European Commission

Socio-economic insights into the Bioeconomy in BIOEAST countries

Research Brief[1]

HIGHLIGHTS

- **The bioeconomy employs 7.4 million people in the BIOEAST countries, over 40% of the total bioeconomy employment in the EU. The BIOEAST countries have comparably high employment multipliers and an over-proportional concentration of jobs in the bioeconomy compared to the EU average**.
- **Agriculture is the main sector, making up 65% of BIOEAST bioeconomy jobs. The production of major crops is expected to increase significantly, almost entirely through increased yields.**
- **Estimates reveal that 9% of the turnover and 9.5% of the value added in the EU's bioeconomy correspond to BIOEAST countries.**
- **The relatively low number of biorefineries in the BIOEAST area shows an untapped potential for further generation of higher value added biomass applications in rural areas.**
- **The BIOEAST countries can be classified into two groups of countries according to the level of specialisation of the national labour markets in the bioeconomy and the apparent labour productivity. These indicators provide insights into potential future pathways for the bioeconomy of the BIOEAST countries.**

This brief summarises key information on the Bioeconomy in the countries of BIOEAST, a Central and Eastern European initiative for knowledge-based agriculture, aquaculture and forestry in the Bioeconomy. This open initiative started by the Visegrad Group Countries: Czech Republic, Hungary, Poland, Slovakia, who were subsequently joined by Bulgaria, Croatia, Estonia, Latvia, Lithuania, Romania, and Slovenia.

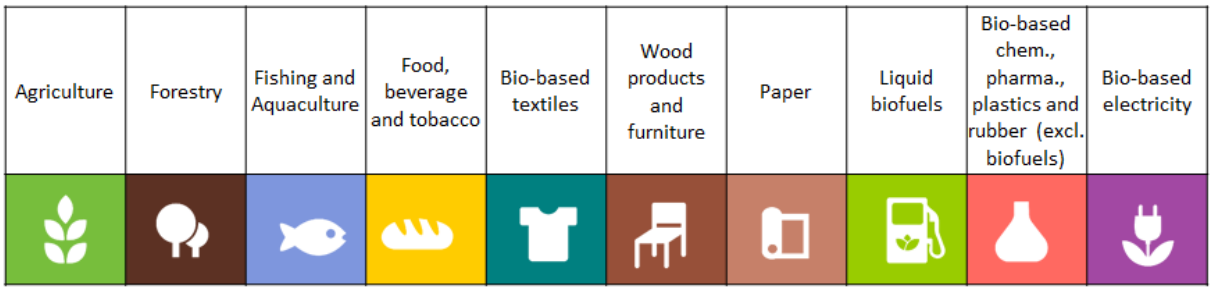
The BIOEAST initiative assists these countries to operationalise their bioeconomy visions for 2030, drawing on their biomass potential to develop a sustainable increase in biomass production and circular processing of the available biomass in viable rural areas, and to develop an innovative, climate-ready and inclusive model of growth.

[1] This research brief is based mainly on i) Ronzon, T. and R. M'Barek (2018). "Socioeconomic Indicators to Monitor the EU's Bioeconomy in Transition." Sustainability 10(6): 1745; ii) https://datam.jrc.ec.europa.eu/datam/mashup/BIOECONOMICS/index.html; iii) Parisi, C. (2018). "Research Brief: Biorefineries distribution in the EU". European Commission - Joint Research Centre; iv) Philippidis G. et al. (2018), JRC technical report, doi:10.2760/560977.

Joint Research Centre

Key socio-economic indicators

The following sectors were considered for the analysis.



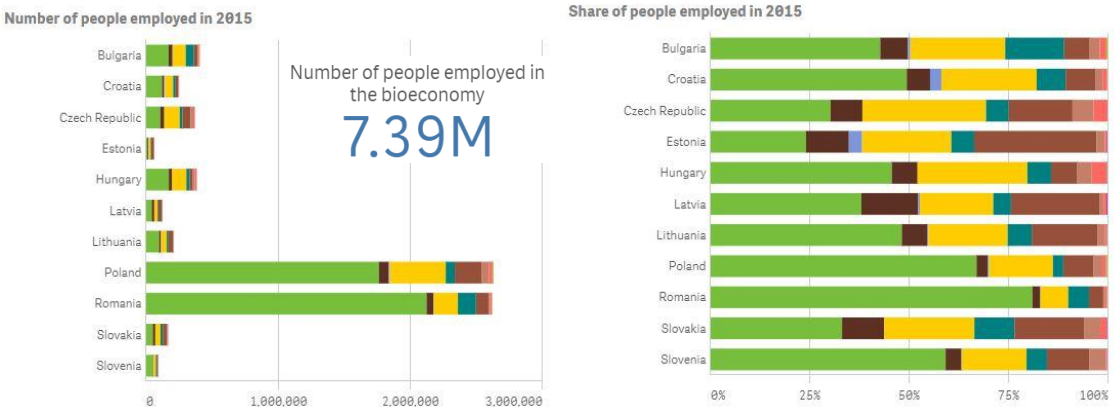
Icons by the Knowledge Centre for Bioeconomy, https://biobs.jrc.ec.europa.eu/

Due to a paucity of relevant reliable and consistent data sources, the current brief excludes bioeconomy sectors such as the bio-construction, waste management and bio-remediation. Furthermore, "Bioeconomy services" are also currently beyond the scope of this analysis, in large part due to a lack of a clear definition. It should also be noted that a significant degree of uncertainty is associated with the estimation of sectoral bio-based shares.

Employment

In 2015, the bioeconomy employed 18 million people in the EU, 8.2% of the total EU labour force. Three quarters worked in agriculture (51%) and in the food, beverages and tobacco industry (25%). The BIOEAST countries make up over 40% of the total EU bioeconomy workforce. Almost 65% of these are employed in the agriculture sector, whilst a further 15% work in the food, beverages and tobacco industry.

Figure 1. Employment in the bioeconomy in the BIOEAST countries.



Source: DataM Jobs and Wealth in the European Union Bioeconomy.

Turnover and value added

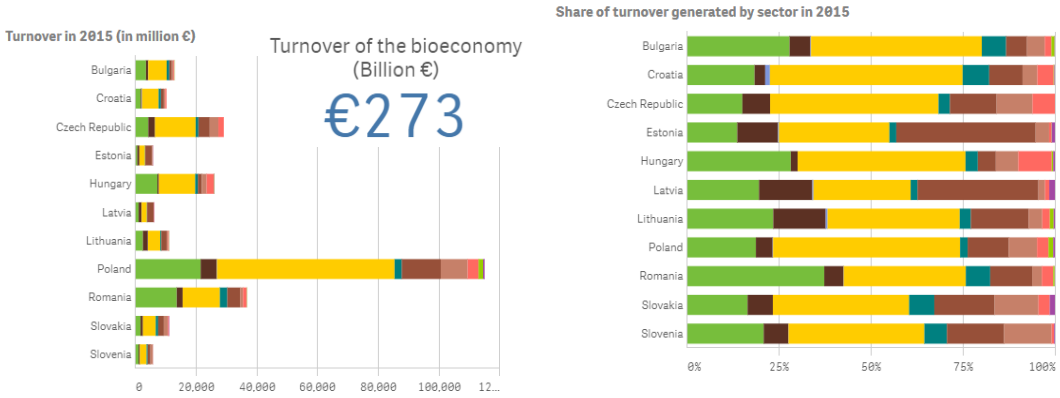
Turnover is the total value of market sales of goods and services to third parties. (Gross) value added corresponds to the output minus the intermediate consumption (as defined by EUROSTAT). Therefore, sectors with a high proportion of inputs (or high costs of bought-in goods and services) have a particularly high turnover compared to value added. This becomes evident when comparing turnover and value added by bioeconomy sector. In the EU, the turnover share of the manufacture of food, beverage and tobacco sector in

the bioeconomy (51%) is far more important than its value-added share (38%), while the opposite is true in agriculture (17% of turnover share versus 28% of value-added share). Looking at the BIOEAST region, the share of primary production (mainly agriculture, then forestry and fisheries), increases on average from about 25% to 50% when using value added instead of turnover.

The advantage of using value added as an economic measure instead of turnover is to avoid double-counting when different sectors of a same value chain are concerned (i.e. summing only the additional value created each given sector). Furthermore, it is more in line with EU Member States' own calculations and allows for comparisons with national accounts. However, in the context of sustainable development assessments, traditional measures such as value added or GDP have to be complemented with other indicators to describe the economic, social and environmental status of the bioeconomy.

In 2015, the bioeconomy created a turnover of EUR 2.3 trillion in the EU. The BIOEAST countries contributed almost 9% to this figure. Poland was the main contributor with 56% of the BIOEAST share.

