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Natural Resources Institute Finland, Helsinki 2019

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# Summary

Markus Lier<sup>1</sup>, Leena Kärkkäinen<sup>1</sup>, Kari T. Korhonen<sup>1</sup>, Tuula Paakkala<sup>1</sup>

<sup>1</sup>Natural Resources Institute Finland (Luke), Joensuu

This report presents the bioeconomy settings and competencies for 29 regions in 11 EU countries. The results of this study contribute to the further discussions with the planned EU bioeconomy policy support facility. The study results confirm the assumption that the main drivers for the transition towards a bioeconomy varies between EU regions. Region-specific socio-economic and ecological settings, legal framework, and social demands, and a long history of using natural resources are reflected in the current development of bioeconomy sectors at regional level.

As for the legal settings, almost all of the study regions have formulated *bioeconomy related* strategies, policies and initiatives. Even if the *bioeconomy related* strategy is not explicitly called a bioeconomy strategy, it contains bioeconomy focused and related issues, e.g. EU bioeconomy objectives. The results show also that synchronizing regional bioeconomy monitoring-activities is necessary to ensure consistent and comparable results across all EU regions.

As for the current bioeconomy competences in the EU regions, our results show the diversity of the industries and activities included in the bioeconomy sector at regional level, even within the same country. The primary producers of bio-based raw materials, agriculture and forestry, are considered as part of the bioeconomy in almost all the regions studied. Naturally, regions with access to surface waters also consider fisheries and aquaculture as part of a region's bioeconomy. The results support the assumption that regions understand the ecological boundaries and sustainable use of bio-based raw materials from agriculture, aquaculture and fisheries, and raw materials from forestry.

When it comes to the manufacture of bio-based end-products, the traditional manufacturers of bio-based end-products, the food industry, was mentioned by the respondents as being the most included, followed by renewable energy and wood products industries. The sectors and activities (e.g. the chemical industry, construction, and pharmaceutical industry) that are currently not included at regional level need more attention in future. The same applies for industries and activities that focus on bio-based services, nature tourism, green care and recreation, transport of bio-based raw materials and products, and water purification and distribution.

Based on the study results we identified four measures for future discussions

- Towards effective policies: screen the necessary and possible policy measures at regional and national level towards a better sustainable and circular bioeconomy.
- New value-chains through citizens-public-private partnership: investigate necessary and possible measures at regional and national level helping bioeconomy activities and sectors to grow.
- Enhance peer-to-peer exchanges: use EU-wide existing networks for mutual learning between regions.
- Include citizens: increase the awareness of future societal and environmental challenges, and the role of a sustainable and circular bioeconomy in tackling them at regional level, national, EU and global level.

Keywords: bioeconomy, EU, regions, competencies

## Tiivistelmä

Tässä raportissa esitetään 11 EU-maan 29 alueen biotaloutta koskevia ominaispiirteitä ja edistämismahdollisuuksia. Tutkimuksen tuloksia voidaan hyödyntää suunniteltaessa EU:ssa biotalouteen liittyvää politiikkatukea. Tutkimuksen mukaan tärkeimmät biotalouteen siirtymistä edistävät tekijät ovat erilaisia EU:n eri alueilla. Alueiden sosioekonomiset ja ekologiset ominaispiirteet, lainsäädäntö ja sosiaaliset tarpeet sekä pitkään jatkunut luonnonvarojen käyttö näkyvät biotalouden eri alojen nykyisessä kehityksessä alueellisella tasolla.

Lähes kaikki tutkitut alueet ovat laatineet *biotalouteen liittyviä* strategioita, politiikkoja ja hankkeita. Vaikka biotalouteen *liittyvää* strategiaa ei usein kutsuta biotalousstrategiaksi, se sisältää biotalouteen keskittyviä ja sitä käsitteleviä asioita, kuten EU:n biotaloustavoitteita. Lisäksi tulokset osoittavat, että biotalouden seurannan yhdenmukaistaminen eri alueilla on välttämätöntä, jotta voidaan varmistaa tulosten johdonmukaisuus ja vertailtavuus kaikilla EU-alueilla.

Tuloksemme osoittavat, että biotalouteen kuuluvat teollisuusalat ja toiminnot vaihtelevat alueittain, jopa saman maan sisällä. Maa- ja metsätalouden katsotaan kuuluvan biotalouteen lähes kaikilla tutkituilla alueilla. Alueilla, joilla on vesistöjä, kalastusta ja vesiviljelyä pidetään osana alueen biotaloutta. Tulosten mukaan alueilla ymmärretään, kuinka maatalouden, vesiviljely- ja kalastusalan sekä metsätalouden biopohjaisia raaka-aineita käytetään kestävästi.

Kun tarkasteltiin biopohjaisten lopputuotteiden valmistusta, vastaajat mainitsivat useimmin elintarviketeollisuuden. Sen jälkeen tulivat uusiutuvan energian toimiala ja puutuoteteollisuus. Jatkossa on kiinnitettävä enemmän huomiota toimialoihin ja toimintoihin, kuten kemianteollisuuteen, rakentamiseen ja lääketeollisuuteen, joiden eitässä tutkimuksessa mainittu sisältyvän biotalouteen tutkituilla alueilla. . Lisäksi on perehdyttävä paremmin teollisuudenaloihin ja toimintoihin, jotka keskittyvät biopohjaisiin palveluihin, luontomatkailuun, vihreään hoivaan ja virkistymiseen, biopohjaisten raaka-aineiden ja tuotteiden kuljettamiseen sekä veden puhdistamiseen ja jakeluun.

Tutkimustulosten perusteella tunnistimme neljä toimenpidettä jatkokeskusteluja varten

- Kohti tehokkaita käytäntöjä: tutkitaan, mitkä ovat alueellisella ja kansallisella tasolla tarpeellisia ja mahdollisia toimenpiteitä, joilla edistetään kestävämpää ja kierrätykseen perustuvaa biotaloutta.
- Uusia arvoketjuja kansalaisten, julkisen ja yksityisen sektorin kumppanuuksilla: tutkitaan alueellisella ja kansallisella tasolla tarpeellisia ja mahdollisia toimenpiteitä, joilla tuetaan biotaloustoimenpiteiden ja -toimialojen kasvua.
- Edistetään tiedonvaihtoa alan toimijoiden kesken: käytetään koko EU:n kattavia verkostoja alueiden välisen oppimisen edistämiseen.
- Kansalaisten osallistaminen: lisätään tietoisuutta tulevaisuuden yhteiskunnallisista ja ympäristöön liittyvistä haasteista sekä kestävä ja kierrätykseen perustuvan biotalouden roolista niiden ratkaisemisessa alueellisella, kansallisella, EU:n ja koko maailman tasolla.

