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EU Bioeconomy Monitoring System indicators update

Jobs and value added in the EU bioeconomy 2020

(BMS-Jobs&Growth, May 2023 release)

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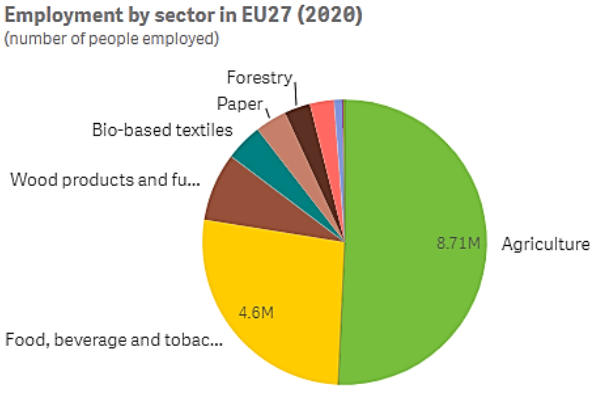

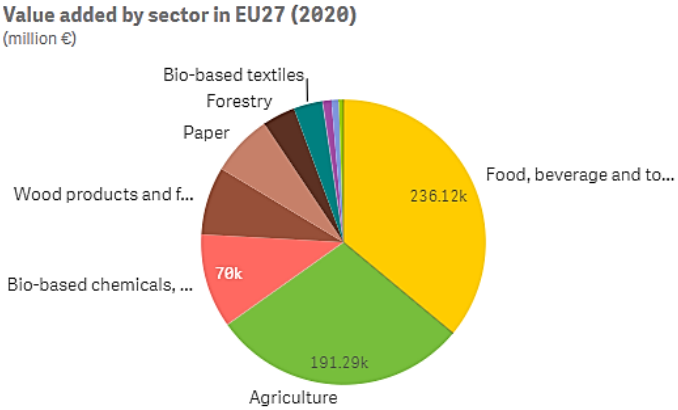

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Contents

Abstract

The socioeconomic indicators for the Bioeconomy Monitoring System ("BMS-Jobs&Growth") are prepared by JRC to monitor the socioeconomic aspects of the EU Bioeconomy. It has been widely used since its first release in 2017. This report is intended to serve as technical documentation for the latest release of the dataset (May 2023), which includes estimates of employment and value added in the bioeconomy sectors for 2020. The report summarised the process to generate the data, and describes the methodological changes implemented with regard to the last release. These changes mainly affect the process for filling in missing data, which now uses additional economic information for the estimation of data gaps. The impact of these changes is limited compared to previous versions of the dataset, but it allows for better identification of sectoral trends and the effects of economic shocks, such as the one caused by the COVID-19 pandemic. Lastly, the report also presents the current version of the online dashboard where the data is displayed.

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1 Introduction

The socioeconomic indicators for the Bioeconomy Monitoring System (BMS-Jobs&Growth dataset) are useful tools for the monitoring of the socio-economic dimension of the EU bioeconomy. Specifically, the indicators considered are Number of persons employed, Turnover, Value Added, Location quotient (Specialization of labour markets in the bioeconomy with regard to the EU27) and Labour Productivity in the bioeconomy sectors. The period covered in the latest release is 2008-2020.

The aforementioned indicators are prepared for the 27 EU Member States, and the sectors considered are:

- Primary sectors: agriculture (A01), forestry (A02) and fishing and aquaculture (A03),
- Manufacture of food, beverages and tobacco (C10, C11 and C12),
- Bio-based textiles (C13, C14 and C15),
- Wood products (C16), wooden furniture (C31), and paper (C17) industries,
- Bio-based chemicals (C20), pharmaceuticals (C21) and plastic and rubber (C22) industries,
- Bio-based electricity (D3511).

This dataset has been maintained and updated yearly by the JRC since 2017. The methodology for quantification has been improved along the years and the present document describes the status of the version released in May 2023: https://datam.jrc.ec.europa.eu/datam/perm/dataset/7d7d5481-2d02-4b36-8e79-697b04fa4278/download/Dataset_JRC_-_Bioeconomics.zip

Derived visualisations are also displayed for a general public in European Commission related-webpages: the Data-Modelling platform of resource economics - DataM, the Knowledge Centre for Bioeconomy and, in a reduced form in the EU Bioeconomy Monitoring System.