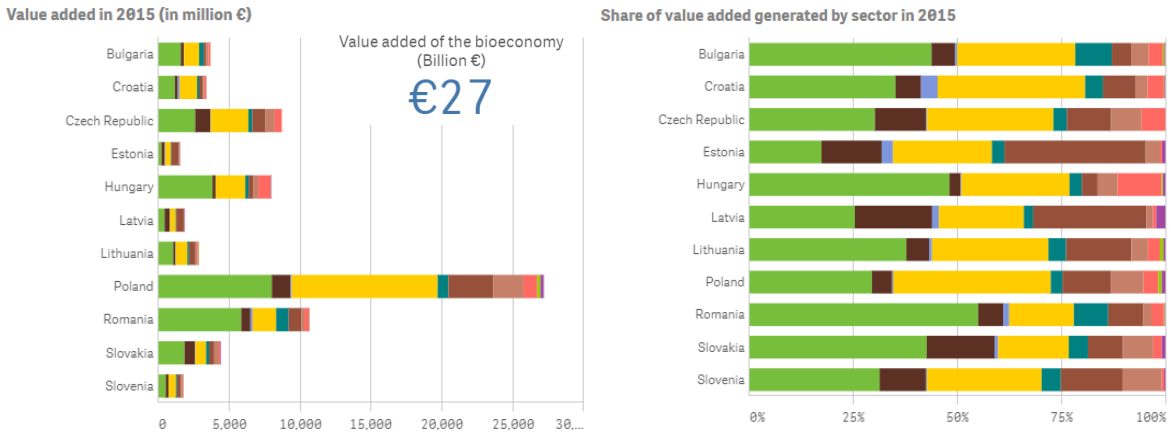
Figure 2. Turnover in the bioeconomy in the BIOEAST countries.



Source: DataM Jobs and Wealth in the European Union Bioeconomy.

In 2015, the bioeconomy created a value added of EUR 621 billion in the EU. The BIOEAST countries made up 9.5% of the total. Poland was also the main contributor with 45% of the share.

Figure 3. Value added (gross) in the bioeconomy in the BIOEAST countries.



Source: DataM Jobs and Wealth in the European Union Bioeconomy.

An untapped potential

Many regions in Central and Eastern Europe have a strong agricultural tradition. Before analysing socioeconomic indicators to explain the development and potential of the bioeconomy in individual EU Member States and, eventually, in a cluster of states within the EU, two more agronomic aspects are discussed below, which could support the argument of the untapped potential in the BIOEAST countries: land abandonment and the yield gap.

The development of agricultural land area in the BIOEAST countries contrasts with the strong **agricultural land abandonment** trend in the EU-28. The utilised agricultural area (UAA) has decreased by 0.7% per year between 2011 and 2016 in the EU-28 and it is expected to continue at a rate of -0.2% per year until 2030. By 2030, the EU arable land is projected to have decreased by 3% to reach 104 million ha. In contrast, different developments are plausible in BIOEAST countries. According to the Agricultural Member States Modelling (AGMEMOD) model results, the sown area has not changed significantly in the past and is not expected to do so in the future. On the other hand, Stürck et al. (2018)[2] came to the conclusion, in different modelled scenarios, that land abandonment will occur, particularly in Eastern and Southern Europe.

The EU-28 shows only marginal growth of **yield development** for major crops, particularly because of the high yield levels already achieved in the EU-15 (Member States that joined the EU before 2014: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom). In contrast, the production of major crops is expected to increase significantly in the BIOEAST countries, almost entirely through increased yields (e.g., for wheat and maize, increases of 15% and 50% respectively are projected for 2026). Notwithstanding, according to the AGMEMOD projections for 2026[3], the EU-15's yields will still be around 40% higher than for BIOEAST countries. The Global yield gap atlas (http://www.yieldgap.org/) explains the difference between actual yields and agro-climatically achievable yields in the same region. For the BIOEAST countries, several examples underpin the existing gap from the North-Western EU countries.

Similarly, the potential from forestry and agroforestry **residues** could be further exploited.

The potential to provide more biomass from agriculture for different bio-based activities could be further enhanced through a development push for rural areas of the BIOEAST countries, where, in some regions, small semi-subsistence farms still dominate. Furthermore, double-cropping could increase biomass output. The same opportunity to increase productivity also applies, in principle, to animal production. Higher productivity through an improved input/output ratio would therefore require less feedstock, which would then be available for other uses in the bioeconomy.[4]

In this context, the much smaller proportion of the processing industry in the BIOEAST countries to date has to be stressed. The **Biorefineries** map shows a total of 803 biorefineries identified in the EU that produce bio-based chemicals, liquid biofuels and bio-based composites and fibres, of which 134 are located in the BIOEAST countries[5]. Totalling 177 cases, the purple dots indicate biorefineries in which integrated production of bio-based products (chemicals and/or composites) and bio-based energy (biofuels and/or other types of energy from biomass) is taking place, thus reflecting the strictest definition of biorefinery. The BIOEAST countries host 18 of these integrated facilities, with the highest number of facilities (8) being located in the Czech Republic.

These considerations suggest the existence of an untapped potential for biomass production. Through the closing of the yield gap the development of the bioeconomies could be improved, with the imperative that the additional biomass is produced (environmentally) sustainably. The lower number of biorefineries in the Eastern

[2] Stürck, J.; Levers, C.; van der Zanden, E.H.; Schulp, C.J.E.; Verkerk, P.J.; Kuemmerle, T.; Helming, J.; Lotze-Campen, H.; Tabeau, A.; Popp, A.; et al. Simulating and delineating future land change trajectories across Europe. Reg. Environ. Chang. 2018, 18, 733–749.

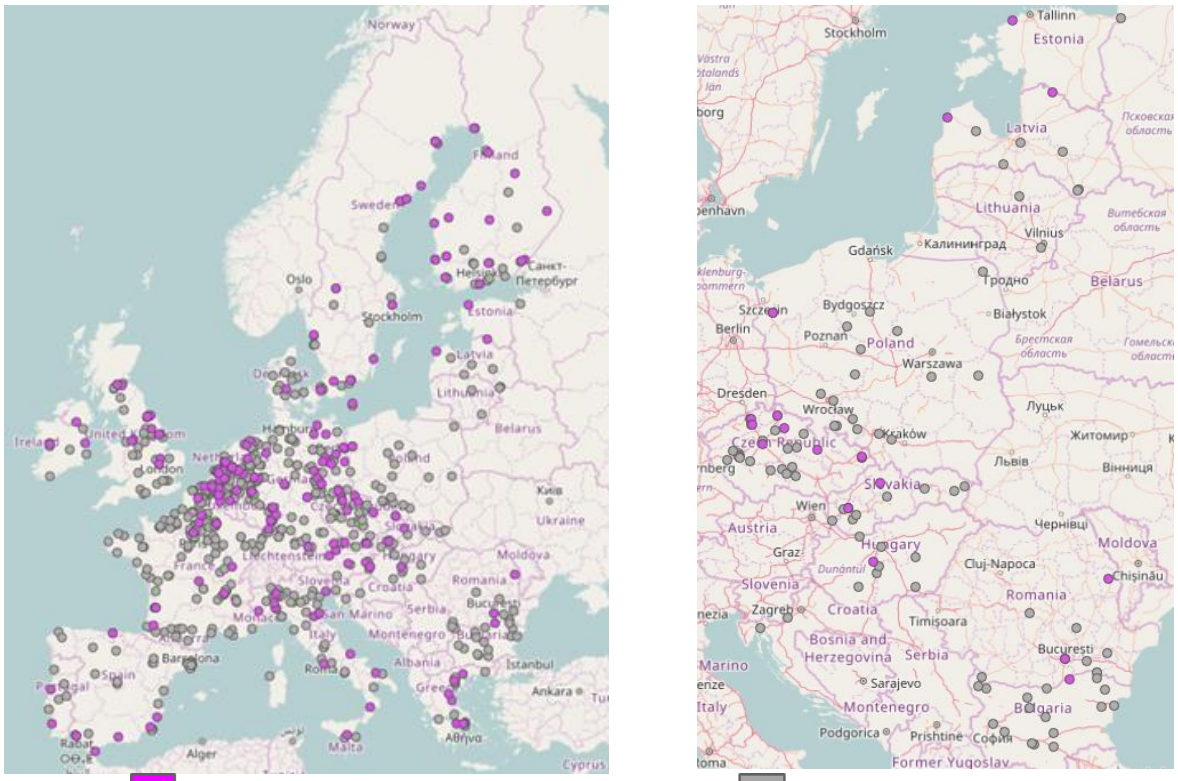
[3] Salamon, P.; Banse, M.; Barreiro-Hurlé, J.; Chaloupka, O.; Donnellan, T.; Erjavec, E.; Fellmann, T.; Hanrahan, K.; Hass, M.; Jongeneel, R. Unveiling Diversity in Agricultural Markets Projections: From EU to Member States. A Medium-Term Outlook with the AGMEMOD Model; JRC Technical Report, 29025 EUR; Publications Office of the European Union: Luxembourg, 2017; p. 90

[4] Details and sources see Ronzon, T. and R. M'Barek (2018). "Socioeconomic Indicators to Monitor the EU's Bioeconomy in Transition." Sustainability 10(6): 1745.

