considered Castilla y León to have very low readiness but also 9% of the respondents reported a high readiness. None of the respondents (0%) considered a high regional readiness to transition to a circular bio-based economy.

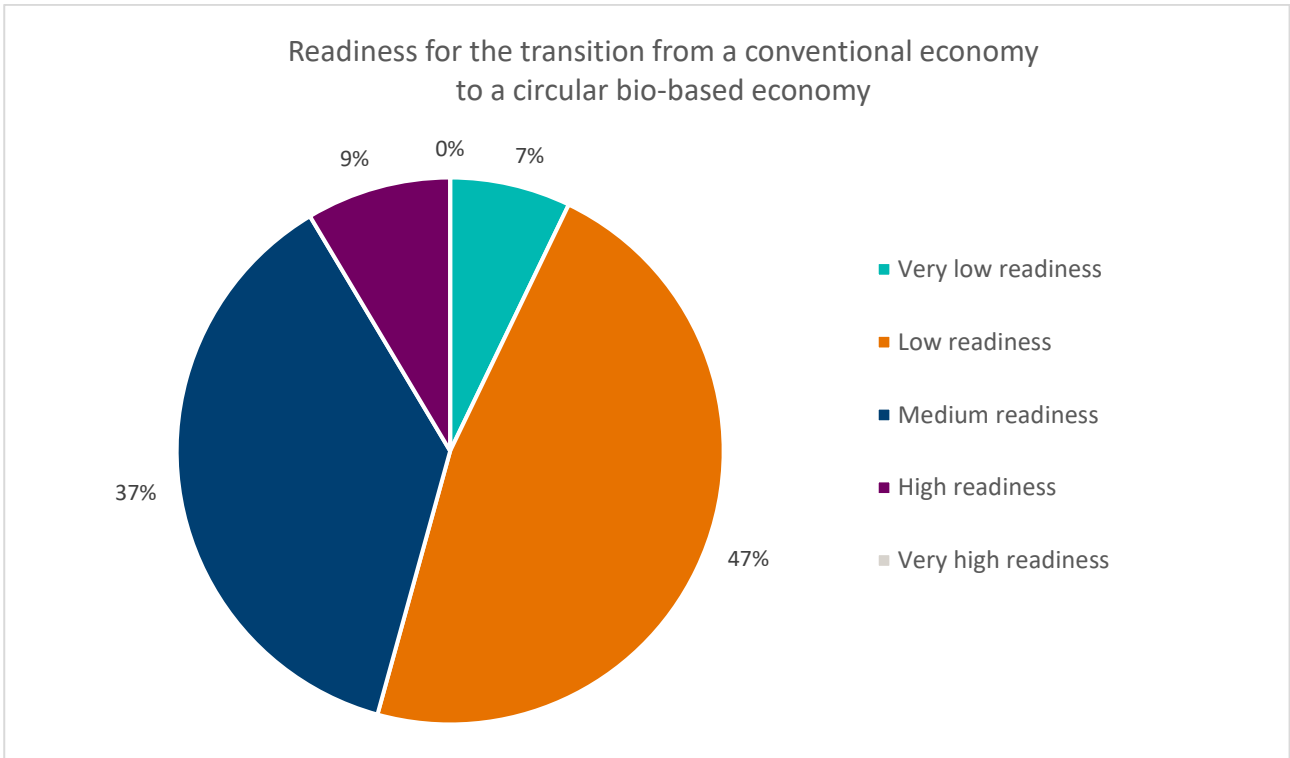


Figure 7: Proportion of respondents that consider different readiness levels of Castilla y León to transition from a conventional economy to a circular bio-based economy.

Respondents perceived by-far that Bioenergy (71%) is the bioeconomy sector with highest potential for growth in Castilla y León (Figure 8). Food and gastronomy (46%) and nature-based tourism (31%) were considered sectors with a high potential by a moderate number of respondents. Textiles & fashion (6%) and Pulp & paper (4%) were least considered to have high potential for growth in Castilla y León (Figure 8).

