BIOREGIONS

Forest bioeconomy in action

Perceptions on the Bioeconomy in South Ostrobothnia

Results from a regional survey targeted at government and industry

In collaboration with:

REGIONAL COUNCIL OF
South Ostrobothnia

Contents	Survey report: Government and industry perceptions on the Bioeconomy in South Ostrobothnia
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REGIONAL COUNCIL OF South Ostrobothnia

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1. Executive summary

The Bioregions Facility launched its Bioeconomy Perceptions Regional Survey in South Ostrobothnia in the period December 2022 – February 2023 in the local language, Finnish. The survey was targeted at different groups within government and industry, 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 six key highlights, one per target outcome, of the survey in South Ostrobothnia.

- Bioeconomy is highly linked to use of biomass for multiple purposes, nature-based solutions and sustainable land management.
- Bioeconomy is perceived to have a great potential to address environmental challenges, its potential to economic growth appears less prominently.
- There is a strong perception among government and industry that the public is not sufficiently informed on the bioeconomy.
- Bioenergy is considered the most promising bioeconomy sector in South Ostrobothnia. Food & gastronomy and wood construction are also considered to be promising. Textiles, pulp and paper and bioplastics are not perceived to have a high potential.
- Most supporting conditions are seen as key enablers of the bioeconomy. The main barriers are the lack of profitability and market demand, the lack of cooperation between different stakeholders and the lack of technical capacity.
- Government and industry indicate willingness to engage with the bioeconomy and are well aligned in their perceptions on the responsibilities.

2. Regional context

The region of South Ostrobothnia is located in western Finland. It consists of 18 municipalities with a population of about 192.000 inhabitants living in an area of 14.355,63 km^2. South Ostrobothnia is the most rural region in Finland, with 45% of the population living in the core rural areas.[1] Population density is 13,83 inhabitants/km².

In the landscape of South Ostrobothnia, forest and marshland areas are criss-crossed by rivers and wide expanses of continuous fields. Due to climatic conditions in particular, the marshlands of South Ostrobothnia are quite diverse. The use of peatlands for agricultural, forestry and peat production has a long tradition in the region. The province's forestry swamp area is approximately 441.000 hectares. 76% of the land area in South Ostrobothnia is forestry land, of which the actual 922.000 ha of forest land. The province's forests are vibrant. Forest stock has increased somewhat in recent years, the total volume of the stand has increased by and the amount of deadwood has increased. [2]

The state of biodiversity in the province has been affected in particular by the deterioration and loss of habitat quality. Protected areas are mainly small and more attention will have to be paid in the future to habitat connectivity and the protection of species and habitat types. In South Ostrobothnia in particular, action is needed to protect and restore bogs, restore traditional biotopes and protect and manage forest habitats. In recent years, conservation has increasingly been carried out on a voluntary basis. [2]

Most of the land in the province is privately owned. It is important to communicate the importance of the measures and the options available to landowners. The measures will also respond to climate change adaptation, for example in terms of ensuring the dispersal of species and safeguarding carbon stocks. In commercial forests, increasing carbon sinks in peatlands and reducing CO_2 emissions from soil peat are future issues in the province. [1]

South Ostrobothnia is home to about 4% of Finland's population, but produces 14% of the country's food. This is reflected in the region-based emissions calculation as a high amount of emissions comes from South Ostrobothnia's agricultural sector. In South Ostrobothnia, the food sector accounts for the largest share of GDP of all Finnish regions. In the food chain, the largest emission reduction potential is in primary production, especially in climate-resilient solutions in peatland cultivation (42.000 ha in the region). The province's agricultural land also sequesters carbon. Climate-smart food chain activities in the province will also be directed towards energy efficiency measures in the food industry and sustainable procurement of food services. [1]

The transformation of energy production and the electrification of society are challenging South Ostrobothnia, which has had little electricity production and a high share of peat in district heat production. However, a change in the energy production system is already underway. For example, the share of electricity generated by wind power in the region's electricity production has increased significantly. In 2021, wind power already accounted for 57.3% of the region's own electricity production. Total electricity generation in the province has increased by almost 80% since 2011. The need to develop electricity generation infrastructure will remain high in the coming years. According to the Energy

[1] ALKE tilannekuva (Etelä-Pohjanmaan liitto, 21.11.2022)

[2] Etelä-Pohjanmaan maakuntaohjelman 2022-2025 ympäristöselostus (Etelä-Pohjanmaan liitto 2021)

Production in Ostrobothnia and South Ostrobothnia 2050 study, South Ostrobothnia will become a net exporter of electricity in the future. The regional economic potential is considerable and needs to be exploited. Other specific themes for the transformation of the energy production system in South Ostrobothnia are the increased production and use of energy wood, bioenergy and biogas, and the integration of the energy sector into, for example, agriculture and the food industry. The challenge is to take into account the regional economic and natural environment impacts of these changes. [1]

South Ostrobothnia has the potential and raw materials to strengthen the bioeconomy and produce bioenergy. In particular, small-scale decentralised energy production and the development of related solutions will be promoted. In South Ostrobothnia, biogas investments are underway in Kauhajoki, Seinäjoki and Kurikka, among others. The conditions for building a biogas ecosystem are good. [1]

3. Results

3.1. About the respondents

We targeted groups working within government and industry in South Ostrobothnia. 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 67 people responded to the survey, 39 respondents said to be from Government (or related public sector) (58%), 21 from Industry (or related private sector) (31%) and 7 respondents identified themselves as not being part of government or industry but rather of another field (10%) (Figure 1).

51% of respondents were male, 45% female, few others preferred not to say (Annex 1). Responses were received from all age groups except for the 18-24 age group. Most respondents belong to the 35-44 age group (33% of respondents) and 45-54 age group (31%). Most respondents (61%) both live and work in South Ostrobothnia, but there were also those who only live in the region (25%) or only work in the region (13%). Most respondents live in urban areas (45%), in comparison with those who live in rural (40%) or semi-rural/suburban (15%) areas.

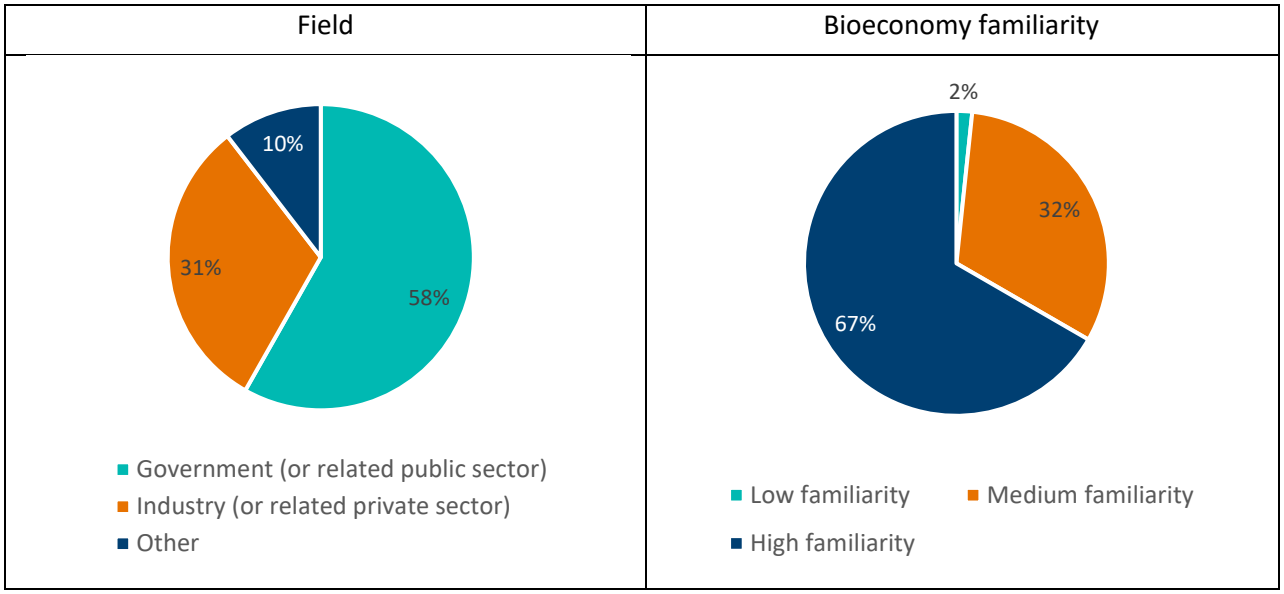


Figure 1: Characterisation of respondents according to field and bioeconomy familiarity. Additional charts related to the characterisation of the respondents can be found in Annex 1.