[5] Details see Parisi, C. (2018). "Research Brief: Biorefineries distribution in the EU". European Commission - Joint Research Centre.

part of the EU demonstrates an untapped potential for further generation of higher value added biomass application.

Figure 4. Biorefineries in the BIOEAST countries.

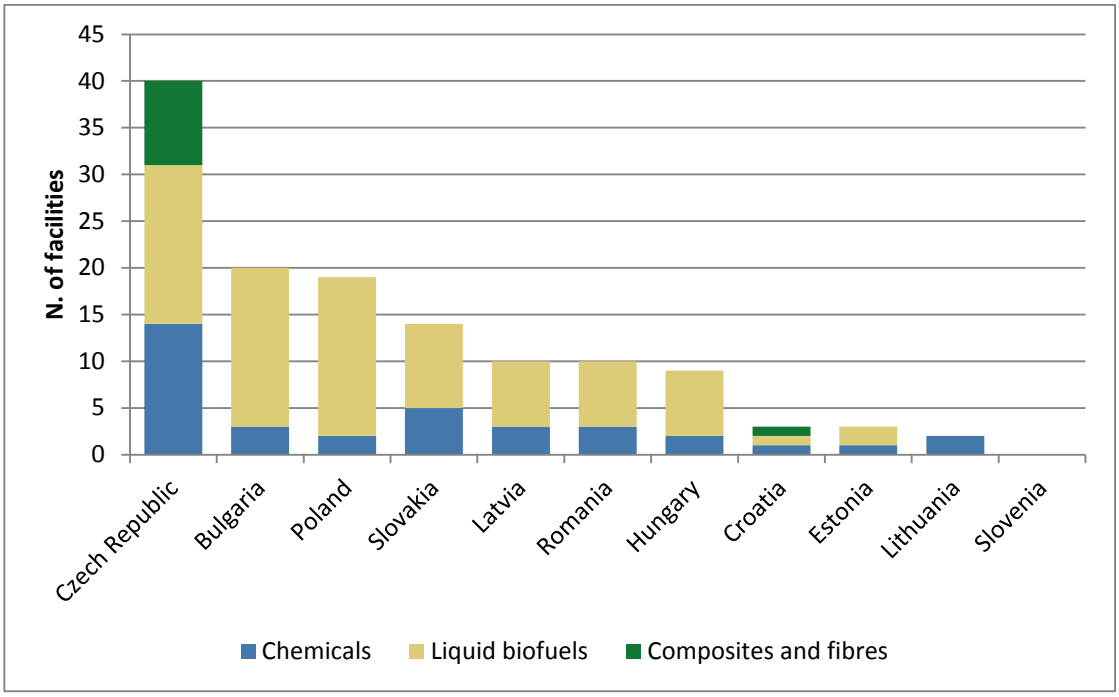


Source: Parisi, C. (2018). "Research Brief: Biorefineries distribution in the EU". European Commission - Joint Research Centre.

The following graphs show the description of the 134 biorefineries located in BIOEAST countries, in terms of type of bio-based products manufactured and type of feedstock used[6]. It can be observed that, in terms of number of biorefineries (no exact quantities), liquid biofuels dominate the scene and the main type of biomass used come from agriculture. This is in line with what observed in the previous paragraphs regarding the stronger focus on agriculture in those countries and the not yet exploited potential on bio-based products with high added-value, like chemicals.

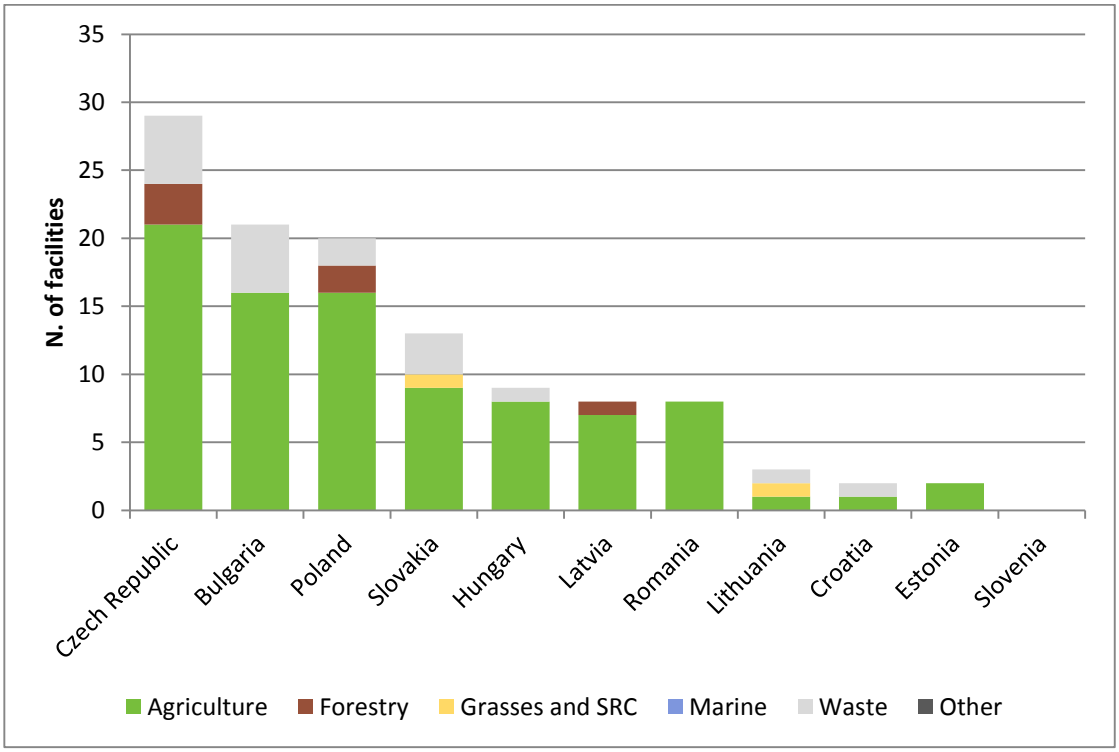
[6] Details see Parisi, C. (2018). "Research Brief: Biorefineries distribution in the EU". European Commission - Joint Research Centre.

Figure 5. Geographical distribution of biorefineries per type of bio-based production.



Source: Parisi, C. (2018). "Research Brief: Biorefineries distribution in the EU". European Commission - Joint Research Centre.

Figure 6. Geographical distribution of biorefineries per type of biomass feedstock used.



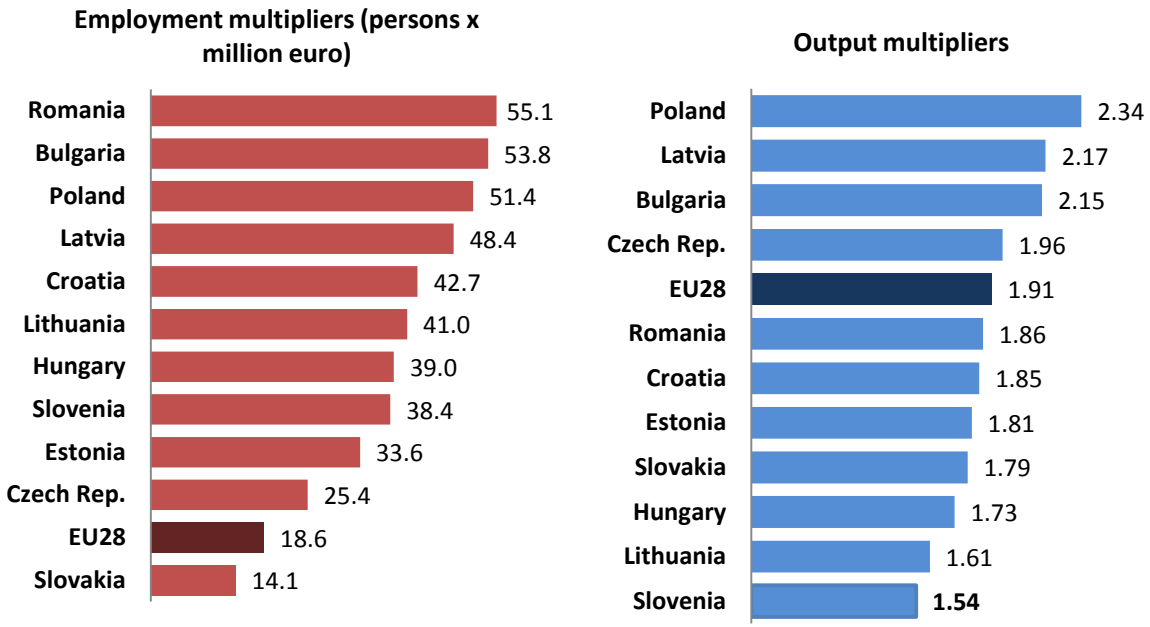
Source: Parisi, C. (2018). "Research Brief: Biorefineries distribution in the EU". European Commission - Joint Research Centre.