Avainsanat: biotalous, EU, edistäminen

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# 1. Introduction

According to the EU Bioeconomy strategy review report (EC 2017) the EU “2012 Bioeconomy Strategy...has brought the bioeconomy principles and cross-cutting objectives to the attention of national and regional policymakers...”. As a result many European Union Member States (EU MS) have formulated national bioeconomy focused strategies, related policies or initiatives (e.g. EU 2017b, Lier et al. 2018). The revised EU Bioeconomy Strategy (2018) aims “... to ensure that all territories ... have the opportunity to develop their bioeconomy potential, an EU bioeconomy policy support facility will be set up ... with the scope to support the development of national and regional bioeconomy strategies, ...”. At national level initiatives and processes have been established to support EU member states to develop bioeconomy strategies, e.g. in form of H2020 research projects (BIOMONITOR), or H2020 coordination and support actions (BIOEASTsUP).

The EU regions are however considered as the main driver for a successful sustainable and circular bioeconomy. This has been recognised by EU bioeconomy stakeholders by stating, “*a bioeconomy offers a new perspective on traditional and high-value production in the (EU) regions, as well as creating new opportunities and jobs for farming, forestry, fisheries, aquaculture and industry*”. Therefore a mapping of the EU regional bioeconomy competencies, supporting mutual learning within and between regions, and peer-to-peer exchanges at the EU level are seen as essential in order to create new bioeconomy value chains while optimising existing ones (European Bioeconomy Stakeholders Manifesto 2018).

However, to date there is scattered information on the state-of-the-art of regional bioeconomies available. Against this background, a first step is to investigate the current EU regional bioeconomy settings and competencies. It can be assumed, that the ability of EU regions to transit their currently non-circular oil-based economy towards a circular bioeconomy varies a lot between the EU regions even within the same country. Furthermore, it can be assumed that even if EU regions do not currently have a bioeconomy focused strategy, they might have bioeconomy related programs and strategies at regional level (e.g. regional forest program, rural strategies, climate and energy strategy, etc.).

The aim of this study is to map the EU regional bioeconomy competencies, in particular by identifying and comparing:

- the existence of regional bioeconomy strategies, policies and/or related initiatives
- the existence of indicators to monitor and assess the regional bioeconomy strategies, policies and/or related initiatives,
- the bioeconomy objectives currently included in region’s bioeconomy strategies, policies and/or related initiatives,
- the industries and activities included in the bioeconomy sector at regional level, and
- the availability of bioeconomy related and focused statistics at regional level.

An integrated part is the participatory approach of this study, by direct involvement of regional authorities responsible for developing, assessing and monitoring regional bioeconomy strategies, policies and/or related initiatives. The study results contribute to the further discussions on current challenges of and future opportunities for bioeconomies at EU regional level.

This study was co-ordinated by the Natural Resources Institute Finland (Luke) and the European Region for Innovation in Agriculture, Food and Forestry (ERIAFF), in particular with the East and North Finland EU Office, the Regione Toscana, DG Giunta Regionale, Italy the region Castilla y Leon, DG Patrimonio Natural, Spain and the CTFC, Catalonia, Spain. The survey was prepared and the results analysed between 3/2019 and 10/2019.

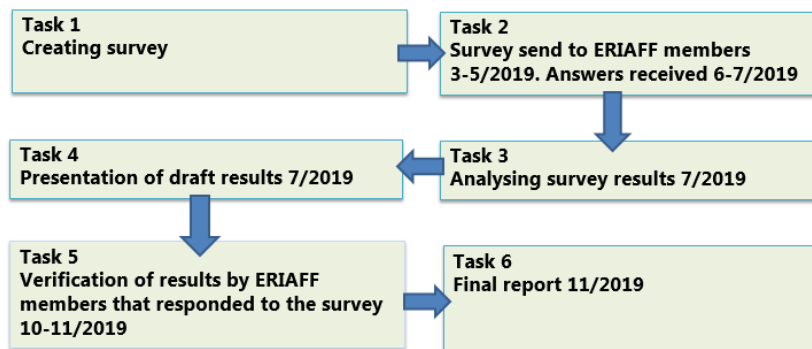


## 2. Methods and material

### 2.1. Work plan, milestones and expected outputs

The study was conducted in cooperation with the Natural Resources Institute Finland (Luke) and the European Region for Innovation in Agriculture, Food and Forestry (ERIAFF), in particular with the East and North Finland EU Office, the Regione Toscana, DG Giunta Regionale, Italy the region Castilla y Leon, DG Patrimonio Natural, Spain and the CTFC, Catalonia, Spain.

The study was carried out in six tasks (see Figure 1) from March 2019 until November 2019.



**Figure 1.** Work plan, milestones and output of the survey

### 2.2. Survey

An integrated part was the participatory approach of this study, by direct involvement of regional authorities responsible for developing, assessing and monitoring regional bioeconomy strategies, policies and/or related initiatives. Their input was collected by a survey sent via the ERIAFF Network. The survey used the methodology developed by the project MontBioeco (Synthesis on bioeconomy monitoring systems in the EU Member States (Lier et al. 2018)).

The survey (Annex 1) was structured in five parts. Questions were asked on:

- general information,
- the existence of regional bioeconomy strategies, policies and/or related initiatives,
- the existence of indicators to monitor and assess the bioeconomy strategies, policies and/or related initiatives at regional level,
- the EU bioeconomy objectives included in a region's bioeconomy strategies, policies and/or related initiatives (incl. region-specific bioeconomy objectives)
- the industries and activities (using the harmonized classification of economic activities in the EU, NACE Rev. 2, EUROSTAT) currently included in the bioeconomy sector at regional level,
- the availability of bioeconomy related and focused statistics at regional level.

The survey (Annex 1) was sent between March and May 2019 to current ERIAFF-members by E-mail. By July 2019 the survey received 29 responses from regions in 11 EU MS, of which 10 responses were from Finland (Table 1). Responding regions represent NUTS-level 1 (1 response), NUTS-level 2 (13 responses) and NUTS-Level 3 (15 responses). The draft survey results were presented at the 11th Bioeconomy Stakeholders Panel meeting on 8 July 2019 in Helsinki, Finland. To verify the answers, the respondents had the opportunity to revise the answers provided for final check-up by E-mail in October 2019, where the aggregated information was presented in table format. This format was chosen for a better presentation of the answers given

**Table 1.** Main organisation involved in answering the survey by region, NUTS-level<sup>1</sup> and country.

Region	NUTS level	Country	Organisation involved in answering the survey
Alto Tâmega	3	Portugal	Development Association of the Alto Tâmega Region
Campania	2	Italy	Campania Region
Castilla y León	2	Spain	Regional Innovation Agency, Institute for Business Competitiveness of Castilla y León (ICE)
Cataluña	2	Spain	Government of Catalonia
Central Finland	3	Finland	Regional Council of Central Finland
Emilia-Romagna	2	Italy	Clust-ER Agrifood
Extremadura	2	Spain	Fundecyt-Pctex
Flanders	1	Belgium	Flemish Government
Friuli-Venezia Giulia	2	Italy	Friuli Venezia Giulia Autonomous Region
Halland	3	Sweden	Regional community planning
Kainuu	3	Finland	Regional Council of Kainuu
Kalmar	3	Sweden	Regional development
Kymenlaakso	3	Finland	Regional Council of Kymenlaakso
Lapland	3	Finland	Regional Council of Lapland /Arctic Smart Rural Community cluster
Limburg	2	Netherlands	Province Limburg
Murcia	2	Spain	Office for Technology Transfer
North Karelia	3	Finland	Regional Council of North Karelia
North East	2	Romania	North East Regional Development Agency
North Savo	3	Finland	Centre for Economic Development, Transport and the environment
Oulu Region	3	Finland	Council of Oulu Region
Pays de la Loire	2	France	Pays de la Loire Regional Council
Satakunta	3	Finland	Regional Council of Satakunta
South Holland	2	Netherlands	Municipality of Westland
South Ostrobothnia	3	Finland	Seinäjoki University of Applied Sciences
South Savo	3	Finland	Regional Council of South Savo
Tuscany	2	Italy	Tuscany Region
Vidzeme	3	Latvia	Vidzeme Planning Region
Värmland	3	Sweden	Region Värmland
Western Macedonia	2	Greece	Managing Authority of Western Macedonia