Most respondents reported good familiarity with the bioeconomy, with 67 % indicating high familiarity and 32 % indicating they had medium familiarity with the bioeconomy (Figure 1). 2 % 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.

Use of biomass for multiple purposes (by 97% of respondents), *Nature-based solutions* (92%) and *Sustainable land management* (90%) were most understood to be a part of the bioeconomy (Figure 2). *Carbon neutrality* (80%), *Ecosystem services* (77%), *Circular use of resources* (77%), *Local and traditional food movements* (75%), *Sustainable consumption* (72%), *Technological advancement and digitalisation* (72%) and *Community resilience* (55%) were indicated by the majority of respondents to be a part of the bioeconomy. Interestingly, *Degrowth* (42%) and *Economic prosperity* (43 %) were less considered by respondents to be a part of the bioeconomy.

Summarising, respondents see biomass use, sustainable land management and nature-based solutions most linked to the bioeconomy. On the other hand, the bioeconomy is considered less relevant for economic development but is neither very connected to degrowth.

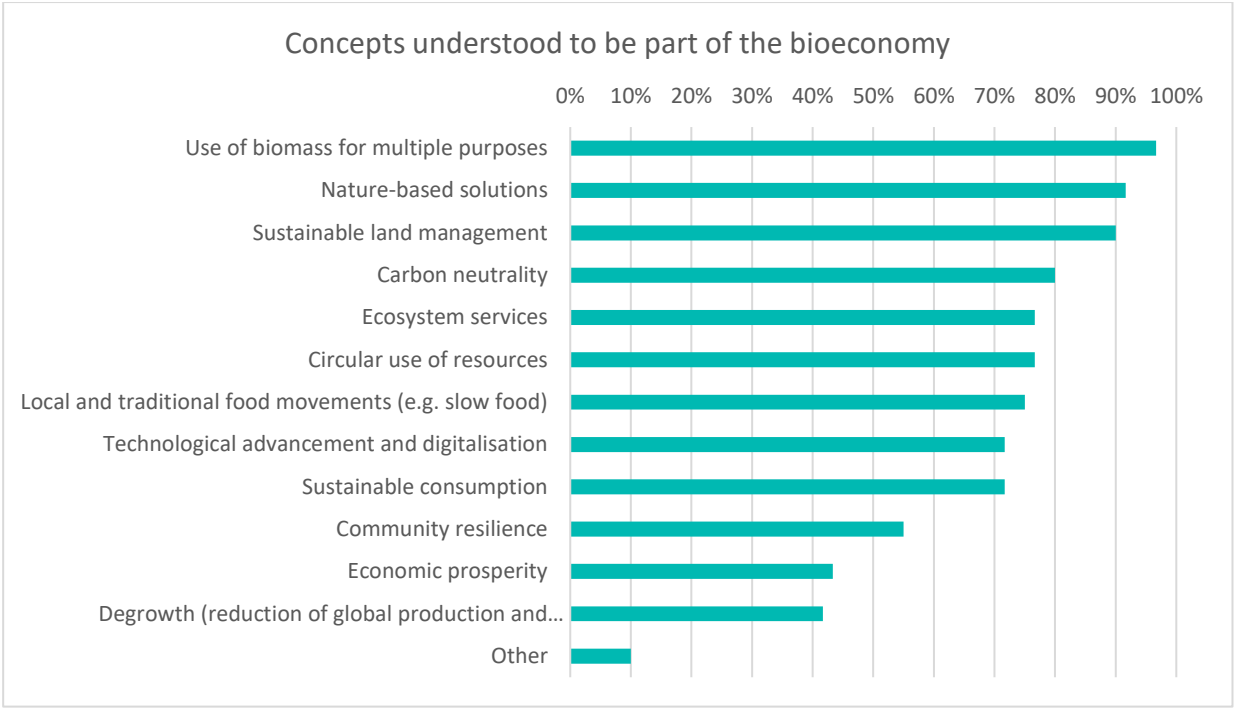


Figure 2: Proportion of survey respondents that understand certain concepts to be part of the bioeconomy. Respondents were allowed to select as many concepts as desired. Proportion is expressed as percentage of respondents.

In terms of primary production, bioeconomy is perceived to be more linked with *Agriculture* (98%) and *Forestry* (92%) than with *Fisheries and aquaculture* (87%) (Figure 3). A very high proportion of respondents consider *Waste management* (77%) as part of the bioeconomy. Also 72% of respondents consider *Biotechnology and pharmaceutical* sectors as part of the bioeconomy.

Among downstream sectors, *Energy* (90%) and *Food and gastronomy* (88%) receive by far most consideration. *Chemistry* (67%) and *Tourism and recreation* (50%) are other secondary sectors perceived by half or more than half of respondents to be part of the bioeconomy, followed by *Construction* (47%). *Textiles* (40%), *Health and wellbeing* (38%), and *Machine industry* (25%) are among the sectors least

considered to be a part of the bioeconomy. In addition, 5% of respondents defined *Other* sectors that they understand to be part of the bioeconomy. Some suggestions include that bio-based fuels and wetland farming could be part of the bioeconomy.

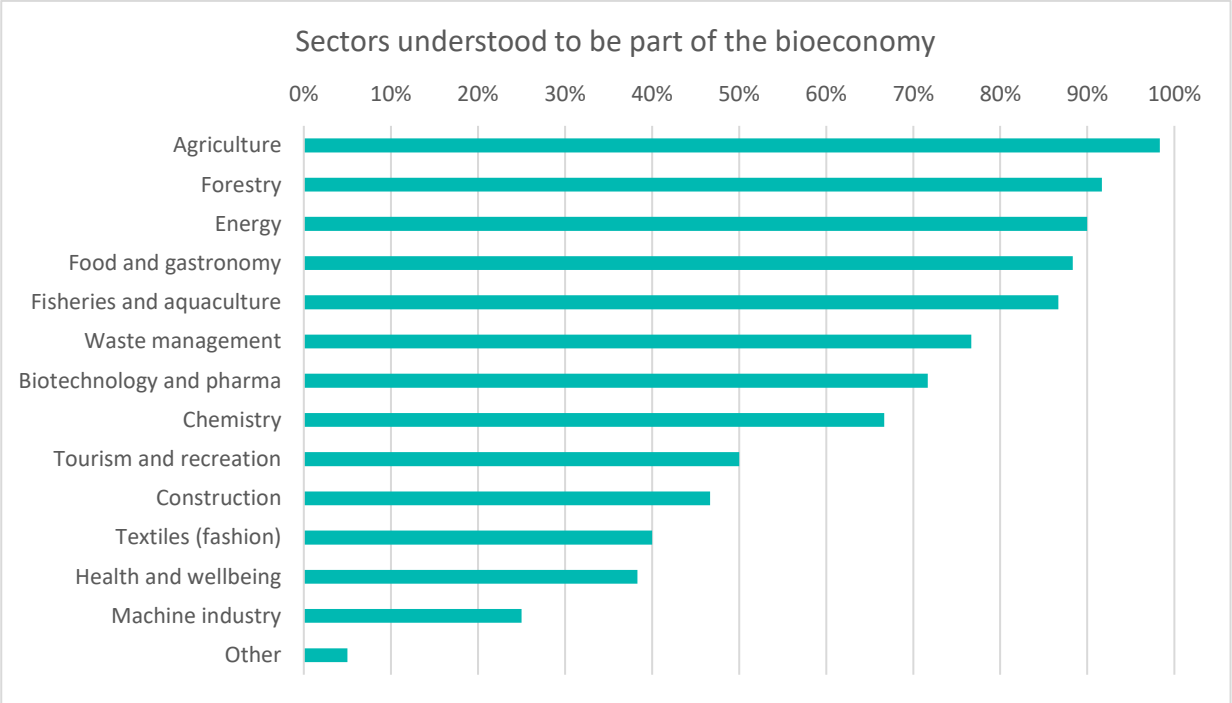


Figure 3: Proportion of survey respondents that understand certain sectors to be part of the bioeconomy. Respondents were allowed to select as many sectors as desired. Proportion is expressed as percentage of respondents.