2 Methodology

The methodology for estimating the BMS-Jobs&Growth indicators are prepared using systematic combination of economic indicators with sectoral bio-based shares. This methodology has been scientifically validated and published in different academic journals (Ronzon, Piotrowski, M'Barek, and Carus, 2017, Ronzon and M'Barek, 2018, and Ronzon et al., 2020).

The latest release of BMS-Jobs&Growth (May 2023) is based on the methodology described by Ronzon et al. (2020). Section 2.1 defines the target indicators, while Section 2.2 details the data sources by sector and indicator. Section 2.3 described the basic steps of the method from Ronzon et al. (2022a), while gives a summary of that methodology. Section 2.4 describes the changes in the data processing. Section 2.5 highlights other minor changes that were applied for the May 2023 version of the dataset.

2.1 Definition of target indicators and sectoral scope

For this task, we address three target indicators:

1. **The number of people employed** is *"the total number of persons who work in the observation unit, as well as persons who work outside the unit who belong to it (…) and are paid by it"* (European Commission, 2009).
2. **The value added at factor cost** "*is the gross income from operating activities after adjusting for operating subsidies and indirect taxes*" (European Commission, 2009). It is measured at nominal prices in this study,
3. **The turnover**, which *"comprises the totals invoiced by the observation unit during the reference period: this corresponds to the total value of market sales of goods and services to third parties"* (European Commission, 2009). As value added, it is measured at nominal prices.

Two additional indicators are derived from the number of persons employed and value added: the location quotient of the Bioeconomy in each EU Member States and the sectorial productivity of the NACE classes represented in the BMS-Jobs&Growth dataset.

- **The apparent labour productivity** is defined as value added at factor costs divided by the number of persons employed[(1)].
- **The location quotient** refers to the ratio of the proportion of persons employed in the bioeconomy in a given Member State on the European proportion. A location quotient greater than 1 means that the labour market of the Member State is more "concentrated" in the bioeconomy than the EU average.

The sectors in the classification of Economic Activities in the European Community (NACE) (Eurostat, 2008) that would, fully or partially, fall within the scope of the bioeconomy, are detailed below.

- agriculture (NACE code A01),
- forestry (A02),
- fishing (A03),
- the manufacturing of food (C10),
- manufacturing of beverages (C11),
- manufacturing of tobacco (C12),
- manufacturing of textiles (C13),
- manufacturing of wearing apparel (C14),
- manufacturing of leather (C15),
- manufacturing of wood products (C16),
- manufacturing of paper (C17),
- manufacturing of furniture (C31),
- manufacturing of chemicals (C20),
- manufacturing of pharmaceuticals (C21),
- manufacturing of plastics and rubber (C22),
- production of electricity (D3511).

(1) https://ec.europa.eu/eurostat/databrowser/view/tin00152/default/table?lang=en

2.2 Data sources

Table 1 lists the data sources used for the elaboration of the BMS-Jobs&Growth dataset.

Table 1. BMS-Jobs&Growth ' data sources

Sector	NACE codes	Main data sources	Auxiliary data sources
Primary sectors	A01, A02, A03.	**Employment**: National accounts employment data by industry (nama_10_a64_e) **Value added:** National accounts (nama_10_a64)	N.A
Manufacturing	C10, C11, C12, C13*, C14*, C15*, C16*, C17*, C20*, C21*, C22*.	**Bio-based shares:** - Expert knowledge - Statistics on the production of manufactured goods (prom DS-066341) **Employment and Value added:** Structural Business Statistics (sbs_na_ind_r2)	**Employment**: National accounts employment data by industry (nama_10_a64_e) **Value added:** EUROSTAT - National accounts (nama_10_a64)
Production of electricity	D3511*.	**Bio-based shares:** Production of electricity (nrg_bal_peh) **Employment and Value added:** Structural Business Statistics (sbs_na_ind_r2)	**Employment**: National accounts employment data by industry (nama_10_a64_e) **Value added:** EUROSTAT - National accounts (nama_10_a64)

(*) Hybrid sectors: bio-based shares are applied to these to estimate the activity generated by the manufacture of biomass feedstock by each one.

Source: Author's own elaboration

As indicated in Table 1, National Accounts from Eurostat were the data source for compiling employment data (Eurostat nama_10_a64_e) and value added data (Eurostat nama_10_a64) for agriculture (NACE A01), forestry (A02), and fishing and aquaculture (A03) (Eurostat, 2020a, 2020b).