Diversified Bioeconomies and potential transition paths in the BIOEAST countries

Combinations of different socioeconomic indicators enable cross-country comparisons and give insights into the complex interactions of job and growth creation. They also allow the identification of potential future pathways of countries that exhibit similar dynamic patterns.

JRC research shows that the BIOEAST countries have comparably high **employment multipliers**. For each million Euro invested in the national bioeconomy sector, up to 55 jobs could be created in these countries, mainly driven by primary agriculture activities. The role agriculture plays in rural areas and as an economic and social buffer is not to be underestimated.

Figure 7. Employment and output multipliers of the bioeconomy aggregate sector of the EU MS (2010).



Source: Own elaboration based on Mainar-Causapé et al.(2017): "Analysis of structural patterns in highly disaggregated bioeconomy sectors by EU Member States using SAM/IO multipliers".

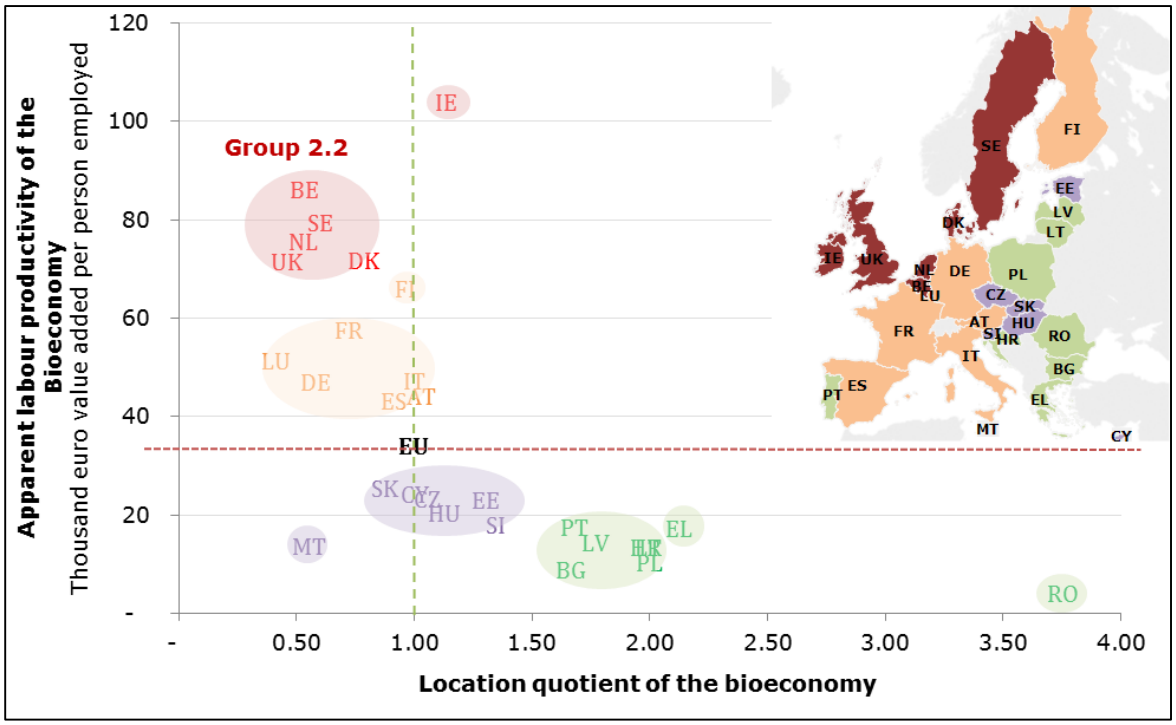
By analysing the concentration of national labour markets in the bioeconomy[7] and the apparent labour productivity of the bioeconomy, four distinct groups of Member States (MS) can be identified:

- Group 1.1: MS whose national labour markets are strongly specialised in the bioeconomy sectors but have a low level of apparent labour productivity. In this group, the bioeconomy is geared towards biomass-producing sectors and the food, beverages and tobacco manufacturing sector, while other manufacturing sectors with low levels of apparent labour productivity can play a significant role, depending on their historical sectoral specialisation or biomass endowment.
- Group 1.2: MS with a medium specialisation of national labour markets in the bioeconomy sectors and a medium-low level of apparent labour productivity. In this group, the agriculture and the food, beverages and tobacco manufacturing sectors are the main sources of bioeconomy jobs and value added, but other biomass-producing sectors are also relevant due to resource availability (e.g. fishing in MT and forestry in EE, SK and CZ).

[7] It uses the location quotient as a proxy for the employment situation. In this context, location quotient (LQ) is the share of those employed in a Member State that are working in the bioeconomy (or one of its sectors), divided by the equivalent employment share in the EU as a whole. LQ helps quantify how "concentrated" the bioeconomy is in a Member State compared to the EU as a whole.

- Group 2.1: MS with a low-to-medium specialisation of national labour markets in the bioeconomy and medium-high level of apparent labour productivity. Generally, these MS show high sectoral diversification and productivity, suggesting a high level of maturity of the bioeconomy manufacturing sectors.
- Group 2.2: MS with a low level of bioeconomy specialisation in their national labour markets and high level of apparent labour productivity of the bioeconomy sectors.

Figure 8. Clustering of EU-28 Member States based on the apparent labour productivity and employment concentration in the different sectors.



Source: Ronzon, T. and R. M'Barek (2018). "Socioeconomic Indicators to Monitor the EU's Bioeconomy in Transition." Sustainability 10(6): 1745. Note: Average EU-28 values are shown as dashed lines.

As far as BIOEAST countries are concerned, the so-called **location quotient** illustrates the over-proportional concentration of jobs in the bioeconomy compared to the EU average (see figure 8). On the other hand, the apparent labour productivity of the bioeconomy, which reflects the value added generated by a worker, shows an inverse picture.

Group 1.1 includes the BIOEAST countries of Bulgaria, Croatia, Latvia, Lithuania, Poland, and Romania (as well as Greece and Portugal). This group is defined by a strong specialisation of national labour markets in the bioeconomy. Over half of the bioeconomy labour force in this group is concentrated in biomass-producing sectors (i.e., agriculture, forestry and the fishing sector), which generate 33–63% of the bioeconomy value added. The agriculture sector alone contributes between 38% and 81% of bioeconomy jobs and 23–55% of the value added. In Latvia, Bulgaria and Lithuania, the relatively low contribution of agriculture to bioeconomy jobs (38–48%) is compensated for by a strong contribution of the forestry sector (6–14% versus 3% on average in the EU-28).