As shown in Figure 4 below, based on true/false statements, the vast majority of respondents (>85%) 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. Even 100% of respondents agree that bioeconomy helps reduce our dependency on fossil fuels. On the other hand, only a low proportion of respondents do perceive some risks of the bioeconomy as inducing *stress on natural systems* (14%), *contributing to deforestation* (14%) and *not enough biomass to implement the bioeconomy* (23%).

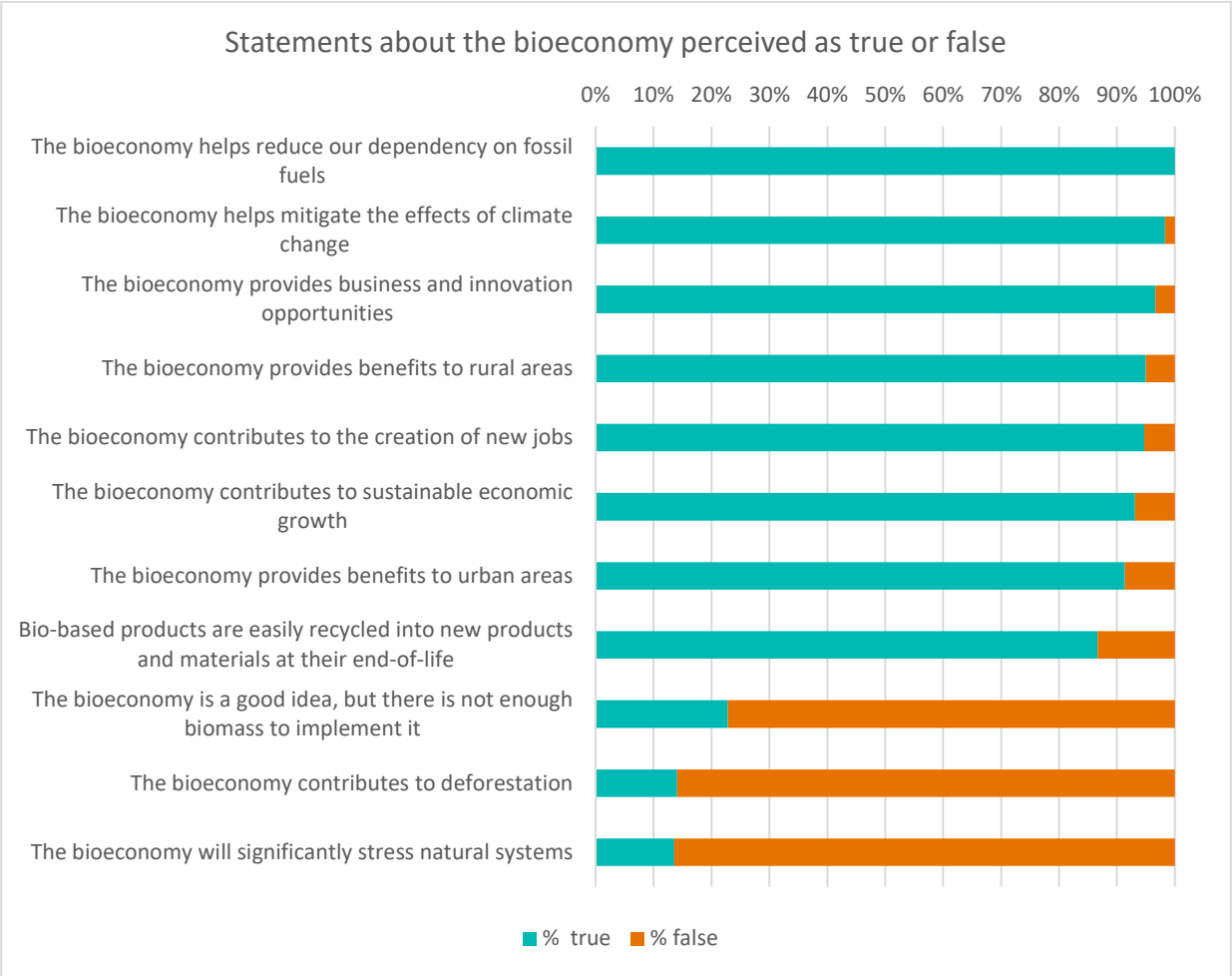


Figure 4: Proportion of survey respondents that marked bioeconomy statements as true (blue) or false (orange). Proportion is expressed as percentage of respondents.

When asked about the single most important benefit of the bioeconomy, *Providing renewable alternatives to non-renewable materials* emerges as the most frequent answer (28%), followed by *Reduced material consumption and waste* (19%), *Renewable energy to replace fossil fuels* (18%), *Transition to a low-carbon economy* (16%), *Helping conserve biodiversity and ecosystem services* (14%). (Figure 5). None of the respondents considered *Job creation and economic growth* (0%), *Providing wellbeing for people* (0%), or *Fostering technological innovation* (0%) to be the most important benefits of the bioeconomy.

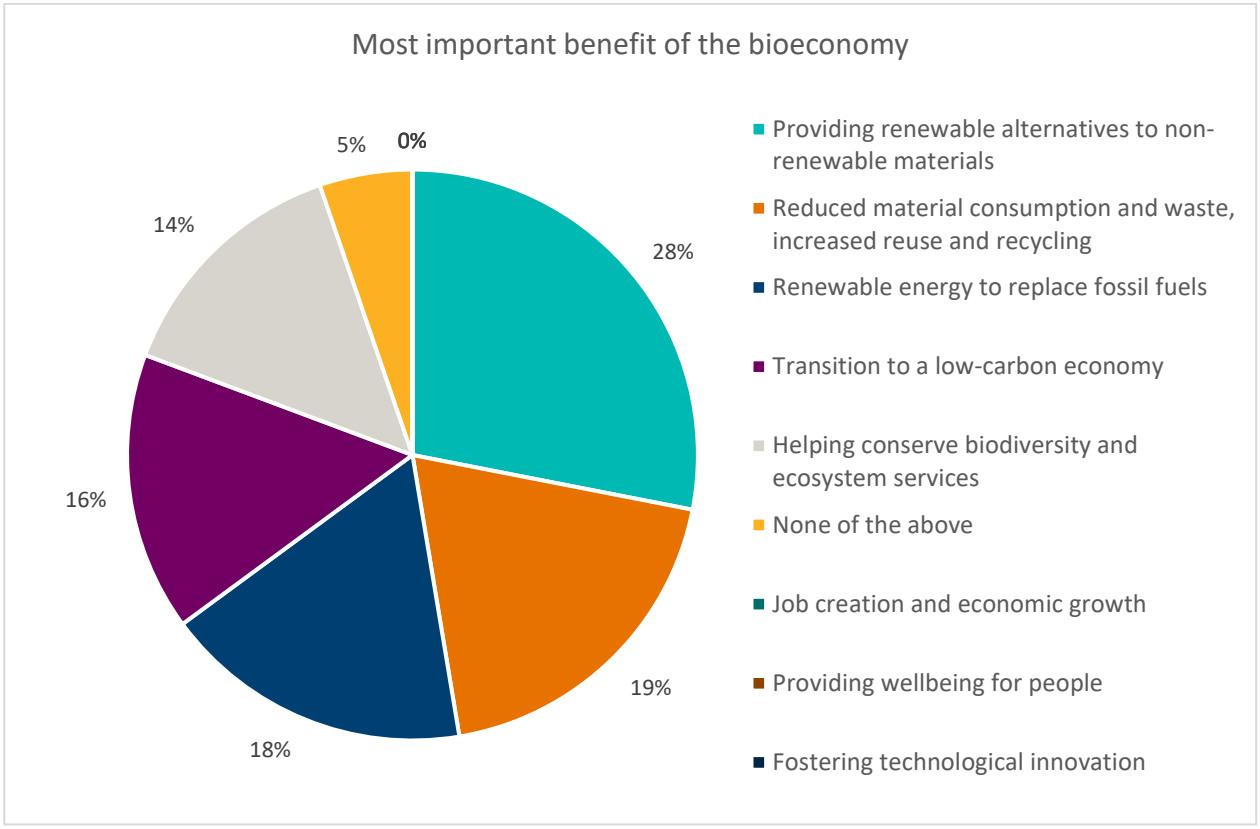


Figure 5: Proportion of respondents that perceived benefits of the bioeconomy as being the most important benefit out of eight predefined benefits. Respondents were limited to select only one benefit. Proportion is expressed as percentage of respondents.