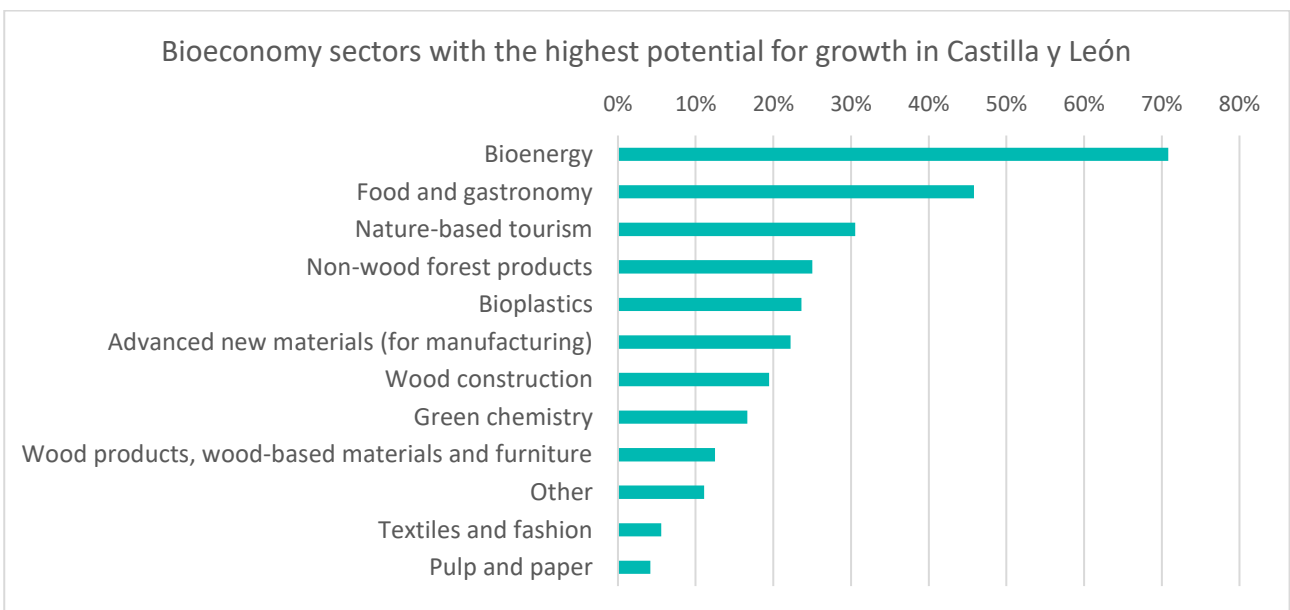


Figure 8: Proportion of respondents that selected bioeconomy sectors to have the highest potential for growth in Castilla y León. Respondents were allowed to choose up to three sectors. Proportion expressed as percentage of respondents.

When analysing this question separately for government and industry respondents, it becomes clear that it are mainly the industry respondents who perceive such a considerable difference in potential for growth for Bioenergy in comparison with the other bioeconomy sectors while the government respondents consider more potential in a diversity of sectors (Table 1).

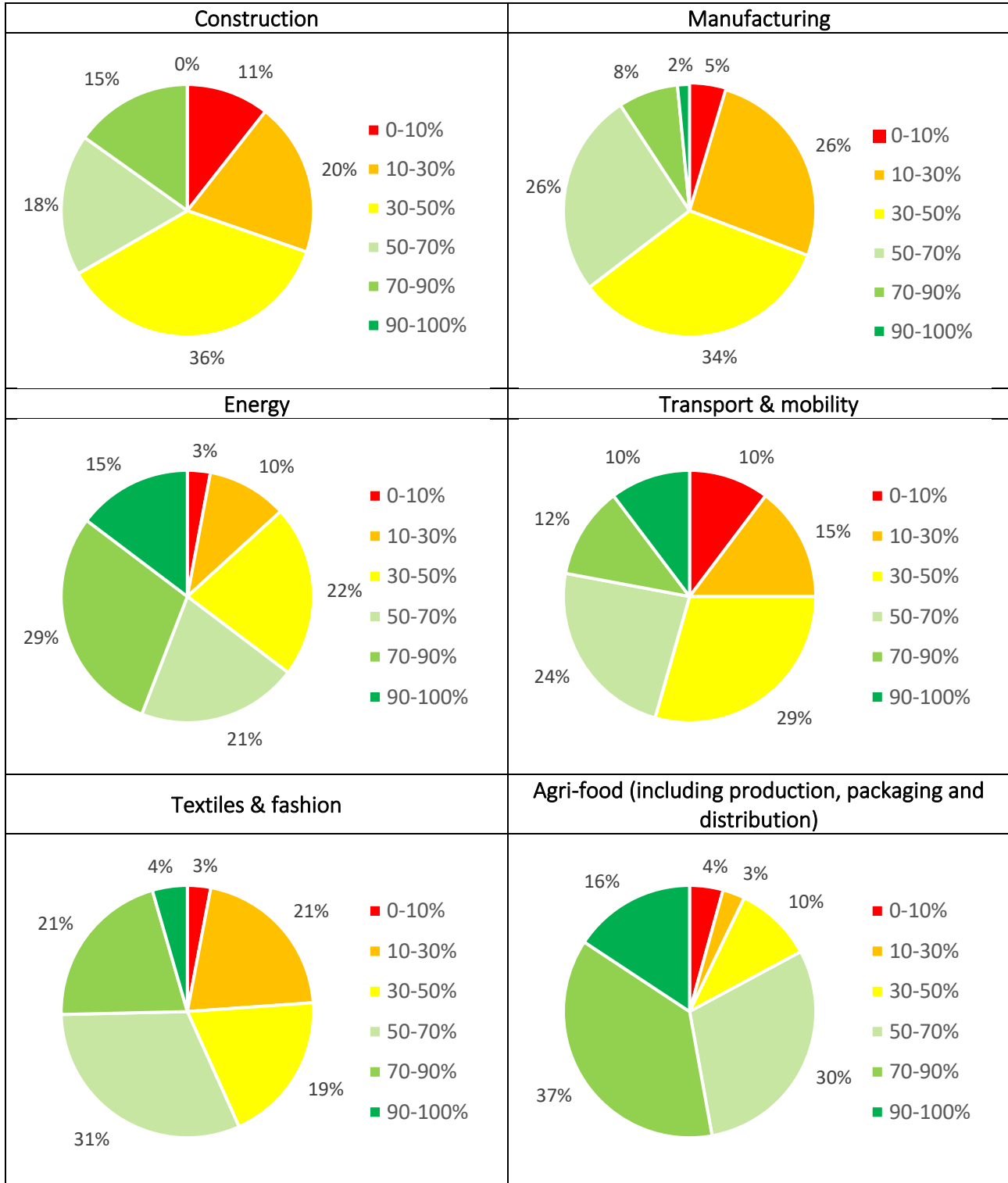
Table 1: Five sectors with highest potential for growth in Castilla y León for government and industry respondents respectively. The percentage reflects the proportion of respondents that selected those bioeconomy sectors. Respondents were allowed to choose up to three sectors.