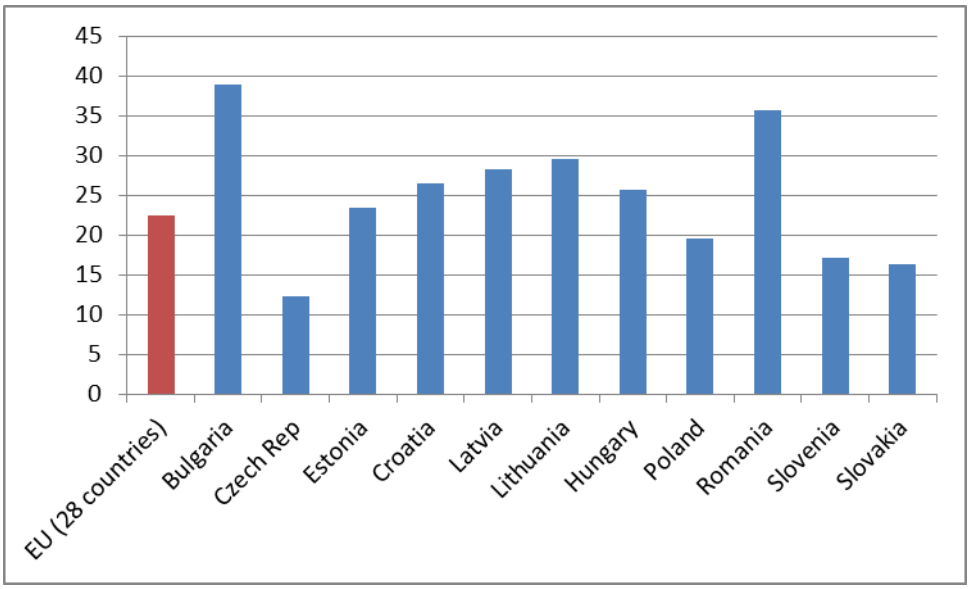
Group 1.2 includes the BIOEAST countries of the Czech Republic, Estonia, Hungary, Slovakia, and Slovenia (as well as Cyprus and Malta), and is defined by a medium specialisation of national labour markets in the bioeconomy on the EU-28 scale (location quotient from 0.9 to 1.3) and a level of apparent labour productivity

of the bioeconomy of between half the EU-28 level and the EU-28 average level (i.e. 18,000 to 26,000 of value added per person employed in 2015).

This group of Member States could illustrate the initial stage of a bioeconomy transition characterised by the intermediate levels of apparent labour productivity achieved in low productive sectors. Intermediate levels of productivity are indeed observed in agriculture and forestry. Labour productivity remains low in the other bioeconomy sectors. Therefore, there is still potential for (i) improving the apparent labour productivity in bio-based manufacturing sectors and (ii) developing the bio-based industry in general.

The earlier insights can be placed into a broader socio-economic context with a forward-looking perspective. Starting with a view at the current situation, Figure 9 shows that, according to EUROSTAT, more than half of the BIOEAST countries have a higher share of people at risk of poverty or social exclusion compared with the EU-28 average.

Figure 9. People at risk of poverty or social exclusion in BIOEAST countries, in %, 2017.



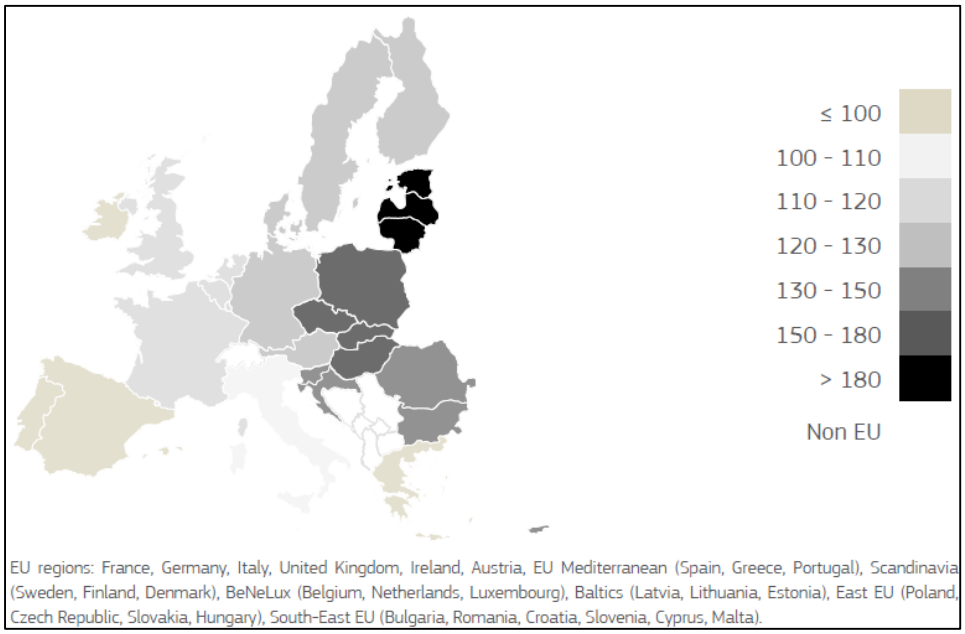
Source: EUROSTAT, https://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=sdg_01_10

These distributional issues clearly need to be addressed by relevant public policies. The picture for the broader macro economy is, however, somewhat more optimistic. A cursory review of Figure 10 reveals a degree of average income convergence with the Western EU economics. Indeed, projecting to 2030 from a base year index of 2011, higher expected rates of real GDP growth coupled with population projections show that the BIOEAST countries exhibit higher rates of per capita real income (utility)[8], particularly the Baltic region, when compared with most of the Western EU countries. It should, however, be noted that that per capita income gap between East and West, remains considerable.

A further sign of potential opportunity for the BIOEAST member states is the metric of renewable energy trade competiveness presented in Figure 11 below. Employing a well-known (Balassa) index, those EU members with a measure above one (shades of blue in the figure) have a higher degree of relative competitiveness. It can be clearly seen that for renewables, the performance of the BIOEAST countries is superior to the majority of Western EU countries. To a significant degree, this is motivated by the greater availability of bio-resources within the Eastern members (i.e., relatively abundant land availability and forestry resources).

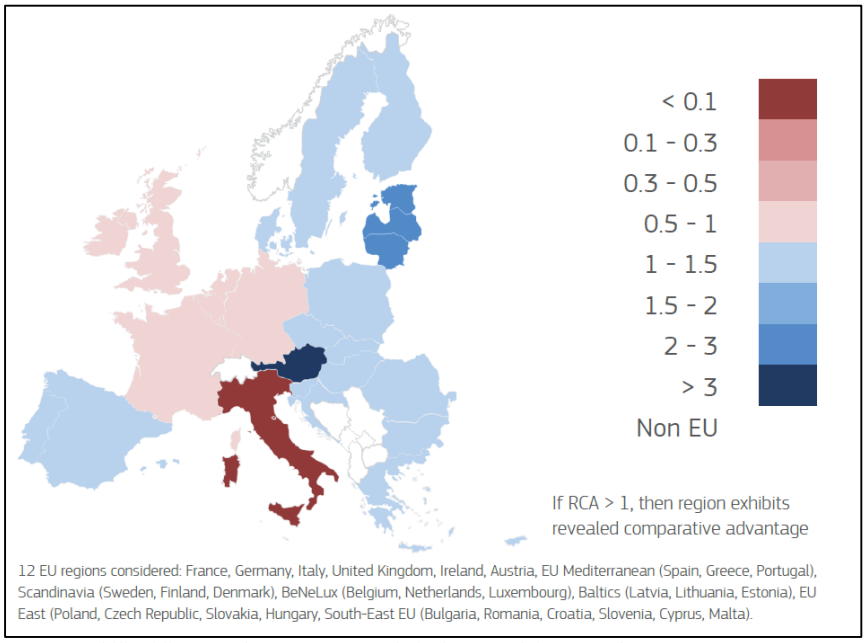
[8] Measure for relative growth; function of real GDP growth and population growth (declining in many BIOEAST countries).

Figure 10: Per capita utility index in 2030 (2011 = base 100)



Source: Philippidis G. et al. (2018), JRC technical report, doi:10.2760/560977

Figure 11: Trade competitiveness of renewable energies, 2030, Balassa index of Revealed Comparative Advantage (RCA).



Source: Philippidis G. et al. (2018), JRC technical report, doi:10.2760/560977

The clear pattern that emerges from the figure above is that those EU regions with a larger bio-resource base, or relatively less developed economies, register higher levels of revealed comparative advantage in renewable energy exports.

The updated Bioeconomy strategy provides many actions to unlock the potential in the BIOEAST countries.