Regarding the manufacturing sectors, the main data source for the target indicators is Structural Business Statistics (sbs_na_ind_r2) (Eurostat, 2020c). In addition, equivalent indicators are retrieved from National Accounts (Eurostat, 2020a, 2020b) to be used as auxiliary variables to fill in the missing data[(2)]. For the partially bio-based manufacturing sectors, we also use information on Value of Sold Production, retrieved from the Eurostat statistics on the production of manufactured goods (prom DS-066341) (Eurostat, 2020d). In combination with expert knowledge, this information would allow to estimate sectoral bio-based shares for the flagged sectors in Table 1[(3)].

In the special case of NACE D3511 'Production of electricity' sector, the sectorial bio-based share is not derived from expert knowledge but from the Eurostat energy balances (nrg_bal_peh) (Eurostat, 2020e).

(2) See Section 2.3 for further details on the data filling procedure.
(3) See Section 2.4 for further details in the computation and application of sectoral bio-based shares

2.3 Data pre-processing

Due to missing values in the selected data sources, a data pre-processing is conducted prior to application of bio-based shares to the target indicators. The data pre-processing address both the filling in the missing data from the selected data sources, as well as checking consistency of the imputed values among the different levels of the NACE sector classification (2-, 3- and 4-digit disaggregation).

2.3.1 Old data processing

The data filling procedure implemented in previous releases was based on the use of the newest information available in the dataset. Specifically, the missing data were first completed using the values of the *last observation carried backward*. As a secondary criterion, when no recent information is available the last years are missing values), then the value of the *last observation carried forward* was used.

The main advantage of this process is that the most recent information is reflected in the target indicators. In addition, this process had an acceptable performance to explain the main trends of the EU bioeconomy sectors, largely explained by the context of economic and financial stability predominating in the last decade. However, some significant deviations were still spotted for some specific high-growth sector, for which carrying backward (forward) filling procedures were not appropriate. So far, these divergences occurred only in very specific cases and their impact was limited. However, the break in the economic trends in most sectors prompted by the impact of the COVID-19 pandemic shock caused that these divergences were identified for more sectors and countries in 2020.

2.3.2 New data processing

The new data pre-processing deals with the deviations problem by incorporating additional economic information to complete the missing data. Consequently, the estimated values better reflects the trends and dynamics of each sector and/or the economic context.

This new process is applied to data from Structural Business Statistics (SBS), and it proceeds in two stages. The first stage estimates missing values corresponding to jobs and value added for the 2-digit NACE sectors. The second stage completes missing data for the 3- and 4- digit corresponding sectors, based on the estimated series in the previous stage. Table 2 summarises the main information of each stage.

2.3.2.1 Stage 1. Filling in the values from the 2-digit NACE sectors

For the imputation of missing values in the 2-digit level of NACE, we use estimates on employment (thousand persons) and value added (million euros, current prices) provided by National Accounts as auxiliary variables[4] to compute missing values from the equivalent indicators in SBS. For this task, the implemented procedure distinguishes among three different cases, which are detailed below.

Case 1 Missing values within the target indicators are intermediate, as long as there is information available for the variable in question for both previous and subsequent years. In these cases, the missing values from the target indicator for a specific year are computed using a combination of the projections and backward estimates obtained using growth rates from National Accounts. The procedure is represented by Equation 1.

$$\hat{Y}_t = {}^1\!/_2 \cdot \left[Y_p^{SBS} \cdot \left(\frac{Y_t^{NA}}{Y_p^{NA}} \right) + Y_s^{SBS} \cdot \left(\frac{Y_t^{NA}}{Y_s^{NA}} \right) \right] \qquad \text{(Eq. 1)}$$

[4] See The *Memobust Handbook on Methodology of Modern Business Statistics* (Scholtus et al., 2014), which has a dedicated section on the use of auxiliary variables for data imputation: https://cros-legacy.ec.europa.eu/content/imputation_en