Government respondents	Industry respondents
1. Bioenergy (67%)	1. Bioenergy (72%)
2. Food & gastronomy (57%)	2. Food & gastronomy (41%)
3. Nature- based tourism (33%)	3. Nature- based tourism (24%)
4. Bioplastics (30%)	3. Bioplastics (24%)
5. Non-wood forest products (27%)	3. Wood construction (24%)

Respondents were asked to what extend six different sectors could replace their conventional (fossil-based) materials with bio-based materials by 2050 in Castilla y León. Table 2 shows that the majority (more than 50%) of respondents considered that within the sectors Agri-food, Textiles & fashion and Energy, 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 Castilla y León. For the Agri-food sector, more than 80% of respondents considered this. In the case of the sectors Transport & mobility, 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 Castilla y León.

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 Castilla y León, namely 67% 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 Textiles & fashion sector, with 52% of conventional resources that are replaceable, and Transport & mobility sector, with 49%. The sectors in Castilla y León that are expected to have lowest proportion of resources to be replaceable by 2050 are Construction and Manufacturing, both sectors are estimated to have 42% of their conventional resources replaced with bio-based resources.

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 Castilla y León. 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 Castilla y León. 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 (4.44/5) was considered as the most important supporting condition for bioeconomy development, closely followed by *Availability of scientific information* (4.31/5) (Figure 9). *Adequate regulation* (4.01/5), *Public procurement programmes* (3.83/5) and *Performance-based payments for carbon sequestration* (3.61/5) obtained scores close to or slightly below Important (4/5).