<sup>1</sup> “The NUTS is based on Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS), which is regularly updated. In order to establish the relevant NUTS level in which a given class of administrative units in a Member State is to be classified, the average size of this class of administrative units in the Member State shall lie within the following population thresholds”: NUTS 1 (3 million to 7 million), NUTS 2 (800k to 3 million), NUTS 3 (150 k to 800 k). Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003R1059&from=EN>

### 3. Results of the survey

#### 3.1. Existing bioeconomy strategies, policies or related initiatives and indicators to monitor and assess these at regional level

Among the 29 regions that responded, 25 regions answered that they currently have an existing regional bioeconomy strategy, policy or related initiative. Meanwhile three regions indicated that a bioeconomy strategy, policy or related initiatives is currently under development. According to Table 2, all responding regions have at national level an existing bioeconomy strategy/policy/related initiatives. Respondents were not asked if and when a region was planning to revise the existing regional bioeconomy strategy.

According to the survey results, indicators for monitoring and evaluating the measures undertaken to reach the bioeconomy strategy's goal already exist or are under development in 23 of the 29 regions. One region responded that *“good bioeconomy indicators that could take into account also non-traditional bioeconomy sectors (green chemistry, building, even energy)”* are still missing. Three regions responded that they have currently no indicators existing to monitor and assess the region's bioeconomy strategy/policy/related initiatives (Table 2). Respondents were not asked which set of indicators they currently use.

**Table 2.** Survey results on existing bioeconomy strategy, policy or related initiatives and indicators to monitor and assess these at regional level by region (existing= “++”/ under development = “+” /not existing =“-”, n.a. = no answer).

Region	Country	Regional bioeconomy related or focused strategy/policy/ initiatives	Indicators to monitor and assess the region's bioeconomy strategy/policy/related initiatives
Alto Tâmega	Portugal	++	-
Campania	Italy	++	n.a.
Castilla y León	Spain	++	++
Cataluña	Spain	++	++
Central Finland	Finland	++	++
Emilia-Romagna	Italy	++	+
Extremadura	Spain	++	+
Flanders	Belgium	++	+
Friuli Venezia Giulia	Italy	++	+
Halland	Sweden	+	++
Kainuu	Finland	++	+
Kalmar	Sweden	-	++
Kymenlaakso	Finland	++	++
Lapland	Finland	++	++
Limburg	Netherlands	++	+
Murcia	Spain	++	++

North Karelia	Finland	++	++
North East	Romania	++	++
North Savo	Finland	+	+
Oulu Region	Finland	++	++
Pays de la Loire	France	++	n.a.
Satakunta	Finland	++	++
South Holland	Netherlands	++	++
South Ostrobothnia	Finland	++	++
South Savo	Finland	++	++
Tuscany	Italy	++	+
Vidzeme	Latvia	+	+
Värmland	Sweden	++	++
Western Macedonia	Greece	++	-

### 3.2. Bioeconomy focused or bioeconomy related strategy, policy/initiatives in place

Links to the existing regional bioeconomy strategy, policy or related initiative were provided by 20 of the 29 regions. This allowed further examination as to whether the responding regions have a *bioeconomy focused* or *bioeconomy related* regional strategy, policy or initiative. Table 3 presents examples of *bioeconomy focused* or *bioeconomy related* regional strategy, policy or initiative against bioeconomy aspects included bioeconomy focused or bioeconomy related regional strategy, policy or initiative. Seven of the EU regions who responded have a *bioeconomy focused* strategy, meaning an explicit bioeconomy strategy. The other regions might not have an explicit bioeconomy strategy at regional level, but a *bioeconomy related* strategy (e.g. rural development programmes, green growth, climate and energy programmes, smart specialisation programmes etc.), where bioeconomy issues are included. This assumption is supported by the results on bioeconomy aspects that are included in *bioeconomy related* strategy (Table 3).

For easier understanding we use for the rest of the report the terms *bioeconomy focused* or *bioeconomy related* regional strategy, policy or initiative.

**Table 3.** Examples of *bioeconomy focused* or *bioeconomy related* regional strategy, policy or initiative against Bioeconomy aspects included bioeconomy focused or bioeconomy related regional strategy, policy or initiative.

Region	Example of bioeconomy <b>related</b> regional strategy, policy or initiative	Example of bioeconomy <b>focused</b> regional strategy, policy or initiative	Year of publication	Bioeconomy aspects included bioeconomy focused or bioeconomy related regional strategy, policy or initiative
Alto Tâmega (PT)	Integrated strategy for territorial development		2018	Resource efficiency, smart specialisation
Campania (IT)	Rural programme		2014	Resource efficiency, circular bioeconomy
Castilla y León (ES)		Circular bioeconomy programme	2016	Circular bioeconomy
Cataluña (ES)		Bioeconomy sector report	2018	Circular bioeconomy
Central Finland (FI)	Rural programme		2017	Resource efficiency, circular economy, bioeconomy
Emilia-Romagna (IT)	Smart specialization strategy		2015	Circular bioeconomy
Extremadura (ES)	Extremadura2030		2018	Bioeconomy
Flanders (BE)		Strategy for a sustainable and competitive bioeconomy	2014	Smart, material- and energy-efficient circular system
Friuli Venezia Giulia (IT)	Smart specialization strategy		2017	Circularity and sustainability
Kainuu (FI)	Regional programme		2017	Carbon neutrality
Kymenlaakso (FI)	Carbon neutral road map		2019	Circular, carbon neutrality. resource efficiency
Lapland (FI)		Arctic bioeconomy development programme	2018	Resource efficiency
Murcia (ES)	Research and innovation strategy for the intelligent specialization		2016	Smart, sustainable growth
North Karelia (FI)	Climate and Energy Programme		2012	Oil-free, low carbon
North Savo (FI)	Operational Program on Natural Resources Management		2015	Resource efficiency, sustainable use
Oulu Region (FI)		Bioeconomy development strategy	2014	Sustainable economy, added-value
Pays de la Loire (FR)		Circular economy action plan	2018	Circular economy
Satakunta (FI)		Growth programme for circular bioeconomy	2019	Circular bioeconomy
South Ostrobothnia (FI)	Regional development plan & regional programme		2014	New solutions
Tuscany (IT)	Smart specialization strategy		2015	Innovations, economic growth

### 3.3. EU bioeconomy strategy objectives included in a region's bioeconomy related or focused strategies, policies or related initiatives

The EU bioeconomy strategy objectives, first mentioned in 2012, have been used directly or indirectly at EU MS level in the formulation of national bioeconomy strategies, policies or related initiatives (Lier et al. 2018). The aim was to find out if EU regions have applied or could apply the five EU bioeconomy strategy objectives in their bioeconomy focused or bioeconomy related strategies, policies or initiatives.