Table 2. Data collection and pre-processing

	STAGE 1	STAGE 2 (for required sectors)
Information on indicators	**Eurostat data source:** Structural Business Statistics (*sbs_na_ind_r2*) **Variables:** Persons employed (number), Value added (current prices) **Sectoral breakdown:** 2-digit NACE classification	**Eurostat data source:** Structural Business Statistics (*sbs_na_ind_r2*) **Variables:** Persons employed (number), Value added (current prices) **Sectoral breakdown:** 3- and 4-digit NACE classification
Auxiliary variables	**Eurostat data source:** National Accounts (*nama_10_a64_e* and *nama_10_a64*) **Variables:** Employment (thousand persons), Gross value added (current prices) **Sectoral breakdown:** 2-digit NACE classification	N.A.
Missing data estimation process	1. Missing values from SBS are estimated using the **growth rates derived from the equivalent variables** from National Accounts. 2. If values from National Accounts are also missing, the following process are applied (in order of priority): 2.1. **Interpolation procedures** 2.2. **Last observation carried backward (forward).**	**1.** If there is only **one missing subsector**, **the difference** between the overarching sector (2- or 3- digit level) and the sum of the non-missing subsectors (3- or 4-digit, respectively) is **assigned to the missing one** (only if higher than 0). **2.** If two or more subsectors are missing, the following procedures are applied (in order of priority): 2.1. **Interpolation procedures** 2.2. **Last observation carried backward (forward).** **3. A rescaling procedure** is applied to the values of the more disaggregated NACE classification to **ensure consistency** among different level of sectoral disaggregation. **4. The process is iterated** until no more values are completed.

Source: Author's own elaboration

Where:

- $\dot{Y}$ is the estimated value of the target indicator (missing in the target indicator).
- Y represents actual values from the variables
- The superscript SBS indicate that the corresponding value Y is obtained from Structural Business Statistics.
- The superscript NA indicate that the corresponding value Y is obtained from National Accounts.
- The subscript t indicates the specific year to be estimated (missing in the target indicator).
- The subscript p indicates the nearest previous year for which the target indicator is non-missing.
- The subscript s indicates the nearest subsequent year for which the target indicator is non-missing.

The use of growth rates allows the estimated values to be consistent with the actual level of the target indicator, which is desirable when there are divergences between Structural Business Statistics and National Accounts. In addition, combining both forward and backward growth rates is useful to adjust the estimated values to the trends reflected by the actual ones. Otherwise, if only a unique growth rate were used, the estimated values could cause artificial breaks in the target indicator in the event that SBS and National accounts show divergent trends, due to differences in estimation methodologies or the rounding procedures applied by Eurostat.

Case 2. Missing years are concentrated in the last periods of the target indicator (SBS only provide information for years prior to the missing values). In this case, the missing values are estimated projecting the target indicator using growth rates derived from the auxiliary variable, according to Equation 2.

$$\hat{Y}_t = Y_p^{SBS} \cdot \left(\frac{Y_t^{NA}}{Y_p^{NA}} \right) \qquad \text{(Eq. 2)}$$

Case 3. Missing years are concentrated in the first periods of the target indicator (SBS only provide information for more recent years). In this case, the missing values are computed estimating backward the SBS values using the growth rates derived from the auxiliary variable (see Equation 3).

$$\hat{Y}_t = Y_s^{SBS} \cdot \left(\frac{Y_t^{NA}}{Y_s^{NA}} \right) \qquad \text{(Eq. 3)}$$

Case 4. The auxiliary variable contains missing values. National Accounts also has some missing data, although to a lesser extent than the SBS, and concentrated in small countries and/or specific sectors. When the auxiliary variable cannot be used to estimate the missing target indicator, the following criteria are implemented as an alternative:

1. When the pattern of missing data is similar to which was described in Case 1, the values are estimated using linear interpolation procedures, i.e., assuming gradual equal variations in each of the years containing missing values.
2. When the pattern of missing data is similar to cases 2 and 3, then the procedures *last observation carried forward* and *last observation carried backward* are respectively applied[5], respectively, similarly to the old data pre-processing (see Section 2.3.1)

A special case is when there is no information for the target indicator (all values are missing). The predetermined option in this case would be to assign the values of the auxiliary variable to the target indicators. However, in the last version of our input dataset, those cases for which the target indicator is completely missing also do not have any information for the auxiliary variables. In this case, no calculations are conducted, so these indicators are kept missing.

(5) This step is similar to the old data-processing. In the new method, it is maintained as a subsidiary procedure for data filling, provided that there is no additional information available.

The advantage of using estimates from national Accounts as auxiliary variables is that the amount of missing values is substantially lower, and it is only concentrated in some countries and specific sectors. As a result, we can estimate a high percentage of the missing values in Structural Business Statistics.