When asked about the single most important risk of the bioeconomy, *Not enough biomass to supply the bioeconomy* emerges as the most frequent answer (27%) (Figure 6). 20% of respondents indicated that *Higher cost of essential goods (e.g. food, water, shelter, etc)* is the most important risk. Otherwise, a considerable number of respondents considered *Dangerous impacts on developing countries due to biomass imports* (16%) and *Impacts on ecosystem services* (14%). Fewer respondents considered *Increasing biomass costs* (5%) and *Impacts on poverty or food sovereignty* (5%). A considerable 13% of respondents indicated *None* of the predefined risks is the most important risk.

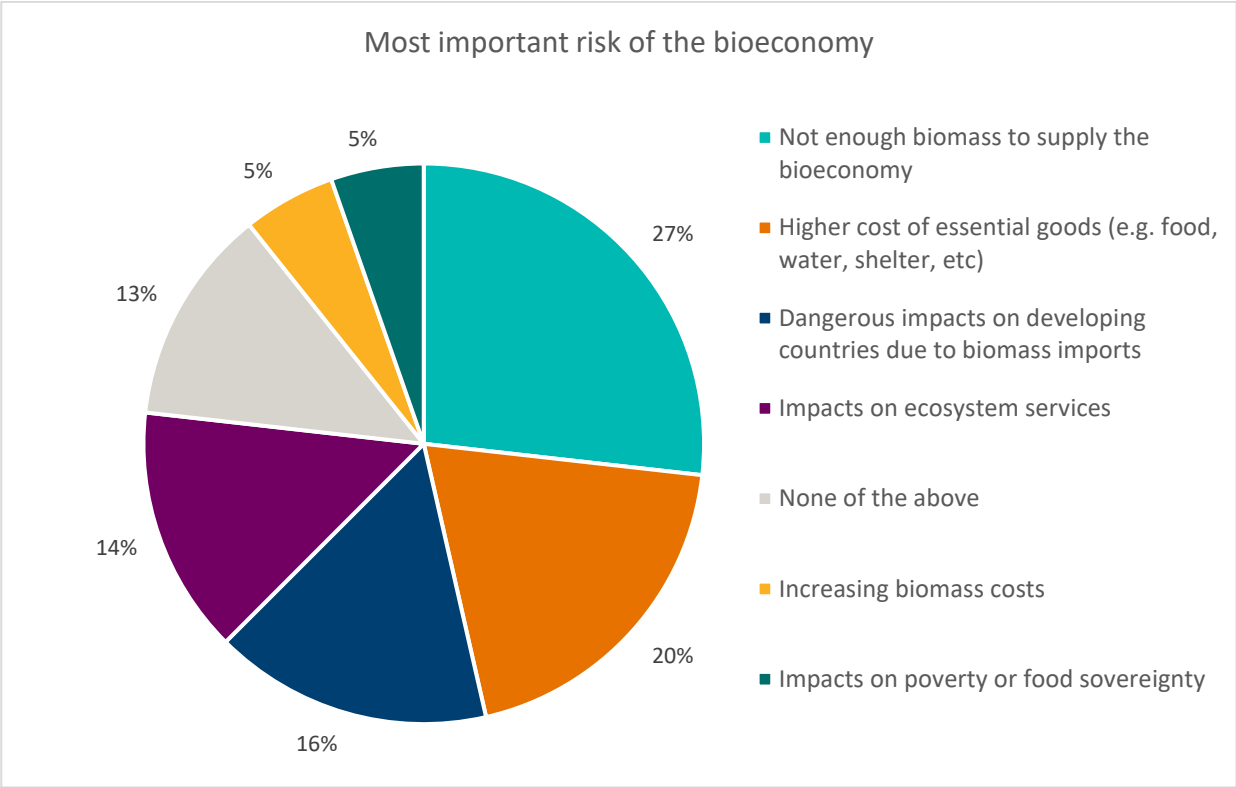


Figure 6: Proportion of respondents that perceived risks of the bioeconomy as being the most important risk out of six predefined risks. Respondents were limited to select only one risk. Proportion is expressed as percentage of respondents.

When asking about public awareness, 93% of respondents overall felt that the general public was not sufficiently informed on the bioeconomy. All industry respondents (100%) and other respondents (100%) felt the general public was not sufficiently informed, while slightly less government respondents (89%) 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 extend 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 South Ostrobothnia for the transition from a conventional economy to a circular bio-based economy, the majority of respondents answered medium readiness (67% of respondents), high readiness (20% of respondents) and low readiness (9 %) (Figure 7). One respondent (2%) considered South Ostrobothnia to have a very low readiness but also one respondent (2%) reported a very high readiness.

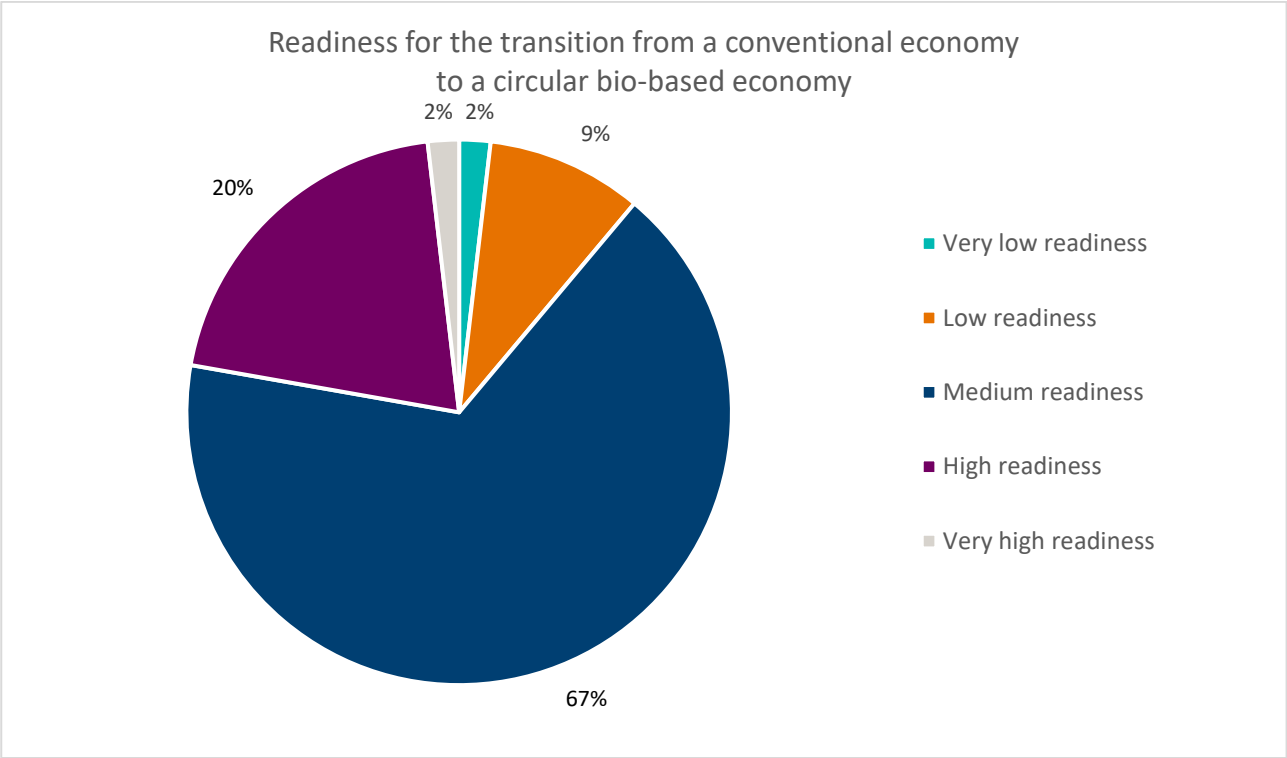


Figure 7: Proportion of respondents that consider different readiness levels of South Ostrobothnia to transition from a conventional economy to a circular bio-based economy.