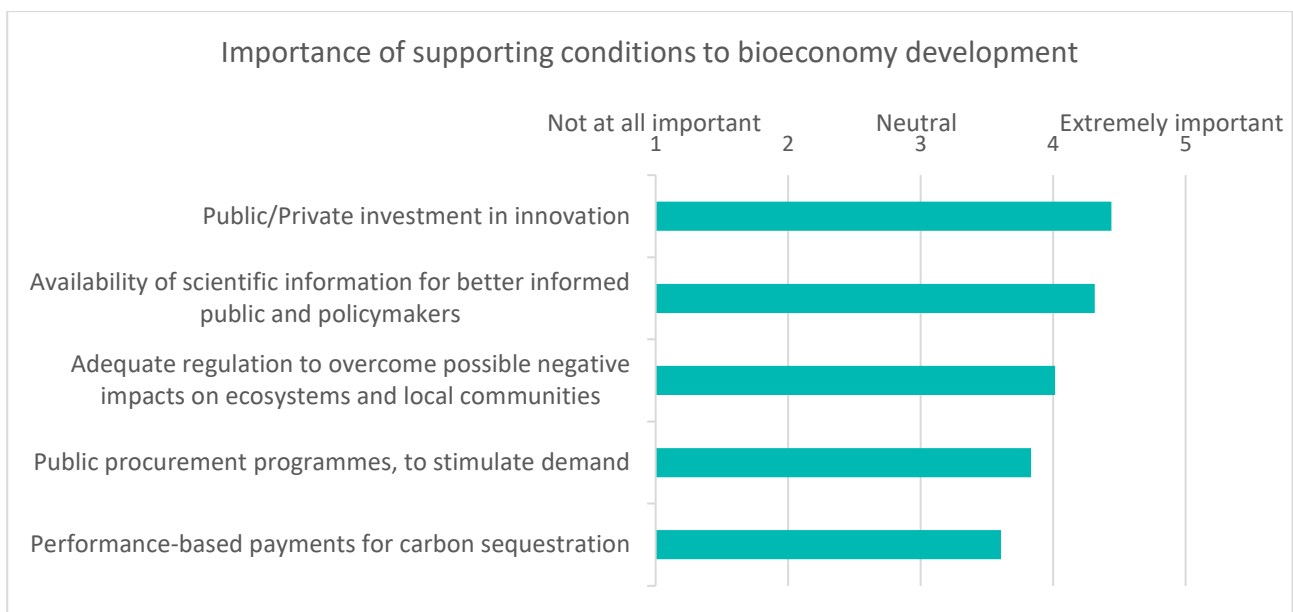


Figure 9: Importance of factors as supporting conditions for bioeconomy development in Castilla y León. Respondents were asked to rank the factors from one (Not at all important) to five (Extremely important), the average value of the respondents' ranking is shown.

Four of the barriers were perceived to be more important than the others, namely *Lack of supportive policy and legislative environment* (4.22/5), *Lack of co-operation among different stakeholders* (4.21/5), *Lack of technical feasibility and/or barriers to innovation* (4.15/5) and *Lack of profitability and market demand* (4.11/5) (Figure 10). With their average scores slightly above 4, they're perceived Important. The other two barriers are ranked in between Neutral (3) and Important (4): *Lack of balance between different uses of forest* (3.84/5), and *Lack of general social acceptance* (3.49/5).

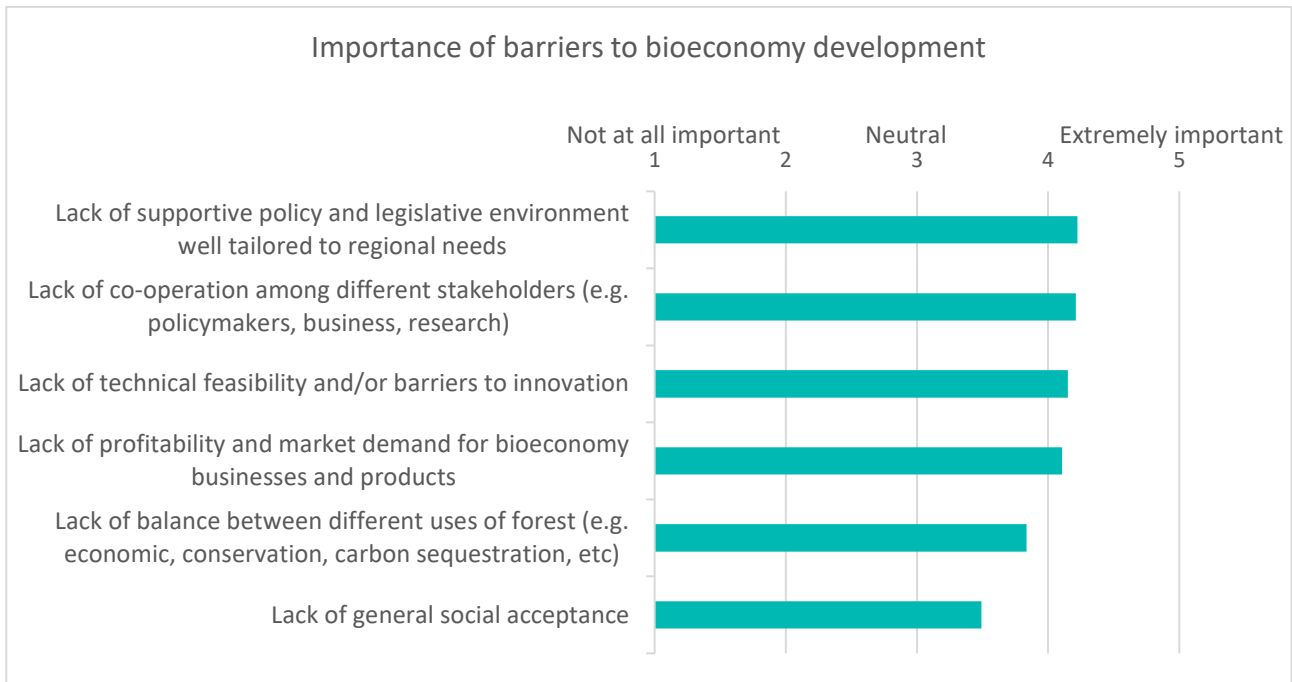


Figure 10: Importance of factors as barriers for bioeconomy development in Castilla y León. Respondents were asked to rank the factors from one (Not at all important) to five (Extremely important), the average value of the respondents' ranking is shown.

3.5. Assess “willingness to engage” with the bioeconomy

Respondents were asked how willing their industry sector or government department would be to developing the bioeconomy; if they had been involved in any investment projects, regulation 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 government and industry side by side.