The counterpart is that the sectoral breakdown is less detailed than that of Structural Business Statistics, as some sectors are reported as a unique aggregate (e.g. National Accounts provide an aggregate value for food, beverages and tobacco, C10-C12, and for all textiles economic activities, C13-C15). This fact might lower the accuracy of the estimates for the affected sectors, as the aggregation can potentially hide diverging trends.

2.3.2.2 Stage 2. Filling in values for 3- and 4-digit NACE sectors

Some of the aggregates provided in the dataset requires further sectoral disaggregation (liquid biofuels, generation of bio-electricity). For this purpose, a specific data filling procedure is also proposed for the 3- a 4-digit NACE sectors, although no additional information is used. However, the results from the Stage 1 are used as a basis for the data filling procedure in this stage, which is described below.

1. If there is only one missing subsector, the difference between the overarching sector (2- or 3- digit level) and the sum of the non-missing subsectors (3- or 4-digit, respectively) is assigned to the missing one. This step is usually applied when both the 2-digit value of an indicator and one of their subsectors are missing. As Stage 1 finishes with an estimate for most missing values at the 2-digit level, the value for the missing subsector can be easily computed. However, this rule will not be applied when the gap is negative (i.e., when the sum of the subsectors is higher than the value assigned to the overarching sector).

2. When there are missing values for two or more subsectors within the same 2-digit NACE sector, the following procedures are applied in order of priority:

    2.1. When the pattern of missing data is similar to which was described in Case 1 (Stage 1, Section 2.3.2.1), the values are estimated using linear interpolation procedures, i.e, assuming gradual equal variations in each of the years containing missing values.
    2.2. When the pattern of missing data is similar to cases 2 and 3, then the procedures *last observation carried backward* and *last observation carried forward* are applied, respectively.

3. A rescaling procedure is applied to the values of the more disaggregated NACE classification to ensure consistency among different levels of sectoral disaggregation. In case that the overarching sector is missing, it will be computed as a sum of the subsectors.
4. For each 2-digit NACE sector requiring further disaggregation, the complete process is reiterated until no more values can be completed.

2.4 Computation and application of bio-based shares.

After compiling the information from different data sources and filling in missing data, it is necessary to compute bio-based shares for the sectors which only partially belong to the bioeconomy, as reported in the NACE classification (i.e., sectors that produce products made of biomass as well as of fossil-, mineral-based or synthetic feedstock). The process is described below.

1. Interviews to industry and market experts are hold by the nova-Institute for determining the biomass content of all manufactured products listed in the PRODCOM statistical classification of products by activity (8-digits level) and with correspondence with the NACE classes mentioned in Section 2.1, except D3511 (see below). Experts quantify two parameters:

   (i) how much of the EU production volume of each manufactured product is bio-based in proportion of the total production (min–max range)

   (ii) the biomass content of this fraction of bio-based products (min–max range) in proportion of the total mass of each product.

2. The multiplication of the two gives a "product bio-based share". Experts' estimates were retrieved for the years 2008, 2016 and 2024. A linear development was assumed when the product bio-based shares changed over these periods. Average product bio-based shares were calculated from the min–max ranges.

3. To compute 2- and 4- digit sectoral bio-based shares, Equation (4) is used.

$$BBS_s = \frac{\sum_p BBS_p \cdot V_p}{\sum_p V_p} \qquad \text{(Eq. 4)}$$

Where:

- BBS_s are the sectoral bio-based shares, with index s being all the 2- and 4-digit NACE sector which are partially bio-based.
- BBS_p are the product bio-based shares (index $p = 1, \dots, n$ representing all the products manufactured by NACE sector s).
- V_p is the production value from each PRODCOM product category within the NACE sector s. The production value is retrieved from the Eurostat statistics on the production of manufactured goods (prom DS-066341) (Eurostat, 2020e).

In the special case of NACE D3511 'Production of electricity' sector, the sectorial bio-based share is derived from the Eurostat energy balances (nrg_bal_peh) (Eurostat, 2020d) by dividing all bio-based energy products on total gross energy production, expressed in energetic terms. Bio-based energy products are primary solid biofuels (code R5110-5150_W6000RI), charcoal (R5160), pure biogasoline (R5210P), pure biodiesels (R5220P), other liquid biofuels (R5290), biogases (R5300), and renewable municipal waste (W6210).

In order to reflect the evolution of national production mixes, product and sectoral bio-based shares are calculated per EU Member State and per year (from 2008–2020).