Respondents perceived by-far that *Bioenergy* (75%) is the bioeconomy sector with highest potential for growth in South Ostrobothnia (Figure 8), which is in line with the region's vision on energy transformation. *Food and gastronomy* (49%), *Wood construction* (42%), *Advanced new materials* (31%), *Wood-based materials & products* (29%), *Non-wood forest products* (20%) and *Nature-based tourism* (15%) were considered sectors with a high potential by a moderate number of respondents. *Green chemistry* (9%), *Bioplastics* (4%), *Pulp and paper* (2%) and *Textiles & fashion* (2%) were least considered to have high potential for growth in South Ostrobothnia (Figure 8).

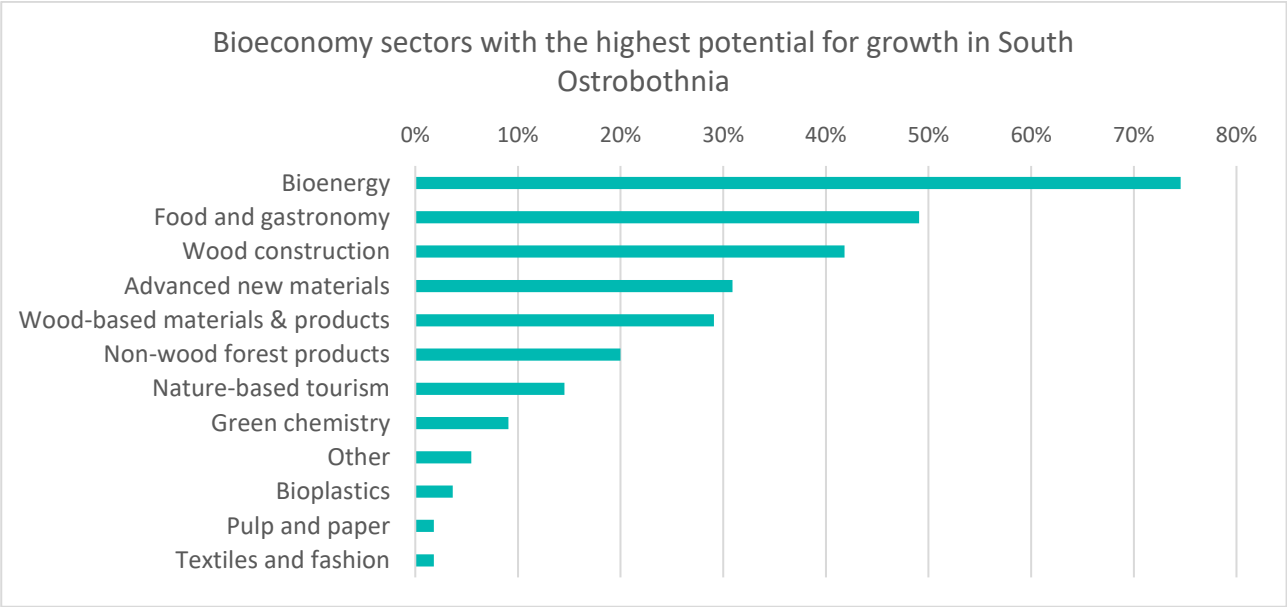
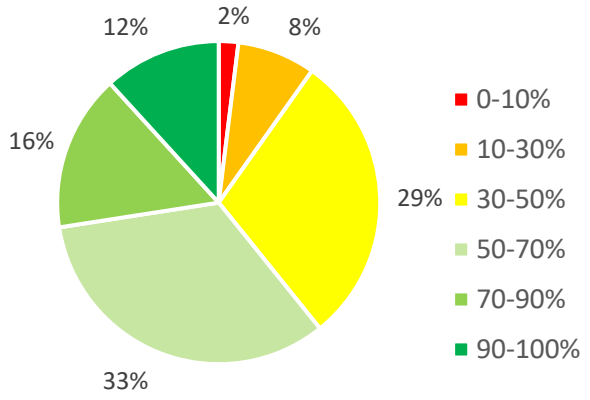
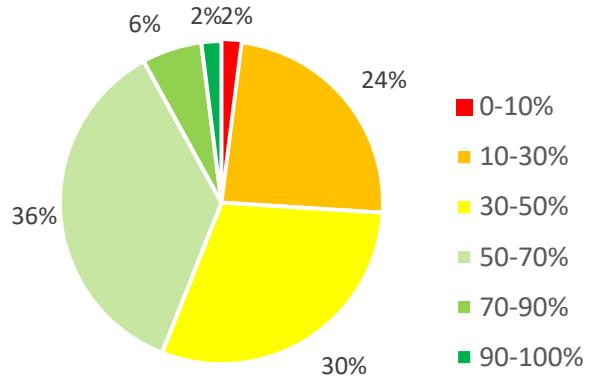
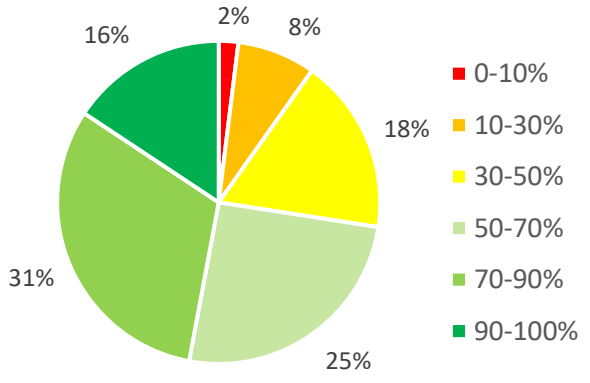
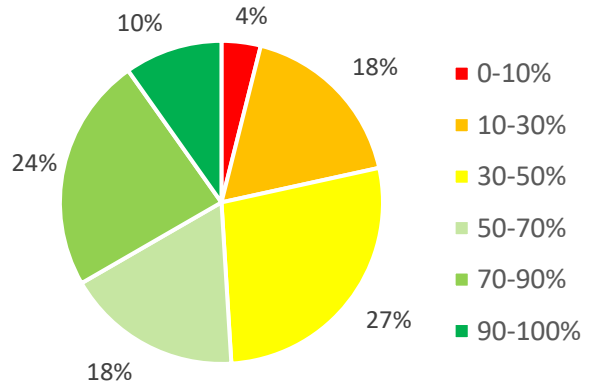
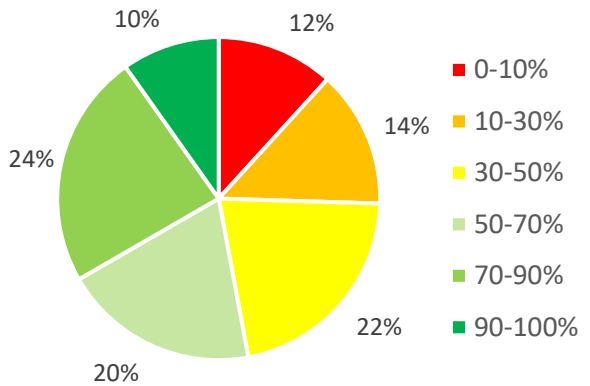
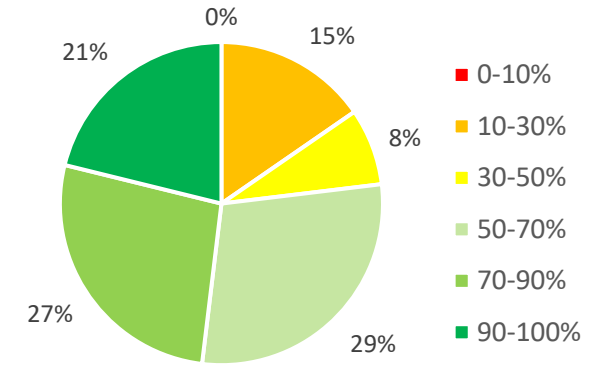


Figure 8: Proportion of respondents that selected bioeconomy sectors to have the highest potential for growth in South Ostrobothnia. Respondents were allowed to choose up to three sectors. Proportion expressed as percentage of respondents.

Respondents were asked to what extend six different sectors could replace their conventional (fossil-based) materials with bio-based materials by 2050 in South Ostrobothnia. Table 1 shows that the majority (more than 50%) of respondents considered that within the sectors Construction, Energy, Transport and 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 South Ostrobothnia. For the Agri-food and Energy sectors, more than 70% of respondents considered this. In the case of Manufacturing, slightly below half of the respondents (44%) 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 South Ostrobothnia.

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 South Ostrobothnia, namely 65% of resources is estimated to be replaceable. The second sector with highest proportion of resources that can be replaced is the Energy sector, with 64%. In third place comes Construction with 57%, followed by Transport and mobility with 53%, Textiles & fashion with 52% and manufacturing 45%.