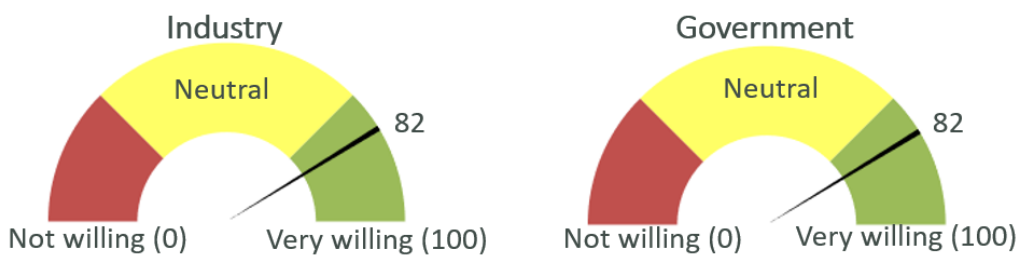


Figure 11: Willingness to develop the bioeconomy. Industry and government respondents were asked to rate how willing their industry sector/government department is to develop the bioeconomy on a scale from zero (not willing) to hundred (extremely willing).

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 82, meaning that the industry respondents are very willing to develop the bioeconomy (Figure 11). Moreover, 89% 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 gain a competitive advantage in future markets* (44% of industry respondents that have undertaken bioeconomy projects), *Other reasons* (44%) and *To take advantage of the existing market opportunities* (32%). The Other reasons

mentioned include generating awareness, company values & sustainability, etc. Only 1 industry respondent that has undertaken bioeconomy projects (4%) selected the pre-defined reason *To take advantage of government incentives*.

Only 1 predefined main reason to NOT have undertaken bioeconomy projects was selected by one respondent, namely *Lack of technical capacity* (33%). The other predefined reasons, *Unprepared market: too small and growing too slow*, *High uncertainty in bioeconomy projects* and *Low expected profitability*, were not selected by any of the respondents. All three industry respondents that did not undertake a bioeconomy project mentioned *Other* reasons. The other reason specifically worth mentioning is *Lack of financial capacity*.

Government

Government 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 82, meaning that industry and government respondents reported an equal high willingness to develop the bioeconomy (Figure 11). Moreover, 82% of government respondents said to have undertaken a bioeconomy regulation or initiative in the past. This number is slightly lower than the comparable answer from industry side.

The main reason to have undertaken a bioeconomy regulation or initiative is *To generate markets and social acceptance of bioeconomy products* (59% of government respondents that have undertaken a bioeconomy regulation or initiative). This is interesting considering that lack of general social acceptance was considered the least important barrier for bioeconomy development in Castilla y León (See section 3.4, Figure 10). Other reasons to not have undertaken a bioeconomy regulation or initiative are *To improve availability and access to biological resources* (45%) and *To ensure sustainability or social equity* (41%). Five government respondents that have undertaken a bioeconomy regulation or initiative (23%) also mentioned *Other* reasons, mainly referring to circular principles (reduce, reuse, revalorise) but also to “increase the competitiveness”.

The main reason to NOT have undertaken a bioeconomy regulation or initiative is the *Lack of technical capacity*, mentioned by three out of five respondents (60%). All other predefined reasons were selected by one out of the five respondents (20%): *Regional development plans do not promote the bioeconomy*, *High uncertainty of bioeconomy outcomes*, *It is not in the best interest of local strategies and policies* and *Public is not asking for this*.

Highlights

1. *Both Government and Industry report an equally high willingness of their department or sector to develop the bioeconomy, this could be the foundation for a future strengthened collaboration and co-operation among different stakeholders (e.g., policymakers, business, research) which was perceived a very important barrier for bioeconomy development in Castilla y León (see Section 3.4).*
2. *Despite a limited number of answers for the reasons to NOT have undertaken any investment projects, regulation or initiatives related to the bioeconomy, there is an indication that **Lack of technical capacity** might play an important role both for government and industry respondents. Therefore, it is recommended to analyse if technical capacity with regards to bioeconomy should be increased in the region and how to do that.*

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 three sub-groups of respondents, namely government, industry and others (respondents that identified themselves as not being part of government or industry but rather of another field).

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, Government respondents perceived that Government and Industry respondents are equally responsible while Industry and Other respondents considered Government to be slightly more responsible, 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 Other respondents.