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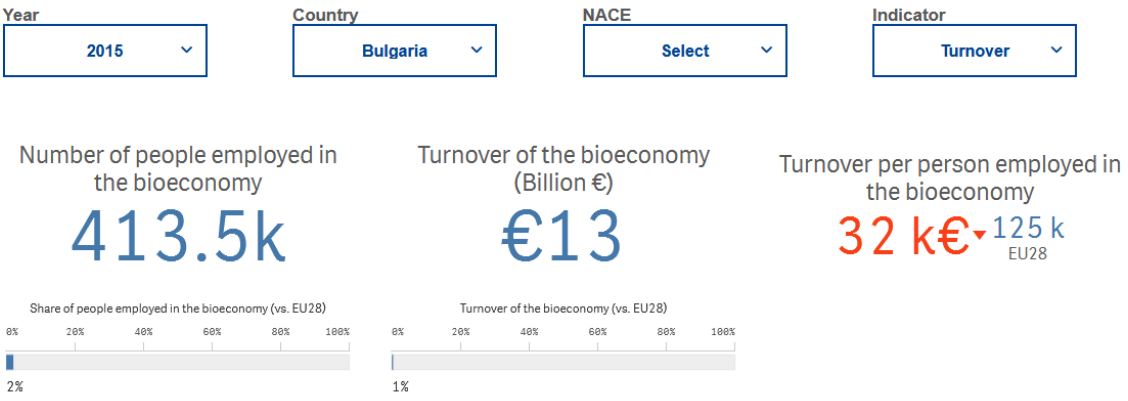
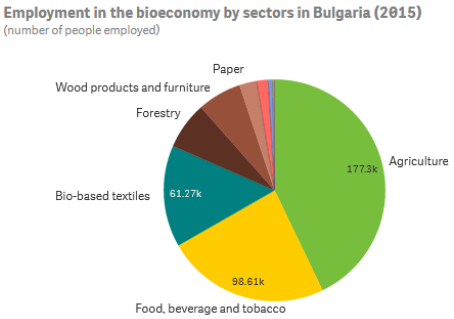
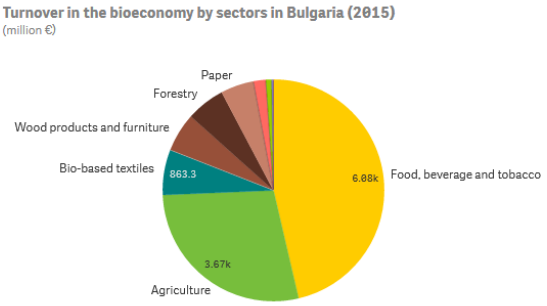
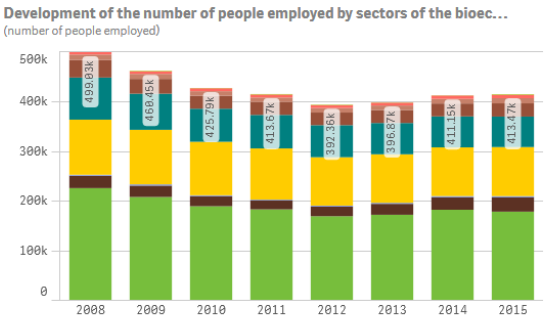
Annex: MS profiles (for the 11 BIOEAST countries)

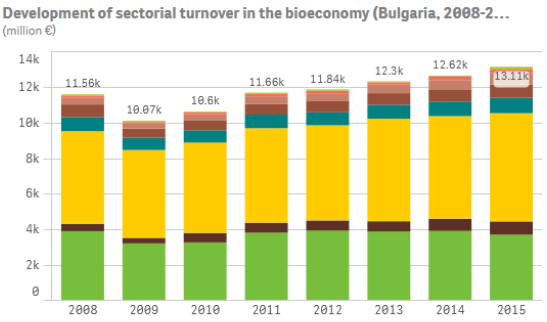
Bulgaria











Croatia

Year: 2015 | Country: Croatia | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
257.7k

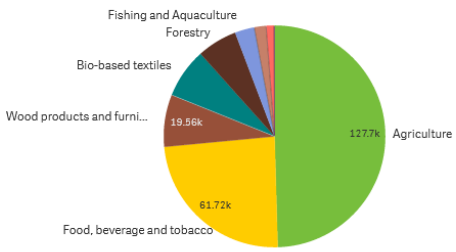
Turnover of the bioeconomy (Billion €)
€10

Turnover per person employed in the bioeconomy
41 k€ 125 k EU28

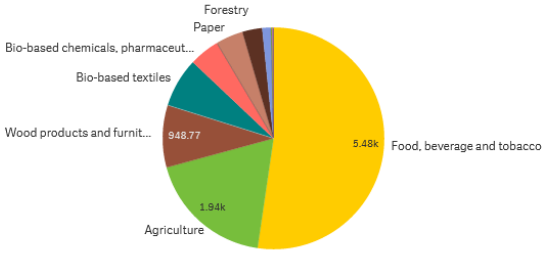
Share of people employed in the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
1%

Turnover of the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
0%

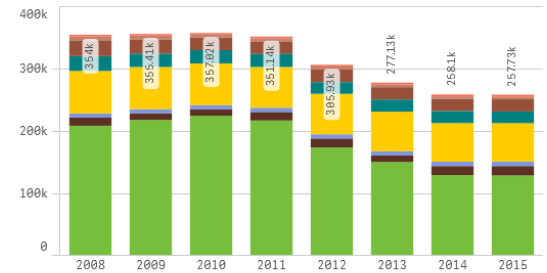
Employment in the bioeconomy by sectors in Croatia (2015)
(number of people employed)



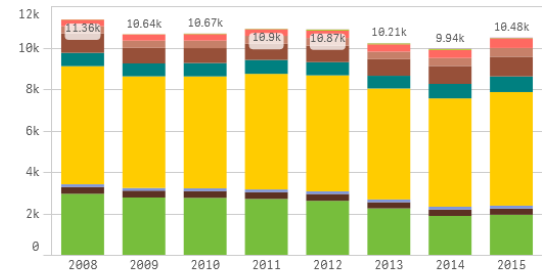
Turnover in the bioeconomy by sectors in Croatia (2015)
(million €)



Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Croatia, 2008-20...
(million €)



Czech Republic

Year: 2015 | Country: Czech Republic | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
375.9k

Turnover of the bioeconomy (Billion €)
€29

Turnover per person employed in the bioeconomy
78 k€ ▼ 125 k EU28

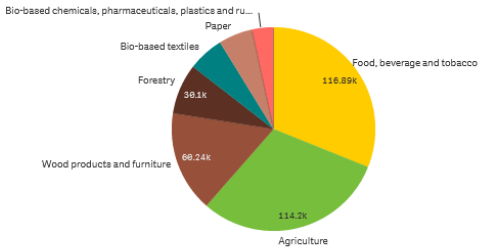
Share of people employed in the bioeconomy (vs. EU28)

2%

Turnover of the bioeconomy (vs. EU28)

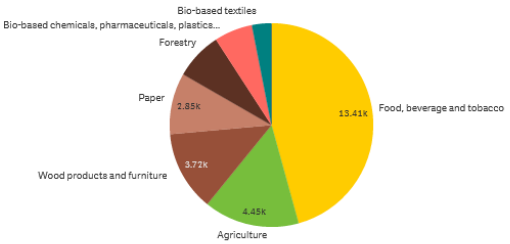
1%

Employment in the bioeconomy by sectors in Czech Republic (2015) *
(number of people employed)



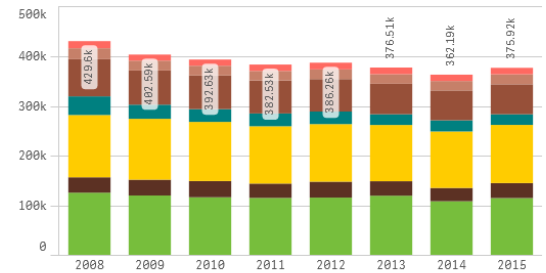
** The data set contains negative or zero values that cannot be shown in this chart.*

Turnover in the bioeconomy by sectors in Czech Republic (2015) *
(million €)

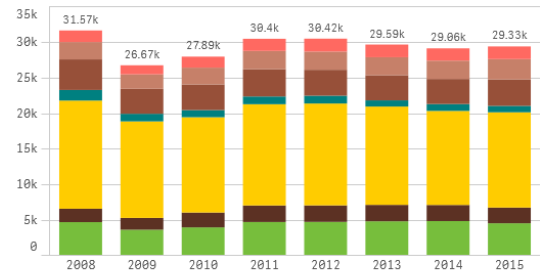


** The data set contains negative or zero values that cannot be shown in this chart.*

Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Czech Republic, ...
(million €)



Estonia

Year: 2015 | Country: Estonia | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
68.6k

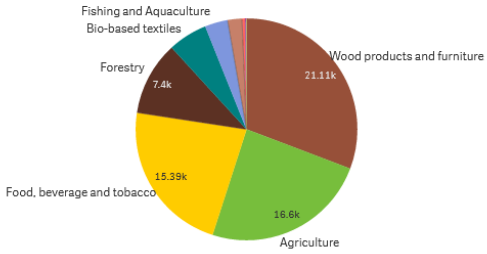
Turnover of the bioeconomy (Billion €)
€6

Turnover per person employed in the bioeconomy
88 k€ 125 k EU28

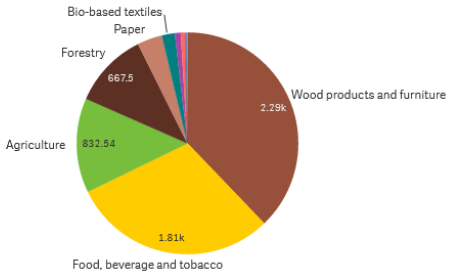
Share of people employed in the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
0%