Table 1: 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 South Ostrobothnia. 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%.

Construction	Manufacturing
	
Energy	**Transport & mobility**
	
Textiles & fashion	**Agri-food (including production, packaging and distribution)**
	

3.4. Identify barriers & supporting conditions

Respondents were asked to indicate the importance of supporting conditions and barriers for bioeconomy development in South Ostrobothnia. 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 (4.43/5) was considered as the most important supporting condition for bioeconomy development, closely followed by *Availability of scientific information* (4.23/5) (Figure 9). *Public procurement programmes* (4.08/5) and *Performance-based payments for carbon sequestration* (3.98/5) obtained scores close to Important (4/5). *Adequate regulation* (3.55/5) was perceived the least important supporting condition.

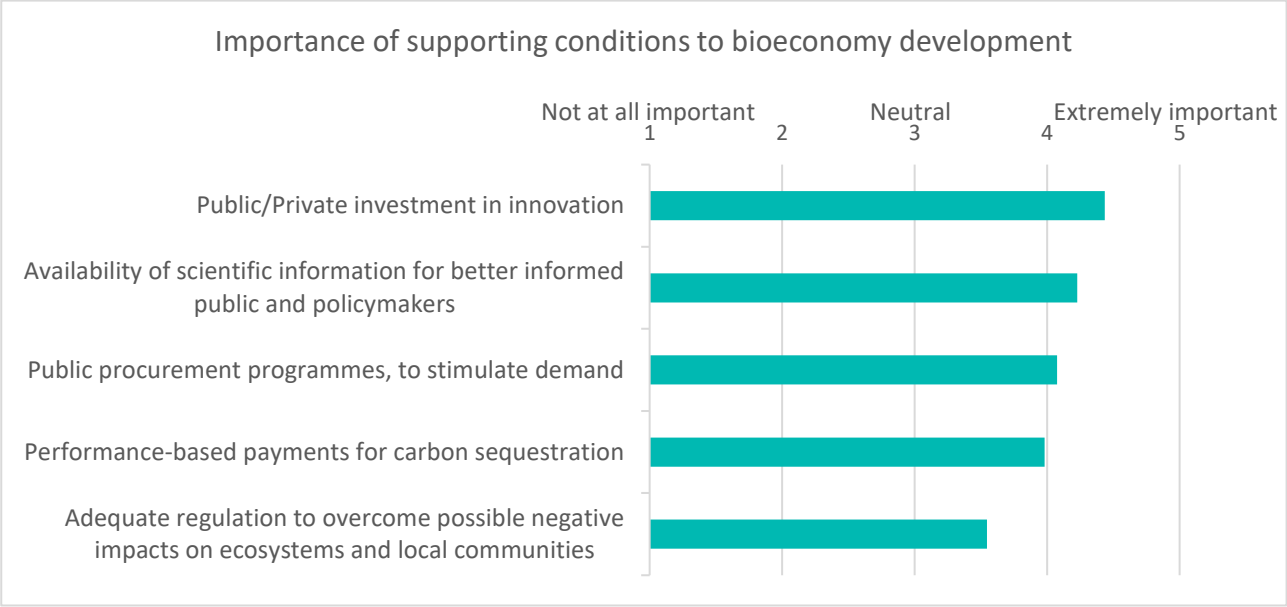


Figure 9: Importance of factors as supporting conditions for bioeconomy development in South Ostrobothnia. Respondents were asked to rank the factors from one (Not at all important) to five (Extremely important), the average value of the respondents' ranking is shown.

Three of the barriers were perceived to be more important than the others, namely *Lack of profitability and market demand* (3.96/5), *Lack of co-operation among different stakeholders* (3.94/5) and *Lack of technical feasibility and/or barriers to innovation* (3,89/5) (Figure 10). With their average scores close to 4/5, they're perceived Important. Two other barriers are ranked in between Neutral (3) and Important (4): *Lack of balance between different uses of forest* (3.61/5), and *Lack of supportive policy and legislative environment* (3.49/5). The barrier *Lack of general social acceptance* (3/5) was perceived of Neutral importance.

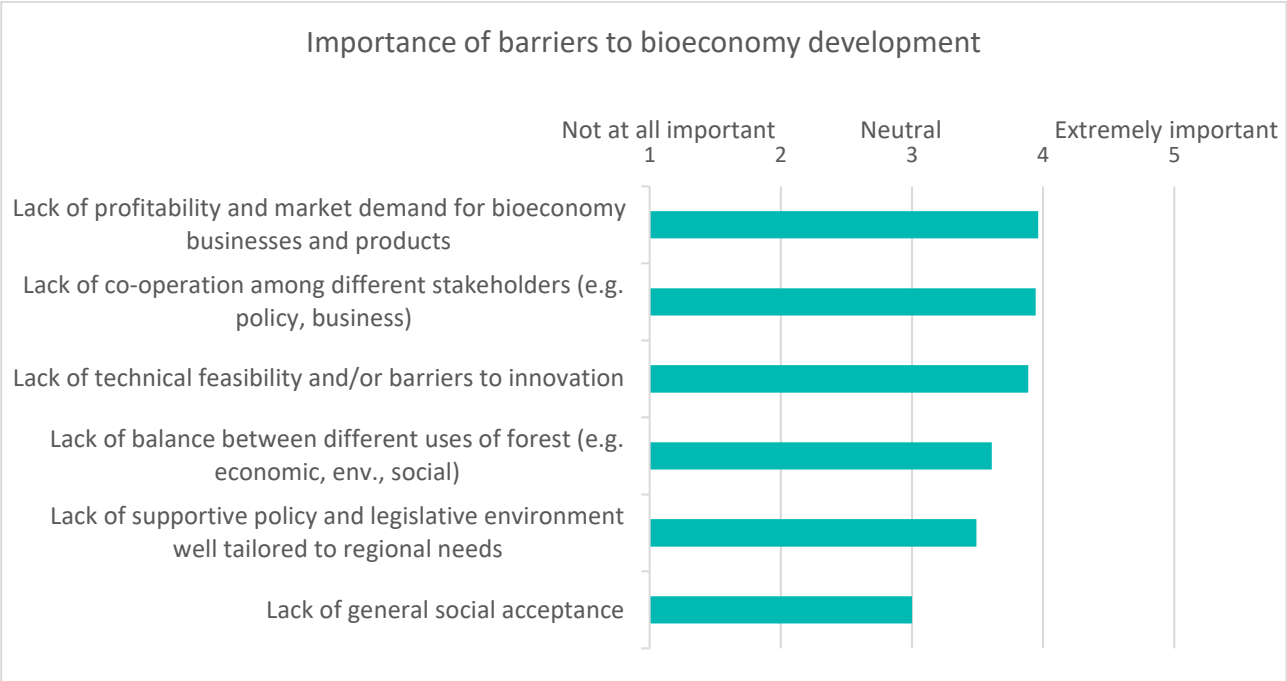


Figure 10: Importance of factors as barriers for bioeconomy development in South Ostrobothnia. Respondents were asked to rank the factors from one (Not at all important) to five (Extremely important), the average value of the respondents' ranking is shown.

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.

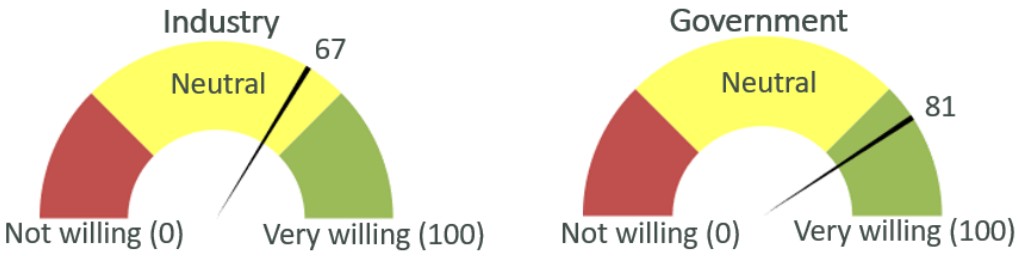


Figure 11: Willingness to develop the bioeconomy. Industry and government respondents were asked to rate how willing their industry sector/government department is to develop the bioeconomy on a scale from zero (not willing) to hundred (extremely willing).