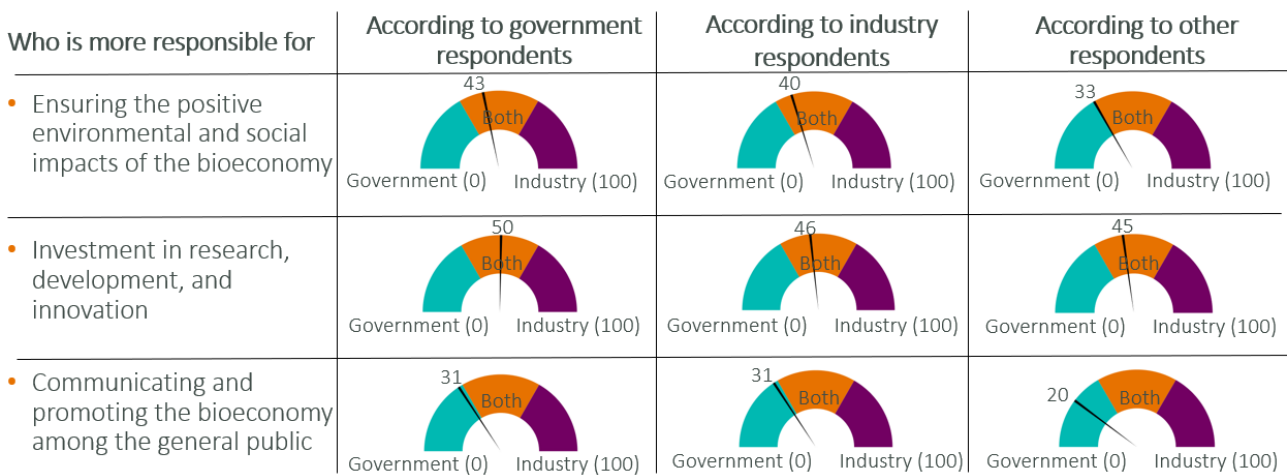


Figure 12: Division of roles and responsibilities between the government and industry regarding three different tasks in moving the bioeconomy in Castilla y León forward. Industry and government respondents were asked to indicate who is more responsible for the three different tasks on a scale from zero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

Circular economy was selected by 97% of respondents as having goal alignment with the bioeconomy, followed by *Clean energy* (91%) and *Rural development* (90%) (Figure 13). Other policy areas with very high overlap with bioeconomy are *Technological innovation* (88%), *Climate change mitigation and adaptation* (85%), *Biodiversity conservation* (84%) and *Job creation* (76%).

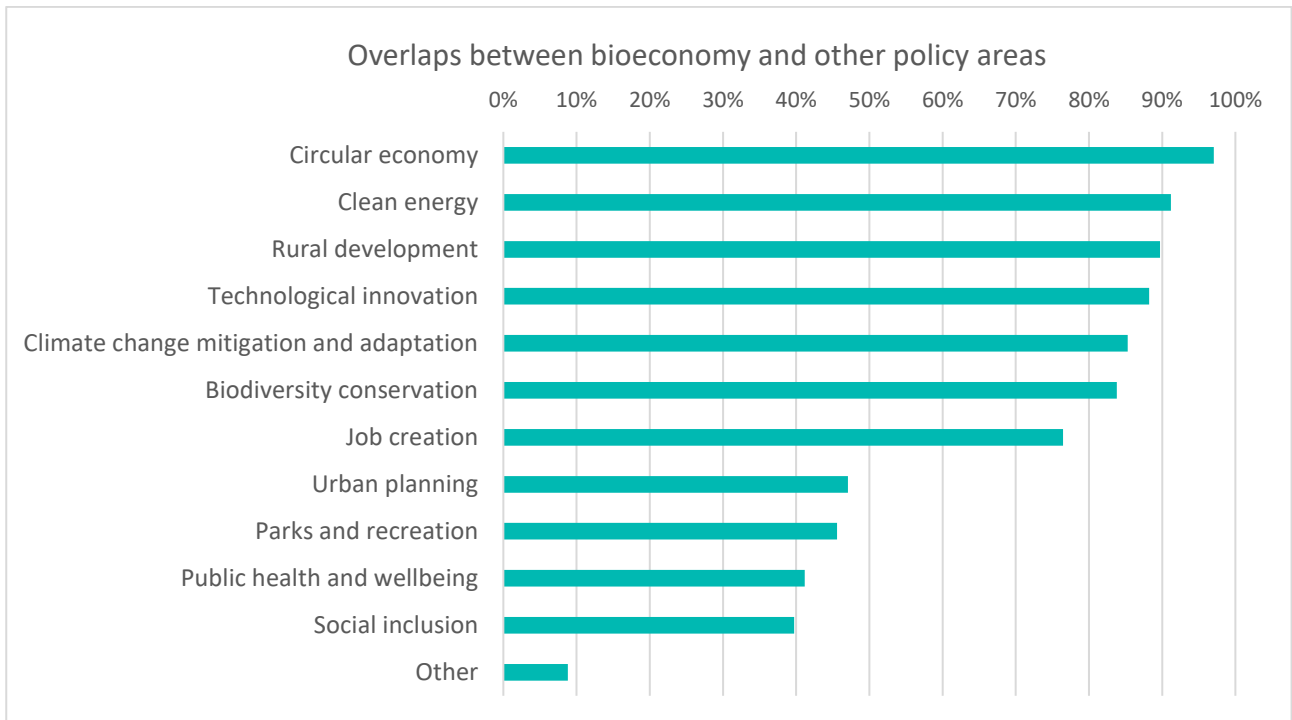


Figure 13: Proportion of respondents that understand certain policy areas to be related with the aims of the bioeconomy. Respondents were allowed to select as many policy areas as desired. Proportion expressed as percentage of respondents.