When it comes to EU regional level, almost all of the survey respondents answered positively to the question whether the five EU bioeconomy strategy objectives (Table 4) were included in their region's bioeconomy related or focused strategy, policy or initiative. *Creating jobs and maintaining competitiveness* and *Managing natural resources sustainably* received the highest rank (both 27 as being "included"), followed by *Reducing dependence on non-renewable resources* and *Mitigating and adapting climate change* (both 26 as being "included"). Those regions that answered that *Ensuring food security* is currently not included could consider this objective and related measures to reach this objective in their next revision round of the region's bioeconomy focused or bioeconomy related strategies, policies or initiatives.

**Table 4.** Survey results if EU bioeconomy strategy five objectives included in a region's bioeconomy strategy, policy and/or related initiative (included= "++"/ not included, but needed = "+" /not included,not needed ="-").

Region	Creating jobs and maintaining competitiveness	Reducing dependence on non-renewable resources	Mitigating and adapting climate change	Ensuring food security	Managing natural resources sustainably
Alto Tâmega (PT)	++	++	+	+	++
Campania (IT)	++	++	++	++	++
Castilla y León (ES)	++	++	++	++	++
Cataluña (ES)	++	++	++	++	++
Central Finland (FI)	++	++	++	++	++
Emilia-Romagna (IT)	+	+	+	+	+
Extremadura (ES)	++	++	++	++	++
Flanders (BE)	++	++	++	++	++
Friuli Venezia Giulia (IT)	++	++	++	++	++
Kainuu (FI)	++	++	++	++	++
Kalmar (SE)	++	++	++	++	++
Kymenlaakso (FI)	++	++	++	n.a.	++
Lapland (FI)	++	++	++	++	++
Limburg (NL)	++	++	++	++	++
Murcia (ES)	++	+	++	++	++
North East (RO)	++	++	++	++	++
North Karelia (FI)	++	++	++	+	++
North Savo (FI)	++	++	++	n.a.	++

Oulu Region (FI)	++	++	++	++	++
Pays de la Loire (FR)	++	++	++	++	++
Satakunta (FI)	++	++	++	++	++
South Holland (NL)	++	++	++	++	++
South Ostrobothnia (FI)	++	++	++	++	++
South Savo (FI)	++	++	++	++	++
Tuscany (IT)	++	++	++	+	++
Vidzeme (LV)	++	++	++	++	++
Värmland (SE)	++	++	++	-	++
Western Macedonia (GR)	++	++	++	++	++

### 3.4. Region-specific bioeconomy objectives included in a region's bioeconomy related or focused strategies, policies or related initiatives

The results of Table 4 show which of the EU bioeconomy strategy objectives are included in bioeconomy related strategy/policy/related initiatives at regional level. However, when creating the survey we also assumed that there might also be additional region-specific bioeconomy objectives.

The survey answers on the region-specific bioeconomy objectives were grouped afterwards under four possible general objectives, namely *Investments towards an innovative and self-efficient circular bioeconomy*, *Citizens' involvement in bioeconomy development*, *Understanding the regional and local boundaries of ecosystems*, and *Effectiveness policies and investments* (Table 5). Objectives under *Investments towards an innovative and self-efficient circular bioeconomy* focus on self-sufficiency, a cascading use of bio-based products and on increasing the value of bio-based products. Enhancing rural development, reducing inequality and gender imbalance, and ensuring a skilled labour force in EU regions are grouped under *Citizens' involvement in bioeconomy development*. Some of these objectives could be considered as regional translation of the EU bioeconomy strategy objectives (EC 2012, EC 2018), but some region-specific objectives offer new perspectives in the bioeconomy discussions.

**Table 5.** Survey results on regional specific bioeconomy objectives. The regional specific bioeconomy objectives were grouped afterwards under a possible general objective.

Possible general bioeconomy objective	Regional specific bioeconomy objective
Investments towards an innovative and self-efficient circular and sustainable bioeconomy	Analysing enablers and bottlenecks for the deployment of bio-based innovations
	Creating smart, material- and energy-efficient circular system
	Enhancing investments
	Increasing the self-sufficiency of the regions
	Launching pilot actions for the development of bioeconomies in rural, coastal and urban areas
	Replacing oil-based energy and products
	Making better use of novel business models in rural areas
Citizens' involvement in bioeconomy development	Enhancing rural development & sustainable cities and municipalities
	Ensuring long-term skills and competency through education, training and skills across the bioeconomy
	Involving citizens to increase the acceptance of the bioeconomy concept at regional level
	Reducing the gender imbalance
Understanding the regional and local boundaries of ecosystems	Enhancing benefits of biodiversity in primary production
Effectiveness policies and investments	Monitoring progress towards a sustainable bioeconomy

### 3.5. Industries and activities included in a region's bioeconomy

The industries and activities were defined according to the European Classification of Economic Activities (NACE, Rev. 2 EUROSTAT) (Table 6), and grouped afterwards as primary producers of bio-based raw materials (PP), manufacturers of bio-based end-products (MF), and bio-based services (BS). As to be expected, the survey results show (Figure 2 and Table 8) the diversity of the industries and activities included in the bioeconomy sector at regional level, even within the same country. These region specific social-economic and ecological settings are well reflected in the responses.



**Table 6.** Definition of the NACE Rev. 2 classification on bioeconomy industries and activities. PP = primary producers of bio-based raw materials, MF = manufacturers of bio-based end-products, BS = bio-based services. Lier et al. (under revision). Understanding the regional bioeconomy settings and competencies in 29 EU regions and 11 EU countries.