4. Finally, indicators of number of persons employed, turnover and value added in bioeconomy sector s are obtained applying sectoral bio-based shares to processed values from Section 2.3. It should be noted that this process is based on the assumption that the proportion of value added and employment generated from the production of bio-based manufactured products in a given 2- or 4-digit NACE sector was equal to the proportion of bio-based production into total production expressed in value terms for that sector.

2.5 Other changes in the May 2023 release compared to the previous versions

Some minor changes have been introduced at the time of elaborating the May 2023 version of BMS-Jobs&Growth. They explain the differences with the previous version on numbers for the period 2008-2019.

— **Eurostat data sources.** All calculations were updated with last available Eurostat data. Considering that Eurostat implements regular revisions on past time series, changes in Eurostat data for the period 2008-2019 period could have caused some divergence with the numbers displayed in the previous release.

— **Indicators computed only for the EU27 Member States.** As the United Kingdom formally left the EU in 2020, estimates are no longer provided for this country.

3 Results and visualisations

The data from the May version of the BMS-Jobs&Growth dataset are presented on the web interface Data-Modelling platform of resource economics - DataM, and mirrored on the Knowledge Centre for Bioeconomy website. The EU Bioeconomy Monitoring System mobilises a subset of the data. These web pages allow browsing the data by filtering the countries, sectors, years and indicators of interest for the users.

3.1 Overview of European Bioeconomy socio-economic indicators from BMS-Jobs&Growth

EU27 numbers for the year 2020 give an overview of the status of Bioeconomy employment and economic performance, see Table 3 3.

Table 3 Number of persons employed and value added by sector of the bioeconomy (EU-27,)

Sector	**Persons employed** (number)		**Value added** (EUR million)	
	2019	2020	2019	2020
Primary sectors	9,512,540	9,361,640	222,465.8	221,162.1
Food, beverages and tobacco	4,657,283	4,597,963	237,532.6	235,867.5
Bio-based textiles	789,780	723,814	25,649.8	21,408.5
Wood products and furniture	1,340,074	1,327,109	49,393.1	50,669.8
Manufacture of paper	631,711	616,637	48,149.3	45,949.4
Bio-based chemicals, pharmaceuticals, plastics and rubber	493,227	499,525	78,079.0	83,126.8
Production of bioelectricity	34,734	36,717	5,958.6	6,634.6
Total Bioeconomy	17,424,615	17,126,688	661,269.7	658,184.1

Source: Author's own elaboration

3.2 Impact on the results of the implemented changes

Figure 1 shows the results of the main aggregates for the EU27 bioeconomy between 2014 and 2019 using both the old and the current pre-processing method. Although there are some divergences between both datasets, the difference is lower than 0.2% for employment, and ranges between -0.6% and 0.7% for value added. These adjustments do not have significant implications for the analysis of the bioeconomy, as there are no substantial changes in its structure and trends during the last decade.

Figure 1. Comparison of main results from both the old and the new data-processing

EMPLOYMENT

Million persons employed

	2014	2015	2016	2017	2018	2019
Old pre-processing	18.01	17.69	17.39	17.53	17.63	17.42
New pre-processing	18.00	17.67	17.36	17.51	17.59	17.42

Share over total employment

	2014	2015	2016	2017	2018	2019
Old pre-processing	9.17	8.92	8.66	8.59	8.51	8.32
New pre-processing	9.16	8.91	8.64	8.58	8.49	8.32

VALUE ADDED

Billion euro

	2014	2015	2016	2017	2018	2019
Old pre-processing	545.0	555.7	576.0	614.7	642.2	656.7
New pre-processing	541.6	552.7	572.8	611.8	639.2	661.3

Share over GDP

	2014	2015	2016	2017	2018	2019
Old pre-processing	4.63	4.55	4.59	4.70	4.75	4.68
New pre-processing	4.60	4.52	4.56	4.68	4.72	4.72

Source: Author's own elaboration

The integration of additional economic information from national accounts, through auxiliary variables, allows the estimation of missing values in Structural Business Statistics while taking into account trends in the economic environment. As an example, Table 4 shows the value added figures of the Polish chemical sector, both from the original sources (SBS and National Accounts), as well as those resulting from both the old and the new pre-processing method. The comparison among both allows identifying a better adjustment of the latter to the economic trends evinced by National Accounts.