4. Conclusions

With a total of 79 responses, of which 42% from Government (or related public sector), 41% from Industry (or related private sector) and 18% from respondents that identified themselves as not being part of government or industry but rather of another field, the survey results give an insight into how mid-to-high ranking government officials and local industry leaders perceive the bioeconomy, its benefits, and its challenges, in Castilla y León. 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 seven key messages from the Survey.

Bioeconomy is highly linked to circularity, sustainable land management and sustainable consumption.

Respondents consider circularity, sustainable consumption and sustainable land management to be an integral part of the bioeconomy. Nature-based solutions, use of biomass for multiple purposes and carbon neutrality were also understood by more than two-third of respondents to be part of the bioeconomy. On the other hand, community resilience, economic prosperity and technological development were considered to be part of the bioeconomy by less than half of the respondents. Nearly a third of respondents associated bioeconomy with degrowth.

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 providing renewable alternatives to non-renewable materials 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 Castilla y León 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 Castilla y León. Food & gastronomy and nature-based tourism are also considered to be promising. Wood construction is not perceived to have a high potential.

Respondents perceive the bioeconomy to be highly linked to agriculture, to biological residues, and to forestry and somewhat less to fisheries and aquaculture. Respondents do perceive it to be very linked to waste processing but less to industrial biotechnologies. Among downstream sectors, bioenergy is perceived by-far the bioeconomy sector with highest potential for growth in Castilla y León. Food & gastronomy and nature-based tourism were also considered to be sectors with a high potential. Surprisingly, wood construction is considered only by a fifth of respondents to have high potential for growth. Textiles & fashion and pulp & paper were least considered to have potential for growth in Castilla y León.

Biologisation of existing sectors is perceived to be significant by 2050 in Castilla y León.

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 42% to 67%, depending on the sector. The sectors with highest potential for biologisation (replacing conventional materials by bio-based materials) are Agri-food, Energy and Textiles & fashion.

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

Two supporting conditions (enablers) for the bioeconomy development in Castilla y León were rated more important than the others, namely investment in innovation and availability of scientific information for better informed public and policymakers. There are four barriers perceived in between important and extremely important for bioeconomy development in Castilla y León: Lack of supportive policy & legislative environment well-tailored to the regional needs; limited co-operation among different stakeholders (policy, business, etc.); lack of technical feasibility and/or barriers to innovation; and lack of profitability and market demand. Lack of general social acceptance was considered the least important of the predefined barriers (still slightly more important than Neutral).

Circular economy, clean energy and rural development are the key policy areas perceived to have the strongest goal alignment with the bioeconomy.

Castilla y León business and policy actors suggest that bioeconomy has strong goal alignment with circular economy. Also, several environment-related policy areas are perceived to have strong goal alignment: clean energy; climate change mitigation and adaptation; and biodiversity conservation. Other policy areas with high overlap with bioeconomy are rural development and technological innovation. Bioeconomy was considered by less than half of respondents to have goal alignment with urban planning, recreation, health & wellbeing, and social inclusion.

Government and industry indicate high willingness to engage with the bioeconomy and are well aligned in their perceptions on the responsibilities.

Both government and industry respondents indicated that their sector or department is willing to develop the bioeconomy. In addition, government and industry respondents felt very similar about who is responsible for different tasks in moving the bioeconomy in Castilla y León forward. Both groups indicated that they are more or less equally responsible for investments in research, development, and innovation. Both groups agree that government is slightly more responsible for ensuring positive environmental and social impacts, and, 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 bellow.

- Improve the bioeconomy awareness of the general public
 - 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 Castilla y León 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 Castilla y León 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 wood construction and nature-based tourism
 - o The Junta de Castilla y León (regional government) considers wood construction and nature-based tourism as sectors with high potential for growth in the region. Anyhow, respondents do not emphasise these sectors. Wood construction was considered to have high potential by less than a fifth of respondents despite the region's solid wood and panel industries that are well-suited for supplying local wood construction projects. Nature-based tourism was considered by less than a third of respondents.
 - o Non-wood forest products was considered to have high potential for growth in Castilla y León by a fourth of respondents. Synergies can be made with nature-based tourism.
 - o Bioenergy was considered by-far the bioeconomy sector with highest potential for growth. Revisit bioenergy related communication policies, in relation to circularity, cascade use and material efficiency, 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. Three founding members are the Basque Country (Spain), North Karelia (Finland) 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 will be replicated in all the founding regions with the aim of gathering insights from regions across Europe and beyond 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

Castilla y León participated in the Survey within the [Bioregions Facility](#) – [ERIAFF network](#) partnership for understanding bioeconomy perceptions from business and policy actors in European regions. The Network of European Regions for Innovation in Agriculture, Food and Forestry (ERIAFF) is an informal association of regional Authorities, currently participated by 50 member Regions and 38 observers from 21 European countries. ERIAFF allows its members to work on themes of common interest and has established a number of thematic working groups which are coordinated by the most committed members.