Turnover of the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
0%

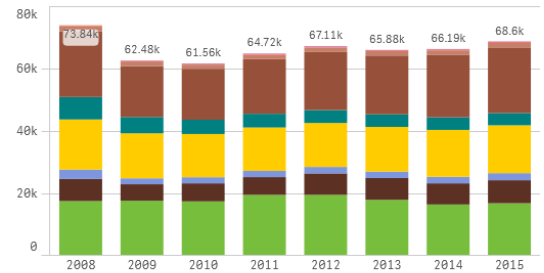
Employment in the bioeconomy by sectors in Estonia (2015)
(number of people employed)



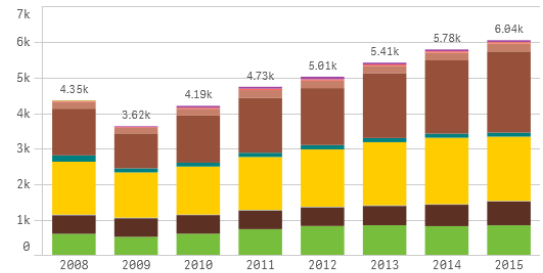
Turnover in the bioeconomy by sectors in Estonia (2015)
(million €)



Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Estonia, 2008-20...
(million €)



Hungary

Year: 2015 | Country: Hungary | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
390.6k

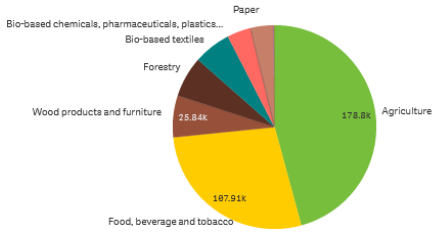
Turnover of the bioeconomy (Billion €)
€26

Turnover per person employed in the bioeconomy
67 k€ 125 k EU28

Share of people employed in the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
2%

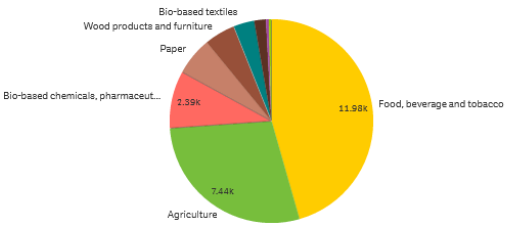
Turnover of the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
1%

Employment in the bioeconomy by sectors in Hungary (2015) *
(number of people employed)



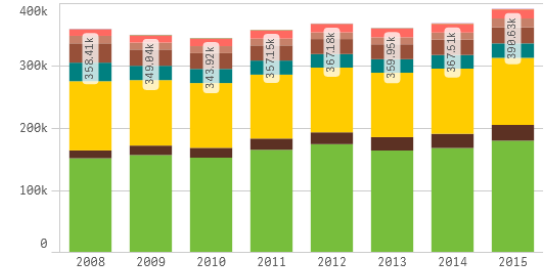
** The data set contains negative or zero values that cannot be shown in this chart.*

Turnover in the bioeconomy by sectors in Hungary (2015) *
(million €)

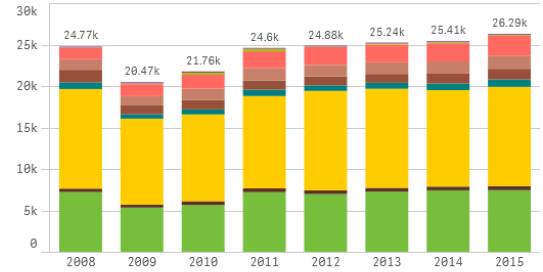


** The data set contains negative or zero values that cannot be shown in this chart.*

Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Hungary, 2008-2...
(million €)



Latvia

Year: 2015 | Country: Latvia | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
130.6k

Turnover of the bioeconomy (Billion €)
€6

Turnover per person employed in the bioeconomy
50 k€ 125 k EU28

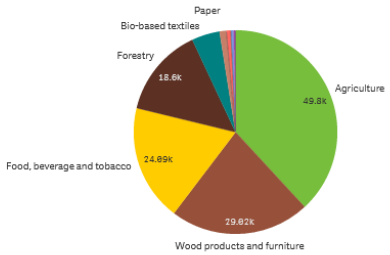
Share of people employed in the bioeconomy (vs. EU28)

1%

Turnover of the bioeconomy (vs. EU28)

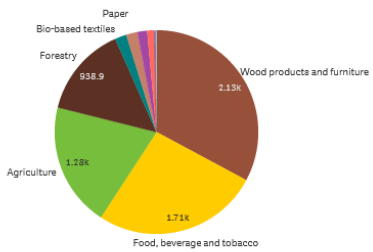
0%

Employment in the bioeconomy by sectors in Latvia (2015) *
(number of people employed)



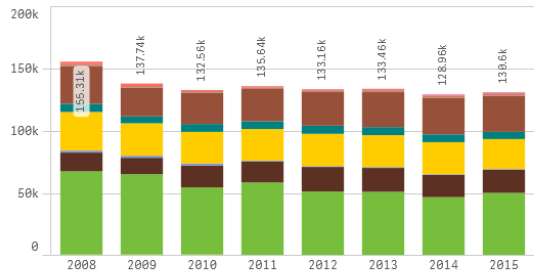
** The data set contains negative or zero values that cannot be shown in this chart.*

Turnover in the bioeconomy by sectors in Latvia (2015) *
(million €)

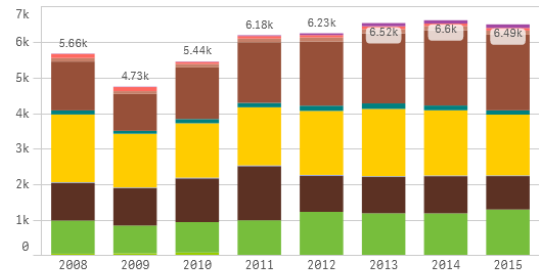


** The data set contains negative or zero values that cannot be shown in this chart.*

Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Latvia, 2008-2015)
(million €)



Lithuania

Year: 2015 | Country: Lithuania | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
218k

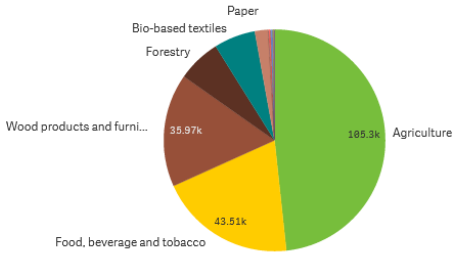
Turnover of the bioeconomy (Billion €)
€11

Turnover per person employed in the bioeconomy
52 k€ 125 k EU28

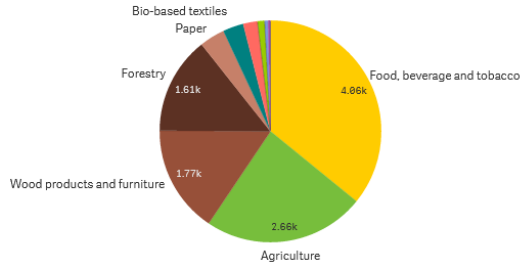
Share of people employed in the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
1%

Turnover of the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
1%

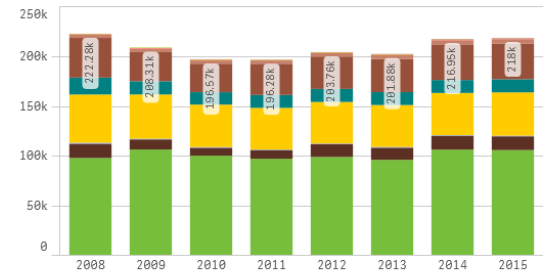
Employment in the bioeconomy by sectors in Lithuania (2015)
(number of people employed)



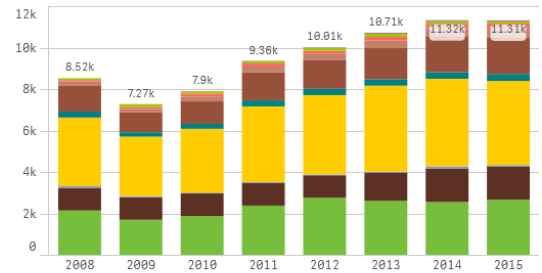
Turnover in the bioeconomy by sectors in Lithuania (2015)
(million €)



Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Lithuania, 2008-...
(million €)



Poland

Year: 2015 | Country: Poland | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
2.64M