Table 4. Comparison of results between methods for the Polish chemical sector (C20)

Country	Attribute	NACE2	Source	2017	2018	2019	2020
PL	Value Added	C20	Structural Business Statistics	3581.7	3816.5	NA	NA
PL	Value Added	C20	National Accounts	3753.6	3788.8	4063.0	4131.9
PL	Value Added	C20	Results (old pre-processing)	3581.7	3816.5	3816.5	3816.5
PL	Value Added	C20	Results (new pre-processing)	3581.7	3816.5	4147.4	4217.8

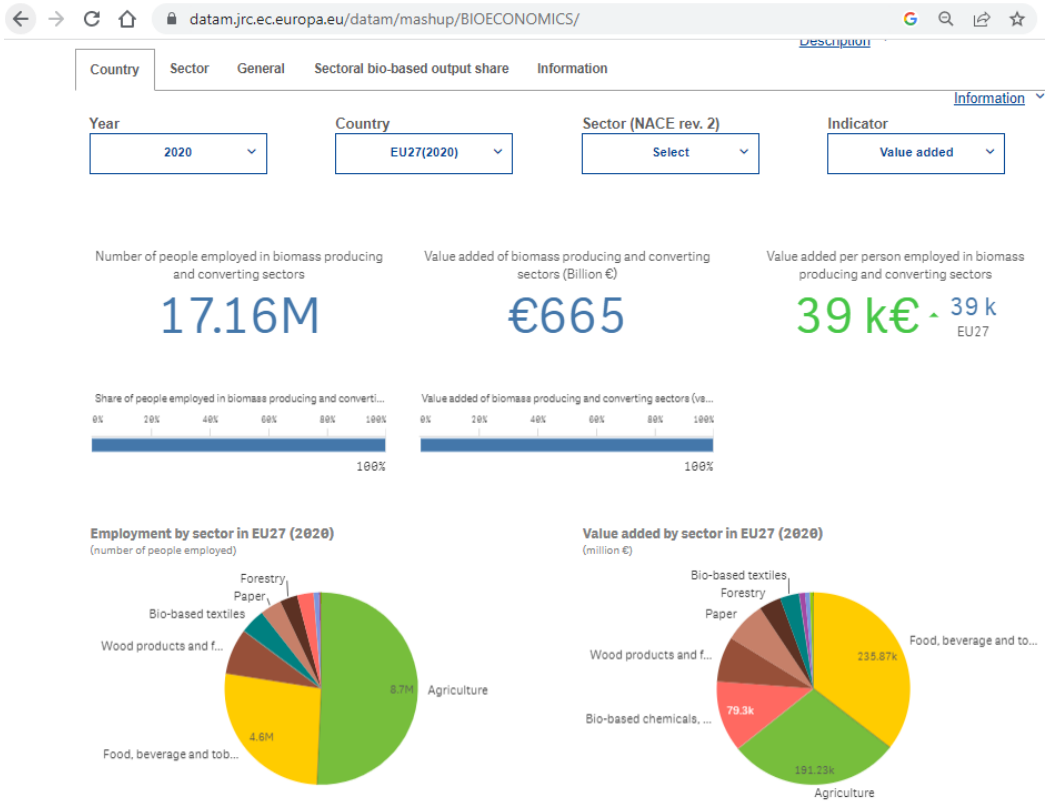
Source: Author's own elaboration

3.3 Update of the web interface of the Data-Modelling platform of resource economics - DataM

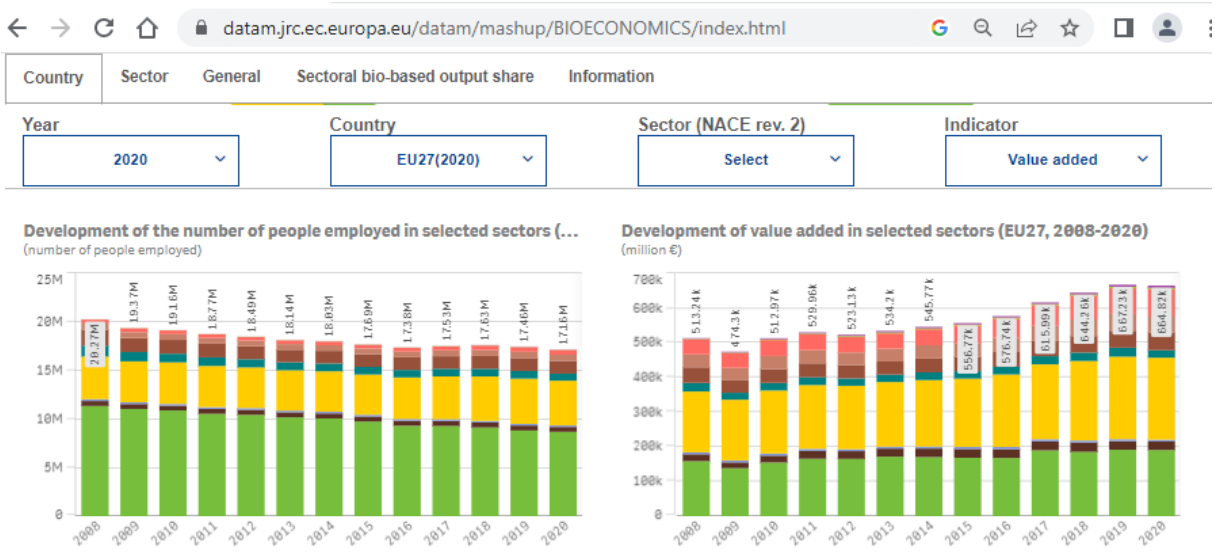