7. Survey methodology

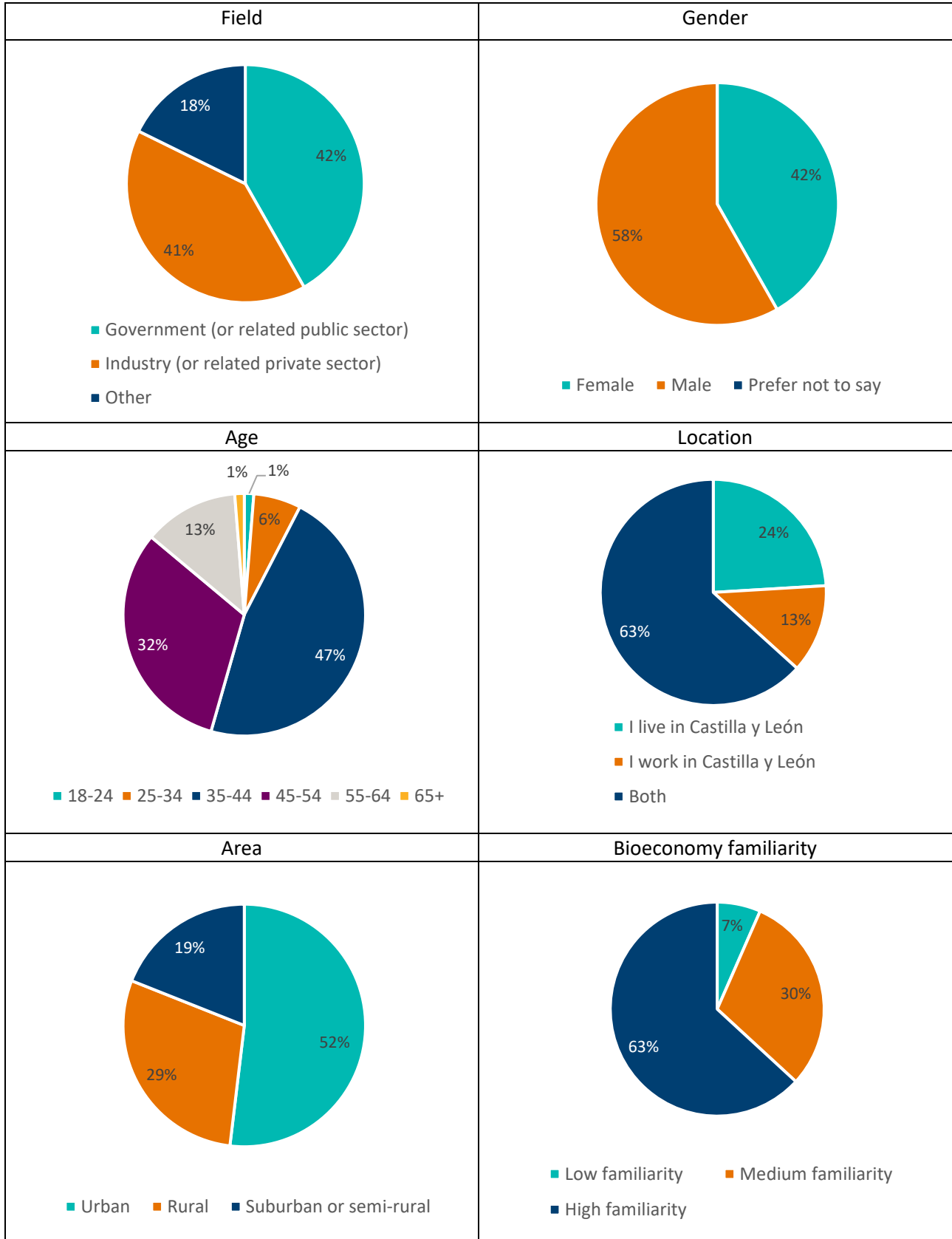
The Survey is provided in the form of a toolkit to a regional partner organisation that takes care of identifying and contacting potential respondents. The toolkit is designed and adapted to the regional context by the Bioregions Facility. Consequently, the regional partner organisation is able to launch 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 Spanish. 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 Castilla y León, Cese for (Centre for services and promotion of forestry and forestry industry of Castilla y León) identified target participants from government and industry and disseminated the survey. The Bioeconomy Perceptions Regional Survey was open to answers during the period May – June 2022 and the analysis and report writing took place between June - July 2022.

A1. Characterisation of the respondents



A2. Survey questions

[Survey pre-formatted in SurveyMonkey: English translation](#), (REGION) is in this case always replaced with Castilla y León

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