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 67, meaning that the industry respondents are rather willing to develop the bioeconomy (Figure 11). 33% 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* (80% of industry respondents that have undertaken bioeconomy projects),

to take advantage of the existing market opportunities (60%,) *to take advantage of government incentives* (20%) and *Other* reasons (20%).

Main reasons to NOT have undertaken bioeconomy projects were *Lack of technical capacity* (25%) followed by *High uncertainty in bioeconomy projects* (13%) and *Low expected profitability* (13%). Half of those respondents (50%) also mentioned *Other* reasons and specified, for example, lack of demand and prejudices.

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 81, meaning that government is very willing to develop the bioeconomy (Figure 11). Moreover, 53% of government respondents said to have undertaken a bioeconomy regulation or initiative in the past. This number is higher than the comparable answer from industry side.

The main reasons to have undertaken a bioeconomy regulation or initiative are *to ensure sustainability or social equity* (71%), *to generate markets and social acceptance of bioeconomy products* (53%) and *to improve availability and access to biological resources* (41%).

Responses were evenly split when asked about the main reason to NOT have undertaken a bioeconomy regulation or initiative: *High uncertainty of bioeconomy outcomes* (14%), *it is not in the best interest of local strategies and policies* (14%), *public is not asking for this* (14%), and *lack of technical capacity* (14%). The predefined reason *regional development plans do not contribute to the bioeconomy* received no responses. Instead, many respondents (50 %) gave *other* options as the most important reasons, four of them specified that it was not their job to implement a bioeconomy development or initiative.

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).

Respondents in all three groups feel that government and industry are about equally responsible for 1) ensuring positive environmental and social impacts and for 2) investment in research, development, and innovation. All three subgroups, with government respondents mostly strongly, indicate the government to be slightly more responsible in communicating and promoting the bioeconomy among the general public (Figure 12).

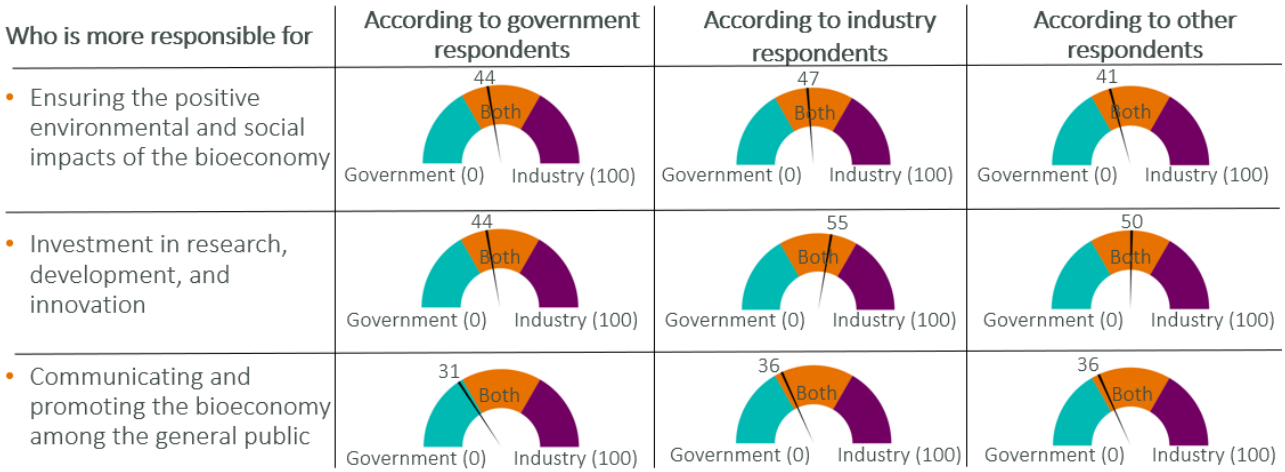


Figure 12: Division of roles and responsibilities between the government and industry regarding three different tasks in moving the bioeconomy in South Ostrobothnia forward. Industry and government respondents were asked to indicate who is more responsible for the three different tasks on a scale from 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 South Ostrobothnia 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, *Clean energy and Rural development* were all selected by 94% of respondents as having goal alignment with the bioeconomy (Figure 13). Other policy areas with very high overlap with bioeconomy are *Climate change mitigation and adaptation* (92%), *Technological innovation* (88%), *Biodiversity conservation* (87%), *Job creation* (73%) and *Urban planning* (67%).

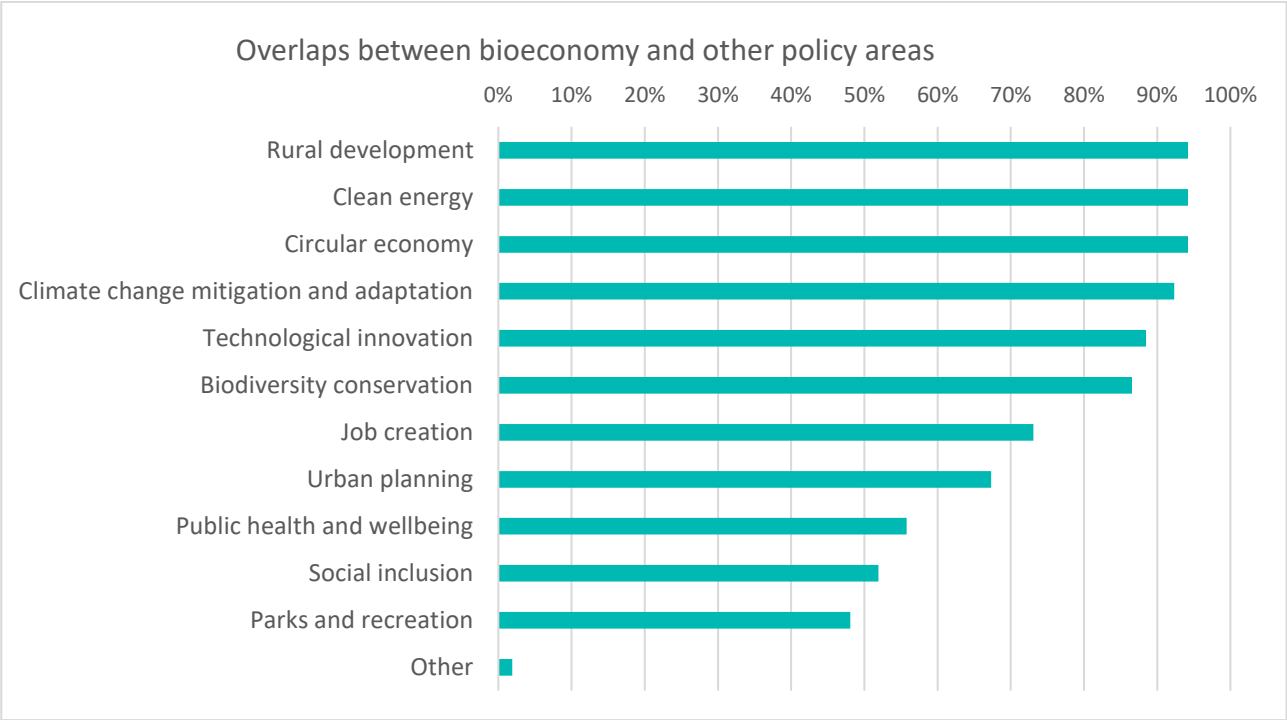


Figure 13: Proportion of respondents that understand certain policy areas to be related with the aims of the bioeconomy. Respondents were allowed to select as many policy areas as desired. Proportion expressed as percentage of respondents.

4. Conclusions

With a total of 67 responses, of which 58 % from Government (or related public sector), 31% from Industry (or related private sector) and 7% 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 South Ostrobothnia. 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 use of biomass for multiple purposes, nature-based solutions and sustainable land management.

Respondents consider use of biomass for multiple purposes, nature-based solutions and sustainable land management to be an integral part of the bioeconomy. Carbon neutrality, ecosystem services, circular use of resources, local and traditional food movements, technological advancement and digitalisation and sustainable consumption were also understood by more than two-third of respondents to be part of the bioeconomy. Degrowth and economic prosperity are perceived to be a part of the bioeconomy by about the same proportion of 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. When asked about the single most important benefit of the bioeconomy, providing renewable alternatives to non-renewable materials emerges as the most frequent answer, followed by reduced material consumption and waste and renewable energy to replace fossil fuels. These benefits are followed by transition to a low-carbon economy, and helping conserve biodiversity and ecosystem services. None of the respondents considered socio-economic benefits such as job creation and economic growth, providing wellbeing for people, or fostering technological innovation to be the most important benefit of the bioeconomy. When asked about the single most important risk of the bioeconomy, not enough biomass to supply the bioeconomy emerges as the most frequent answer. Summarising, respondents generally see the environmental benefits of the bioeconomy as most important and do consider that the bioeconomy delivers socio-economic benefits, like sustainable economic growth and job creation, but find them less important aspects of the bioeconomy.