	Industries and activities	Definition
PP	Agriculture	Activities concerned with cultivating land, raising crops, and feeding, breeding, and raising livestock; farming.
	Aquaculture	The cultivation (including harvesting) of aquatic animals and plants, especially fish, shellfish and seaweed, in natural or controlled marine or freshwater environments; underwater agriculture.
	Fisheries	Include the hunting, collecting and gathering activities directed at removing or collecting live wild aquatic organisms.
	Forestry	Includes the process of establishing and managing forests, wood harvesting (incl. energy wood), as well as the extraction of wild growing non-wood forest products.
MF	Chemical industry	Includes the transformation of organic and inorganic raw materials by a chemical process and the formation of products. Information is only needed on the use of bio-based raw materials.
	Construction	Includes general construction and specialized construction activities for buildings and civil engineering works. Information is only needed on the use of wood and other biomaterials in construction activities.
	Food industry	Processing of the products of agriculture, forestry and fishing into food for humans or animals. The manufacture of beverages and tobacco are also included.
	Pharmaceutical industry	Includes the manufacture of basic pharmaceutical products and pharmaceutical preparations. Information is only needed on the use of bio-based raw materials.
	Pulp and paper industry	Includes the manufacture of pulp, paper and converted paper products.
	Renewable energy	Any naturally occurring source of energy, as biomass, solar, wind, tidal, wave, and hydroelectric power that is not derived from fossil or nuclear fuels.
	Wood products industry	Include the manufacture of sawn wood, veneer sheets, wood-based panels (i.e. plywood, fibre board and particle board), pellets, builders' carpentry and joinery products, wooden houses etc.
RS	Hunting	Includes trapping and hunting on a commercial basis. The taking of animals (dead or alive) for food, fur, skin, or for use in research, in zoos or as pets is also included.
	Nature tourism, green care and recreation	In nature-based tourism, the attraction to nature is the decisive factor for tourists to choose a destination. The recreational use of nature refers to various leisure activities outdoors, such as hiking, cross-country skiing, walking or just spending time in nature e.g. enjoying scenery. Green care encompasses nature-linked activities that maintain and improve human health, well-being, and quality of life through active interventions.
	Transport of bio-based raw materials and products	Includes both the transport of bio-based raw materials to industrial and energy generating plants, and the domestic transport of processed bio-based products. Export deliveries are excluded.
	Water purification and distribution	Include the collection, treatment and distribution of water for domestic and industrial needs.

### 3.5.1. Primary producers of bio-based materials included in a regional bioeconomy

According to the survey results (Figure 2 and Table 7), the primary producers of bio-based raw materials, agriculture and forestry, are included or partly included in the bioeconomy in almost all of the responding regions. Naturally, regions with access to surface waters also consider fisheries and aquaculture as part of a region's bioeconomy. Understanding the ecological boundaries and sustainable use of bio-based raw materials from agriculture, aquaculture and fisheries, and raw materials from forestry are the base for a successful bioeconomy. The survey results do not provide information on

how efficient and effective the above mentioned sectors currently are. Although, it can be assumed that e.g. the sustainable use of forests is regulated by national and regional legislation and certification. This assumption is supported by the survey results presented in Table 5, where regions responded that within their region's bioeconomy related or focused strategies, policies or initiatives the objective *Managing natural resources sustainably* is included.

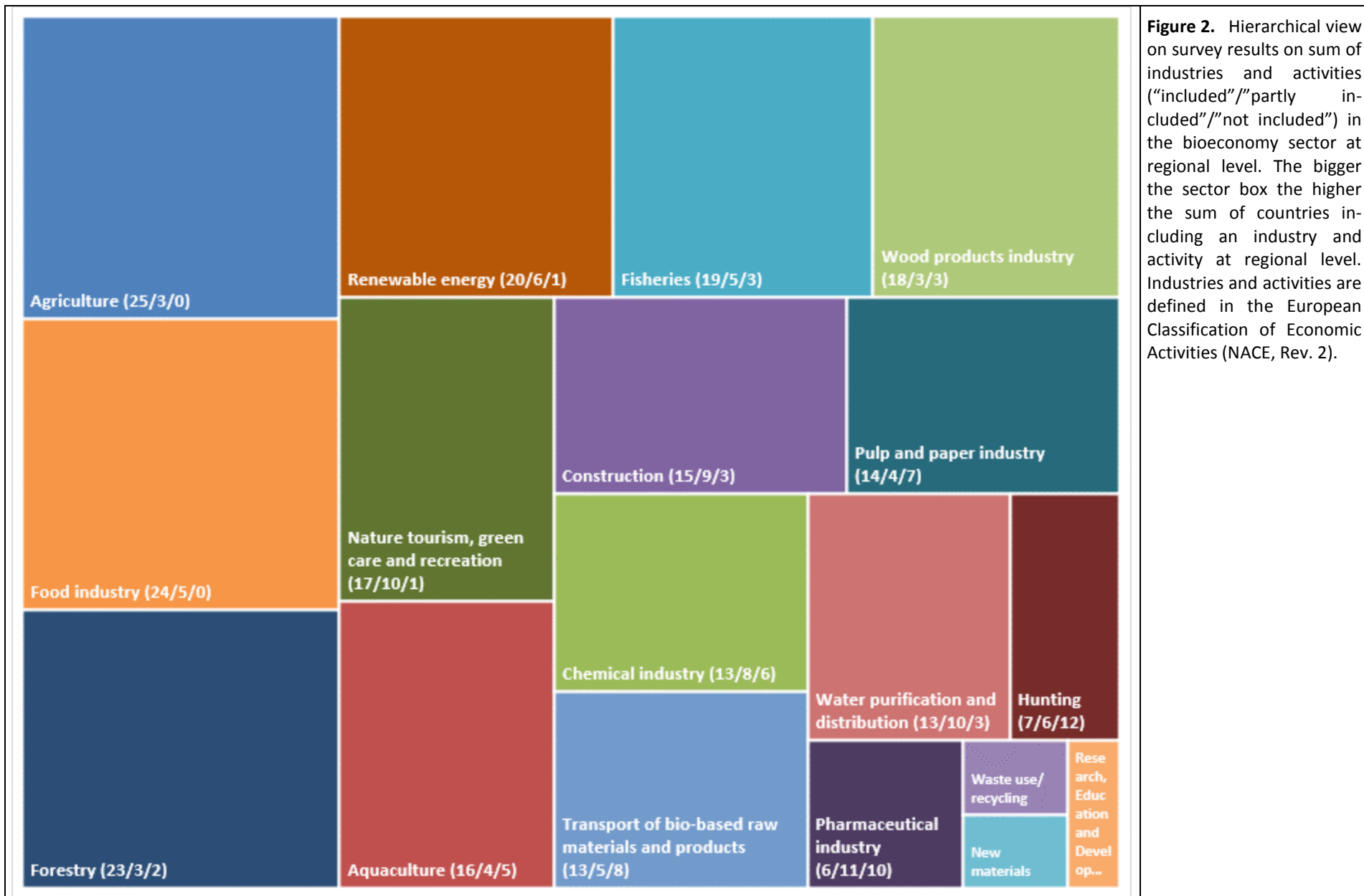
### 3.5.2. Manufacturers of bio-based end-products in regional bioeconomies

When it comes to the manufacturers of bio-based end-products the survey results are manifold. Of the traditional manufacturers of bio-based end-products, the food industry was most mentioned by the respondents (24) as being included, followed by renewable energy (20) and wood products industries (18) (Figure 2 and Table 7). The survey results do not provide information on why manufacturers of bio-based end-products are partly or not currently included in the bioeconomy sector at regional level. However, the answers might also present the potential of the bioeconomy sectors not currently included at regional level. Manufacturing related industries and activities that use wood and other biomaterials are in general equally distributed in the regions. However, in only two regions are all industries and activities that focus on manufacturing of bio-based end-products fully represented according to the survey responses.

### 3.5.3. Bio-based services included in a regional bioeconomy

Of industries and activities that focus on bio-based services, nature tourism, green care and recreation, transport of bio-based raw materials and products, and water purification and distribution are, according the most of respondents, included in the bioeconomy sector at regional level (Figure 2 and Table 7). Nature tourism, green care and recreation received the highest response (17). Hunting is in most of the regions restricted and related to the ownership of land, therefore this is reflected in the answers of the respondents.