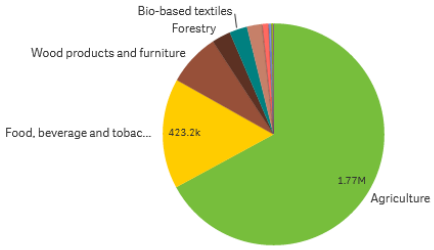
Turnover of the bioeconomy (Billion €)
€115

Turnover per person employed in the bioeconomy
44 k€ 125 k EU28

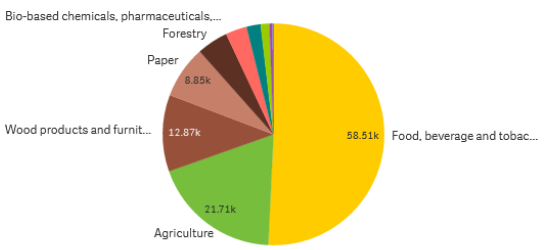
Share of people employed in the bioeconomy (vs. EU28)

Turnover of the bioeconomy (vs. EU28)

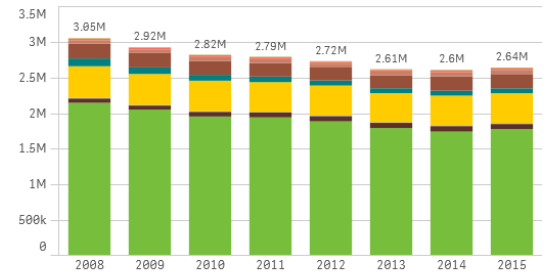
Employment in the bioeconomy by sectors in Poland (2015)
(number of people employed)



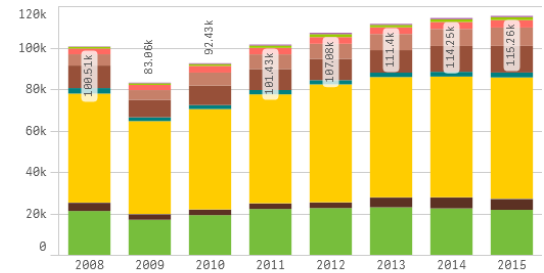
Turnover in the bioeconomy by sectors in Poland (2015)
(million €)



Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Poland, 2008-20...
(million €)



Romania

Year: 2015 | Country: Romania | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
2.63M

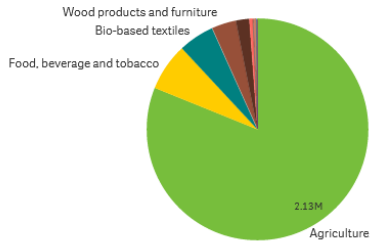
Turnover of the bioeconomy (Billion €)
€37

Turnover per person employed in the bioeconomy
14 k€ 125 k EU28

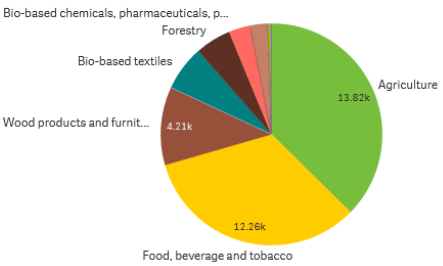
Share of people employed in the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
15%

Turnover of the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
2%

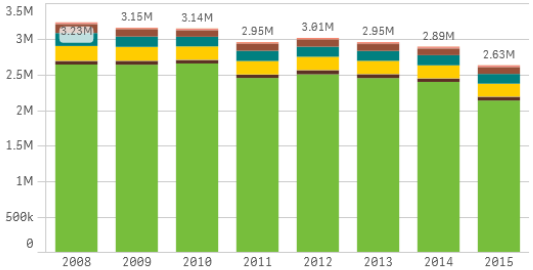
Employment in the bioeconomy by sectors in Romania (2015)
(number of people employed)



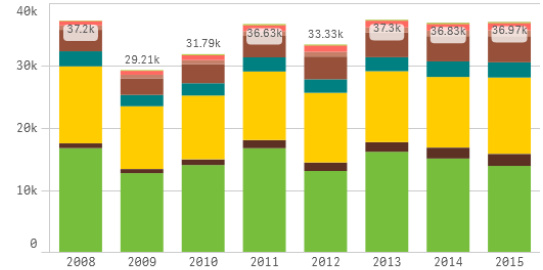
Turnover in the bioeconomy by sectors in Romania (2015)
(million €)



Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Romania, 2008-2...
(million €)



Slovakia

Year: 2015 | Country: Slovakia | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
174k

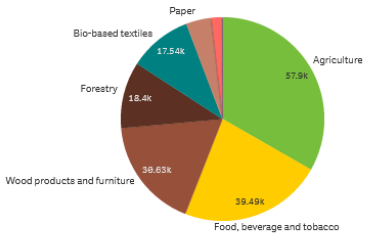
Turnover of the bioeconomy (Billion €)
€11

Turnover per person employed in the bioeconomy
66 k€ 125 k EU28

Share of people employed in the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
1%

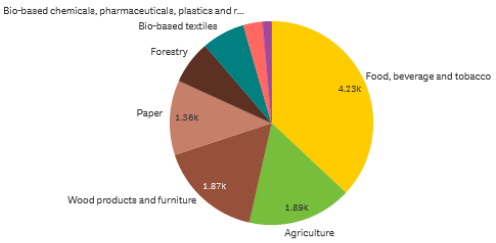
Turnover of the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
1%

Employment in the bioeconomy by sectors in Slovakia (2015) *
(number of people employed)



** The data set contains negative or zero values that cannot be shown in this chart.*

Turnover in the bioeconomy by sectors in Slovakia (2015) *
(million €)



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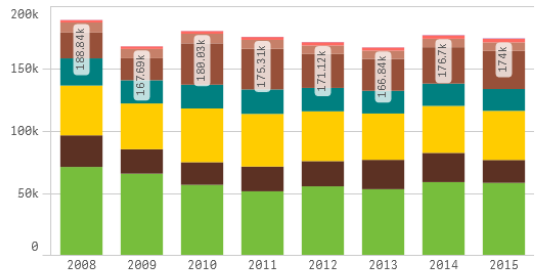
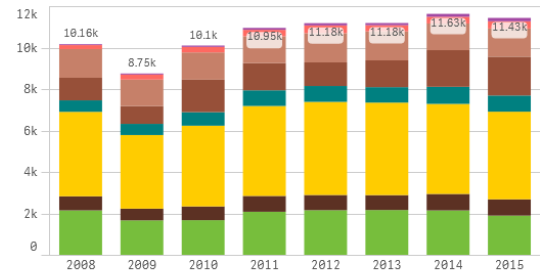
Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Slovakia, 2008-2...
(million €)



Slovenia

Year: 2015 | Country: Slovenia | NACE: Select | Indicator: Turnover

Number of people employed in the bioeconomy
101.3k

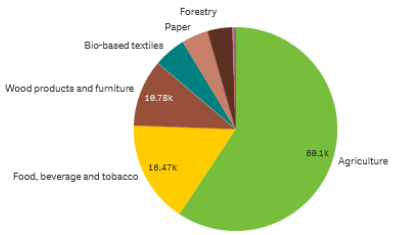
Turnover of the bioeconomy (Billion €)
€6

Turnover per person employed in the bioeconomy
59 k€ ▼ 125 k EU28

Share of people employed in the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
1%

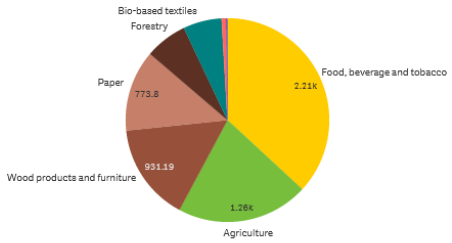
Turnover of the bioeconomy (vs. EU28)
0% 20% 40% 60% 80% 100%
0%

Employment in the bioeconomy by sectors in Slovenia (2015) *
(number of people employed)



** The data set contains negative or zero values that cannot be shown in this chart.*

Turnover in the bioeconomy by sectors in Slovenia (2015) *
(million €)



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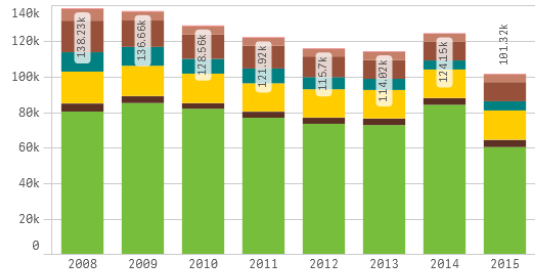
Development of the number of people employed by sectors of the bioec...
(number of people employed)



Development of sectorial turnover in the bioeconomy (Slovenia, 2008-2...
(million €)