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

93% of respondents think that the general public in South Ostrobothnia 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 South Ostrobothnia. Food & gastronomy and wood construction are also considered to be promising. Textiles, pulp and paper and bioplastics are not perceived to have a high potential.

Respondents perceive the bioeconomy to be highly linked to agriculture, to forestry and to fisheries and aquaculture, somewhat less to waste management. Among downstream sectors, bioenergy is the

bioeconomy sector with highest potential for growth in South Ostrobothnia. Food & gastronomy and wood construction were also considered to be sectors with a high potential. Textiles & fashion, bioplastics and pulp & paper were least considered to have potential for growth in South Ostrobothnia.

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

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. The sectors with highest potential for biologisation (replacing conventional materials by bio-based materials) are agri-food, energy and construction.

Most supporting conditions are seen as key enablers of the bioeconomy. The main barriers are the lack of profitability and market demand, the lack of cooperation between different stakeholders and the lack of technical capacity.

Four out of five suggested supporting conditions (enablers) were considered close to or higher than important for the bioeconomy development in South Ostrobothnia, in the following order: Public/private investment in innovation, Availability of scientific information for better informed public and policymakers, Public procurement programmes and Payments for carbon sequestration. Adequate regulation was considered least important. Three of the barriers were perceived to be close to important, namely Lack of profitability and market demand, Lack of co-operation among different stakeholders and Lack of technical feasibility and/or barriers to innovation. The other two barriers which are ranked slightly less important are Lack of balance between different uses of forest, and Lack of general social acceptance.

Government and industry indicate 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 South Ostrobothnia forward. Both groups indicated that they are more or less equally responsible for ensuring positive environmental and social impacts. Both groups are also responsible for investments in research, development and innovation. Both groups agree that government is 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
  - Government and industry respondents agreed that the government is more responsible for communicating and promoting the bioeconomy among the general public.
  - The vast majority of respondents feel that the general public in South Ostrobothnia is not sufficiently informed on the bioeconomy.
  - Further investigate concerns on social awareness of the bioeconomy as a necessary step to improve communication; Proposed research questions: In which ways is the general public in South Ostrobothnia 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
  - Environmental benefits are widely acknowledged. Potential risks are minimised or not perceived as such.
  - Contributions and policy overlaps with economic development, job creation, innovation, etc. appear less prominently.

- Highlight the potential of a variety of bioeconomy sectors
  - Bioenergy was considered by-far the bioeconomy sector with highest potential for growth.
  - The regional government clearly sees an important role for bioenergy in the regional bioeconomy (See regional context).
  - More than a quarter of respondents consider that not enough biomass to implement the bioeconomy is the single most important risk of the bioeconomy.
  - 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. By improving the cascade use of biomass and circularity of the bioeconomy, the risk of not having enough biomass can be partly coped.
  - Therefore, 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 has been replicated in all the member regions, as well as several external regions, 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

South Ostrobothnia 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 (April 2023) participated by 53 member Regions and 39 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

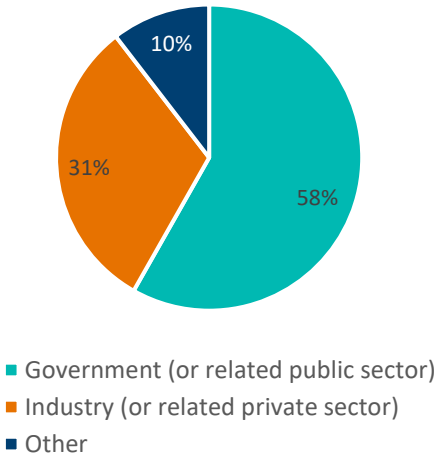
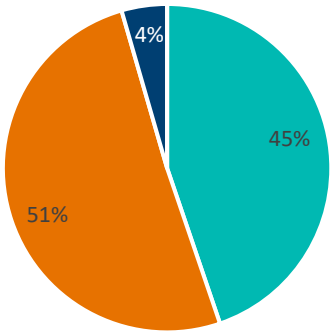
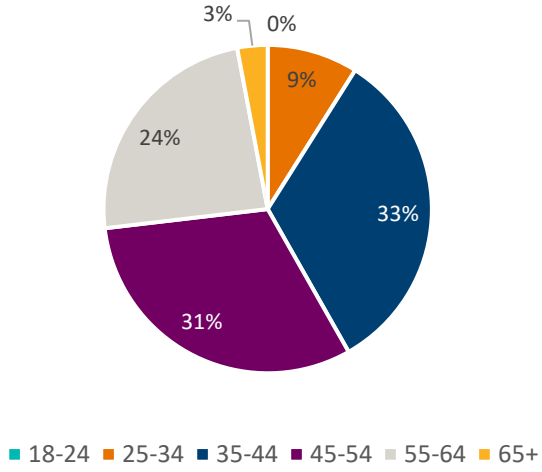
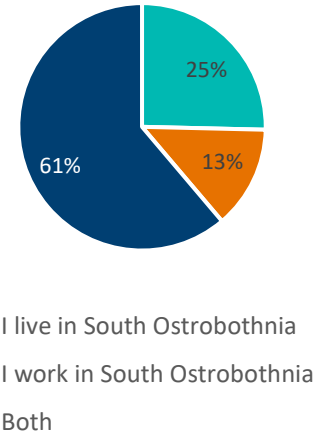
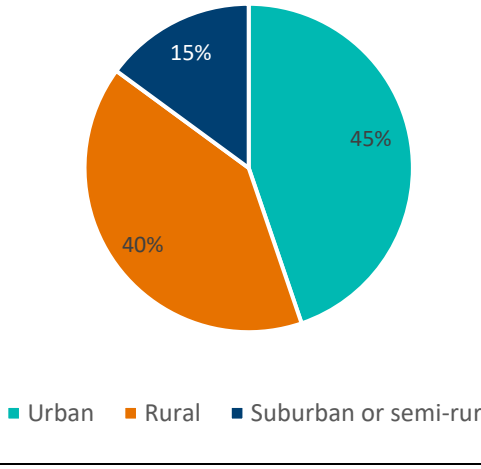
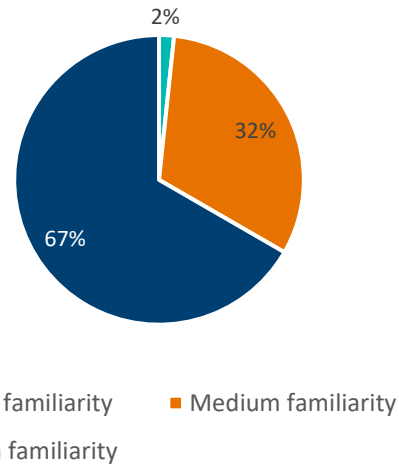
The Survey is provided in the form of a toolkit to a regional partner organisation that takes care of identifying and contacting potential respondents. The toolkit is designed and adapted to the regional context by the Bioregions Facility. Consequently, the regional partner organisation is able to launch 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 Finnish. 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 two deliverables. These include a PowerPoint with summarised results and a social media kit with a number of social media cards. The Regional Council of South Ostrobothnia took the lead in creating a report on the results (this document). The report includes a section on the Regional context and a section with Conclusions & recommendations.

In the case of South Ostrobothnia, the Regional Council of South Ostrobothnia identified target participants from government and industry and disseminated the survey. The Bioeconomy Perceptions Regional Survey was open to answers during the period December 2022 – February 2023 and the analysis and report writing took place between February – April 2023.

A1. Characterisation of the respondents

Field	Gender
	
Age	**Location**
	
Area	**Bioeconomy familiarity**
	

A2. Survey questions

Survey pre-formatted in SurveyMonkey: English translation, (REGION) is in this case always replaced with South Ostrobothnia

Survey pre-formatted in SurveyMonkey: Finnish