Other region specific sectors and activities under the bioeconomy at regional level that were not included in the survey, but mentioned by some responding regions were sectors and activities like research, education and development and industries and activities related to waste management and circularity.



**Figure 2.** Hierarchical view on survey results on sum of industries and activities (“included”/“partly included”/“not included”) in the bioeconomy sector at regional level. The bigger the sector box the higher the sum of countries including an industry and activity at regional level. Industries and activities are defined in the European Classification of Economic Activities (NACE, Rev. 2).

**Table 7.** Survey results on industries and activities according to the *European Classification of Economic Activities* (NACE, Rev. 2) (included= “++”/ partly included = “+” /not included =“-”, no answer “na”) in the bioeconomy sector at regional level. PP = primary producers of bio-based raw materials, MF = manufacturers of bio-based end-products, BS = bio-based services.

	Alto Tâmega (PT)	Campania (IT)	Castilla y León (ES)	Cataluña (ES)	Central Finland (FI)	Emilia-Romagna (IT)	Extremadura (ES)	Flanders (BE)	Friuli Venezia Giulia (IT)	Kainuu (FI)	Kalmar (SE)	Kymenlaakso (FI)	Lapland (FI)	Limburg (NL)	Murcia (ES)	North East (RO)	North Karelia (FI)	North Savo (FI)	Oulu Region (FI)	Pays de la Loire (FR)	Satakunta (FI)	South Holland (NL)	South Ostrobothnia (FI)	South Savo (FI)	Tuscany (IT)	Vidzeme (LV)	Värmland (SE)	Western Macedonia (GR)	SUM "Included"	SUM "Partly included"	SUM "Not included"		
Industries and activities																																	
<b>PP</b>																																	
Agriculture	+	+	++	+	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	25	3	0	
Aquaculture	+	na	++	++	-	+	++	++	++	++	na	+	-	-	++	++	+	++	++	++	++	++	+	-	++	++	+	++	-	16	4	5	
Fisheries	-	+	++	+	++	+	++	++	++	++	++	+	++	-	++	++	++	++	++	++	++	++	+	++	++	+	++	-	19	5	3		
Forestry	++	+	++	++	++	+	++	++	++	++	++	++	++	+	-	++	++	++	++	++	++	++	-	++	++	++	++	++	++	23	3	2	
<b>MF</b>																																	
Chemical industry	-	+	++	+	+	++	-	++	++	++	+	++	-	++	-	na	++	-	++	+	++	++	+	++	++	+	+	+	-	13	8	6	
Construction	-	+	++	+	+	++	++	++	+	++	+	++	++	+	-	na	++	+	++	++	++	+	++	++	++	++	++	+	-	15	9	3	
Food industry	+	+	++	+	++	++	++	++	++	++	++	++	++	+	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	24	4	0	
Pharmaceutical industry	-	+	++	+	++	+	-	+	++	+	+		-	+	-	++	+	-	+	-	-	++	+	-	++	-	+	-	6	11	10		
Pulp and paper industry	-	na	++	+	++	+	-	++	+	++	++	++	++	++	-	na	++	+	++	-	++	-	-	++	++	+	++	-	14	4	7		
Renewable energy	++	+	++	+	++	+	++	++	++	++	+	++	++	++	++	na	++	++	++	-	++	++	++	++	++	++	+	+	++	20	6	1	
Wood products industry	++	na	++	+	++	na	na	++	++	++	+	++	++	-	-	na	++	+	++	++	++	-	++	++	++	++	++	++	++	18	3	3	
<b>BS</b>																																	
Hunting	-	na	-	++	+	na	+	-	++	++		+	-	-	-	++	++	-	+	-	++	-	+	-	+	-	++	-	7	6	12		
Nature tourism, green care and recreation	+	+	++	+	+	+	++	-	+	++	+	++	++	++	++	++	++	+	++	+	++	++	++	++	++	++	+	++	17	10	1		
Transport of bio-based raw materials and products	+	+	++	+	-	na	-	+	++	++	-	++	++	++	-	na	++	-	++	-	++	++	++	++	++	+	-	++	-	13	5	8	
Water purification and distribution	+	na	++	+	++	na	+	+	+	+	+	++	-	++	++	++	+	+	++	-	++	++	++	++	++	++	-	+	++	13	10	3	

### 3.6. Data availability for selected economic variables related to bioeconomy industries and activities at regional level

The survey respondents were asked which socio-economic statistics are currently available for decision makers at regional level to assist them in decision-making processes related to the bioeconomy. In the survey, it was decided to focus on, ask for specific statistics for a selected set of socio-economic variables, namely *employment (people)*, *value added (EUR)* and *turnover (EUR)* at regional level. The selected set of socio-economic variables was asked for industries and activities included in a bioeconomy at regional level. Other bioeconomy *related* and *focused* economic statistics (e.g. exports, imports and investments) was not asked from the respondents. Variables related to other socio-economic, and ecological aspects were also not asked about through this survey. This section synthesizes the results on the data availability.

Regional bioeconomy *related* and *focused* statistics provided by the respondents were based on official statistical resources and estimates. In addition, the reporting years varied between 2014 and 2018. Different statistical sources and different reporting years make comparison between the different regions, even within the same country, very challenging. Taking into consideration that presenting the actual data and information in tables and graphs contains the risk of misinterpretation, and because data and information might need further statistical harmonisation, we decided to use a more general way of presentation. Therefore the information received under the section “data availability for selected economic variables related to bioeconomy industries and activities at regional level” is presented in numbers of regions reporting data availability. For a deeper analysis this information was combined with information received by the respondents under “industries and activities included, partly included and not included in the bioeconomy sector at regional level”.

#### 3.6.1. Statistics on employment in a regional bioeconomy

The results (Table 8) of the survey suggest that the current data availability for *employment* in the industries and activities concentrating on *primary production of bio-based raw materials* and *manufacturing of bio-based end-products* is at least available in half of the reporting regions. It was interesting that the industries and activities concentrating on *renewable energy* seem to have a rather weak data availability, although this was earlier considered by the respondents as one of the most frequent sectors that was included at regional level in a bioeconomy. It can be assumed that for many EU regions the use of *renewable energy* is the cornerstone of the bioeconomy. Data on *employment* for bio-based services (e.g. *hunting; nature tourism, green care and recreation, and transportation of bio-based raw materials and products*) seem according to the survey results rather weak, except for *water purification and distribution*.

#### 3.6.2. Other socio-economic statistics in a regional bioeconomy

For the variables, *value added* and *turnover* at regional level the data availability based on survey results is rather scattered. The survey results suggest that statistics for those two variables are available for the two sectors that are connected to the *primary production of bio-based raw materials* and *manufacturing of bio-based end-products*, agriculture and forestry. Based on the survey results, the availability of statistics for other industries and activities is currently rather weak.

### 3.6.3. Overall observation on socio-economic statistics in a regional bioeconomy

How well advanced a bioeconomy is on the regional level might also be reflected by the socio-economic variables for *employment (people)*, *value added (EUR)* and *turnover (EUR)* within the region. For example, a regional bioeconomy strategy/policy/related initiative has been recently set up with the aim to increase the amount of jobs to a certain level by a certain time. The evaluation of the measurements and related data and information is therefore not yet available. The results of table 9 could give an indication of where data and information might be needed.

**Table 8.** Survey results on industries and activities according to the *European Classification of Economic Activities* (NACE, Rev. 2) (number of regions that reported the listed industries and activities as included or partly included) in the bioeconomy sector at national level. Comparison of the number of regions reporting availability of data for selected economic variables related to bioeconomy industries and activities at regional level. PP = primary producers of bio-based raw materials, MF = manufactures of bio-based end-products, RS = bio-based services.

	Industries and activities	Industries and activities included or partly included at regional level	Number of regions reporting availability of data on Employment at regional level (1000 person)	Number of regions reporting availability of data on Value added at regional level (1000 EUR)	Number of regions reporting availability of data on Turnover at regional level (1000 EUR)
PP	Agriculture	28	19	12	7
	Aquaculture	20	10	5	4
	Fisheries	25	12	3	6
	Forestry	26	17	9	9
MF	Chemical industry	21	14	8	7
	Construction	23	15	7	6
	Food industry	28	17	10	10
	Pharmaceutical industry	17	10	5	4
	Pulp and paper industry	19	13	9	8
	Renewable energy	26	9	2	3
	Wood products industry	21	14	8	7
RS	Hunting	12	4	2	2
	Nature tourism, green care and recreation	27	9	3	4
	Transport of bio-based raw materials and products	18	5	0	1
	Water purification and distribution	22	12	7	7

## 4. Discussions

This section will focus on how the results from 29 regions in 11 countries can contribute to further discussions on how to develop the bioeconomy potential at EU regional level.

The results of the survey produced an overview on current EU regional bioeconomy settings and competencies, in particular:

- i. the existence of regional bioeconomy *focused* and *related* strategies, policies and initiatives,
- ii. the existence of indicators to monitor and assess regional bioeconomy *focused* and *related* strategies, policies and initiatives,
- iii. the overall and region-specific objectives currently included in bioeconomy *focused* and *related* strategies, policies and initiatives,
- iv. the industries and activities currently included in the bioeconomy at regional level, and
- v. the availability of bioeconomy *focused* and *related* socio-economic statistics.

The aim of the study was to get an overview on the current situation of bioeconomy settings and competencies from regions in different countries, presenting Northern, Eastern, Western and Southern Europe.

### 4.1. Bioeconomy focused or related strategies, policies and initiatives at EU regional level

The results of the survey show that most of the regions that responded have bioeconomy *related* strategies, policies or initiatives. Even if the bioeconomy *related* strategy is not explicitly called a bioeconomy strategy/programme or initiative, it contains bioeconomy focused and related issues. This assumption is supported by the results of this survey on bioeconomy objectives that are currently included in bioeconomy *related* strategies (e.g. in rural development programmes, regional programmes, climate and energy programmes, smart specialisation programmes etc.). It is for further discussion as to whether a bioeconomy *related* strategy for a specific region already fulfils the requirements of a bioeconomy *focused* strategy, and if and when the development of a regional *focused bioeconomy* strategy is possible. Region-specific objectives could offer new perspectives in bioeconomy discussions at EU-level e.g. in a possible EU bioeconomy strategy revision.

The set-up or development of a *bioeconomy focused* strategy might benefit from a peer-to-peer exchange between the EU regions and/or from the support of the EU bioeconomy policy support facility for Member States (stated in EC 2018) ... (that) “*support the development of national/regional bioeconomy strategies*”. Thus, existing networks, such as the ERIAFF-network or the BIOEAST initiative, might be used as platforms for initial and further discussions.

### 4.2. Indicators for bioeconomy monitoring at EU regional level

An important tool for the successful implementation of a strategy is the monitoring and evaluation of the success of the measures undertaken to reach the strategy’s goals. Indicators to monitor and evaluate the measures undertaken to reach the bioeconomy strategy’s goal exist or are under development in most of the regions that responded.

The survey did produce information as to whether regions currently use indicators to monitor their bioeconomy related or bioeconomy related strategies. However, no information was provided on which indicators they use. Synchronizing regional bioeconomy monitoring-activities is necessary to

ensure consistent and comparable results across all EU regions. The first steps towards a common EU bioeconomy monitoring-activity have been undertaken by the JRC Knowledge Centre for Bioeconomy and EU research projects (e.g. the EC H2020 project BioMonitor or the SCAR BSWG project MontBio-eco). A peer-to-peer exchange between the EU regions and/or from the support of the EU bioeconomy policy support facility for Member States could contribute to further discussion on bioeconomy monitoring.

### 4.3. Current bioeconomy industries and activities at EU regional level

As to be expected, the survey results show the diversity of the industries and activities included in the bioeconomy sector at regional level, even within the same country.

The ecological settings are naturally reflected in the responses on the primary producers of bio-based raw materials, agriculture and forestry. Regions with access to surface waters consider fisheries and aquaculture to be part of bioeconomy. Understanding the ecological boundaries and sustainable use of bio-based raw materials from agriculture, aquaculture and fisheries, and raw materials from forestry are the base for a successful bioeconomy. The survey results do not provide information on how efficient and effective the above mentioned sectors currently are. However, it can be assumed that the sustainable use of forests, for example, is regulated by national and regional legislation, or by marketing tools (e.g. FSC or/and PEFC).

When it comes to the manufacturers of bio-based end-products the survey results are manifold. Of the traditional manufacturers of bio-based end-products, the food industry was mentioned the most, followed by the renewable energy and wood products industries. The survey results do not provide information why, at present, manufacturers of bio-based end-products are partly or not included in the bioeconomy sector at the regional level. However, the answers might also demonstrate the potential of the bioeconomy sectors currently not included at regional level. Manufacturing related industries and activities that use wood and other biomaterials are in general equally distributed in the regions that responded.

Of the industries and activities that focus on bio-based services, nature tourism, green care and recreation, transport of bio-based raw materials and products, and water purification and distribution are included in the bioeconomy sector at regional level by most of the respondents. Nature tourism, green care and recreation received the highest response (17). Hunting is in most of the regions restricted and related to the ownership of land, therefore this is reflected in the answers of the respondents (9). Region specific sectors and activities included under the bioeconomy were sectors and activities such as research, education and development, industries and activities related to waste management.

The results as to which bioeconomy sectors are currently included at regional level do not present information on the type of companies (e.g. micro, small or medium sized companies), the type of products being produced, which kind of services are being provided, or which kind of cross-sectoral co-operation is currently developed (e.g. automotive industry or plastics industry). Neither does the survey produce information on innovation development within a certain sector. The above mentioned information would need to be obtained at a follow-up to this survey. However, this section provides a general overview on which bioeconomy sectors are included in a bioeconomy at regional level.

Cross-sectoral cooperation at regional level between all bioeconomy related and focused sectors is crucial to avoid competition for primary biomass resources. In this light, it is evident that all bioeconomy sectors need to be innovative, productive and competitive whilst using fewer resources and reducing their environmental impact.



#### 4.4. Availability and comparability of EU regional bioeconomy statistics

According to Lier et al. (2018) “to reach consistent and comparable results across all EU MS, harmonized statistical systems need to be utilized when reporting data.” Further the report stated that “at national level national accounts (NA) will play a decisive role in future harmonized data deliveries to bioeconomy monitoring” ... “other well-established and agreed statistical systems need to be exploited as well”.

The aim of the survey was to get an overview on what socio-economic data/information is currently available for decision makers at regional level to assist them in their decision-making related to the bioeconomy. A selected set of socio-economic variables were requested for industries and activities included in the bioeconomy at regional level.

Regional bioeconomy *related* and *focused* data and information provided by the respondents were based on official statistical resources and estimates, and the reporting years varied over a five year period. The different statistical sources and different reporting years made comparison between the different regions, even within the same country, difficult. Actual data and information were not presented in the report to avoid the risk of misinterpretation.

The general results of the survey suggest that the current data availability for *employment* is slightly better than for variables, *value added* and *turnover* at regional level. It can be assumed that availability of the data is also patchy in other EU regions that did not respond to the survey. A possible way to go forward could be cross-regional co-operation focused on developing regional statistical systems to provide bioeconomy data and information.

#### 4.5. Future steps needed towards a sustainable and circular bioeconomy

Based on the study results we identified measures for future discussions

- Towards effective policies: screen policy measures that are necessary and possible at regional and national level to move towards a better sustainable and circular bioeconomy.
- New value-chains through citizens-public-private partnership: investigate measures that are necessary and possible at regional and national level to help bioeconomy activities and sectors grow.
- Enhance peer-to-peer exchanges: use EU-wide existing networks for mutual learning between regions.
- Include citizens: increase the awareness of future societal and environmental challenges, and the role of a sustainable and circular bioeconomy in tackling them at regional level, national, EU and global level

#### 4.6. Uncertainties of the study

It has to be mentioned that the geographical coverage might be unbalanced because respondents from some countries are more strongly represented than others. Reasons for not answering to the survey might be because of a current lack of bioeconomy strategies at the national level. A further reason might be the fact that participating in the survey was a contribution in-kind from the regions.

## 5. Conclusions

Our results support the assumption that the main drivers for the transition towards a bioeconomy vary across EU regions, even within the same country. Country and region-specific socio-economic and ecological settings, legal framework, and social demands, and a long history of using natural resources are reflected on the current development of bioeconomy sectors at regional level.

Our results show that the regions have formulated *bioeconomy focused* or *bioeconomy related* strategies, policies and initiatives. Even if the bioeconomy *related* strategy is not explicitly called a bioeconomy strategy/programme or initiative, it contains bioeconomy focused and related issues. This assumption is supported by the result of this survey on bioeconomy objectives that are currently included in bioeconomy *related* strategies. It is for further discussion if a bioeconomy *related* strategy for a specific region already fulfils the requirements of a bioeconomy *focused* strategy, and if and when the development of a regional *focused bioeconomy* strategy is possible. Region-specific objectives could offer new perspectives in bioeconomy discussions at EU-level e.g. in a possible EU bioeconomy strategy revision.

The results show which of the regions use indicators to monitor their *bioeconomy related* or *bioeconomy focused* strategies. Synchronizing regional bioeconomy monitoring-activities is necessary to ensure consistent and comparable results across all EU regions. A peer-to-peer exchange between the EU regions and/or from the support of the EU bioeconomy policy support facility for Member States could contribute to the further discussion on bioeconomy monitoring.

The results also give an overview on the current bioeconomy competences in the EU regions. As to be expected, the survey results show the diversity of the industries and activities included in the bioeconomy sector at regional level, even within the same country. The results as to which bioeconomy sectors are currently included at regional level do not present information on the type of companies, the type of products are being produced, which kind of services are being provided, or which kind of cross-sectoral co-operation is currently in place. Information on innovation development within a certain sector is not presented by the results either. Such information would need to be obtained at a follow-up to this survey. However, a general overview on which bioeconomy sectors are included in the bioeconomy at regional level is presented. Cross-sectoral cooperation at regional level between all bioeconomy related and focused sectors is crucial to avoid competition for primary biomass resources. In this light, it is evident that all bioeconomy sectors need to be innovative, productive and competitive whilst using fewer resources and reducing their environmental impact.

Regional bioeconomy *related* and *focused* data and information provided by the respondents were based on official statistical resources and estimates, and the reporting years varied over a five year period. The different statistical sources and different reporting years made a comparison between the different regions, even within the same country, difficult. It can be assumed that availability of data is also patchy in other EU regions that did not respond to the survey. A possible way to go forward could be cross-regional co-operation focused on developing regional statistical systems to provide bioeconomy data and information.

## Annex 1 Survey questions

### General

<b>Name</b>	
<b>Email</b>	-
<b>Organisation</b>	
<b>Department</b>	
<b>Position</b>	
<b>Country</b>	
<b>Region</b>	

	Yes	Under preparation	No	I do not know	Available in English	Available in another language	If your region has a bioeconomy strategy/policy/related initiative, please add the link	If your region has a bioeconomy strategy/policy/related initiative, but it is not available for download
Does your region have a Bioeconomy strategy/policy/related initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indicators to monitor and assess above mentioned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Yes	Not included, but needed	Not included, and not needed	I do not know
Is one of the EU bioeconomy strategy (2018) objectives included in your region's bioeconomy strategy/policy/related initiatives?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Creating jobs and maintaining competitiveness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing dependence on non-renewable resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mitigating and adapting climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensuring food security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Managing natural resources sustainably	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other objectives, please specify in the comment field				

Which industries and activities are included in the bioeconomy sector (see glossary) in your region?	Included	Partly included	Not included	I do not know
Agriculture				
Aquaculture				
Chemical industry				
Construction				
Fisheries				
Food industry				
Forestry				
Hunting				
Nature tourism, green care and recreation				
Pharmaceutical industry				
Pulp and paper industry				
Renewable energy				
Transport of bio-based raw materials and products				
Water purification and distribution				
Wood products industry				
Others, please specify in the comment field				

Does your region collect data on employment (1000 persons) for each bioeconomy sector (see glossary)? If yes, can you provided the data for the latest year on employment (1000 persons), value added and turn-over? Year Source

Does your region collect data on employment (1000 persons) for each bioeconomy sector (see glossary)?	If yes, can you provided the data for the latest year on employment (1000 persons), value added and turn-over?	Year	Source
Agriculture			
Aquaculture			
Chemical industry			
Construction			
Fisheries			
Food industry			
Forestry			
Hunting			
Nature tourism, green care and recreation			
Pharmaceutical industry			
Pulp and paper industry			
Renewable energy			
Transportation of bio-based raw materials and products			
Water purification and distribution			
Wood products industry			
Others, please specify in the comment field			

## References

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- EC 2018. A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment Updated Bioeconomy Strategy  
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Natural Resources Institute Finland  
Latokartanonkaari 9  
FI-00790 Helsinki, Finland  
tel. +358 29 532 6000