The web interface of the DataM platform has been designed to ease the understanding and the use of BMS-Jobs&Growth data by a non-scientific public. It proposes pre-prepared dynamic figures that the user can customise according to its interest by filtering the country, sector, year or indicator of its choice.

3.3.1 "Country" sheet

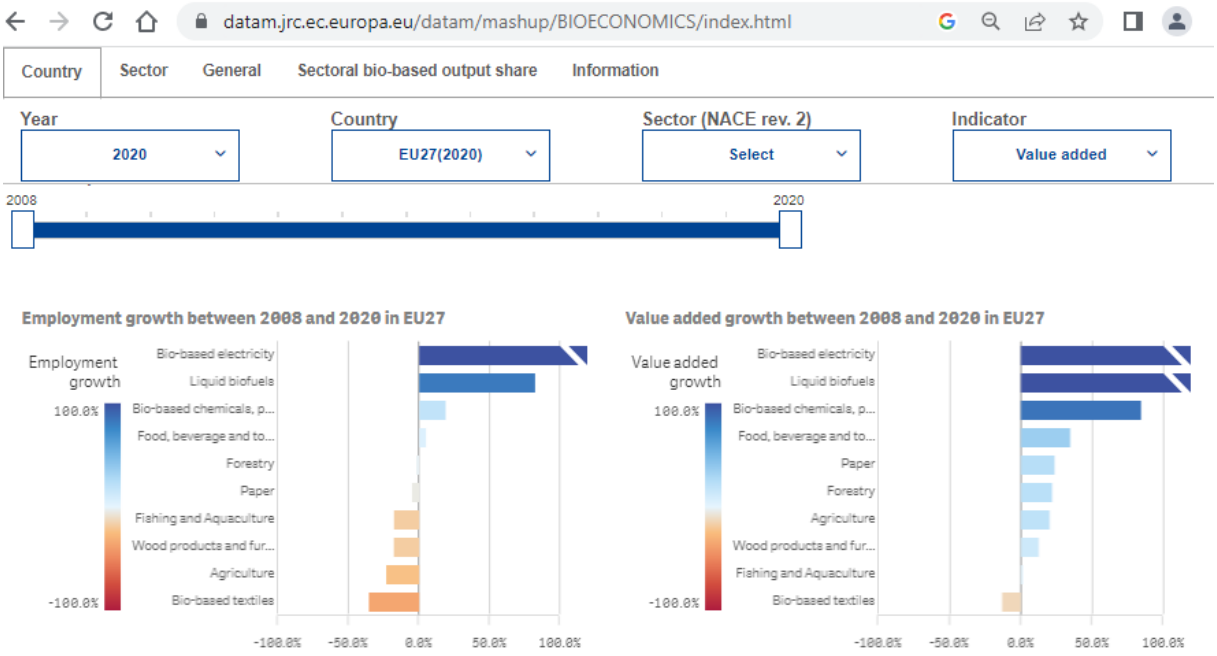
The first page of the web interface, labelled "Country sheet" provides KPIs and a synthetic representation of the Bioeconomy and the sectors it is comprised of through dynamic pie charts.



Then bar charts inform on the evolution of each sectors in terms of employment and value added or turnover over the period 2008-2020.



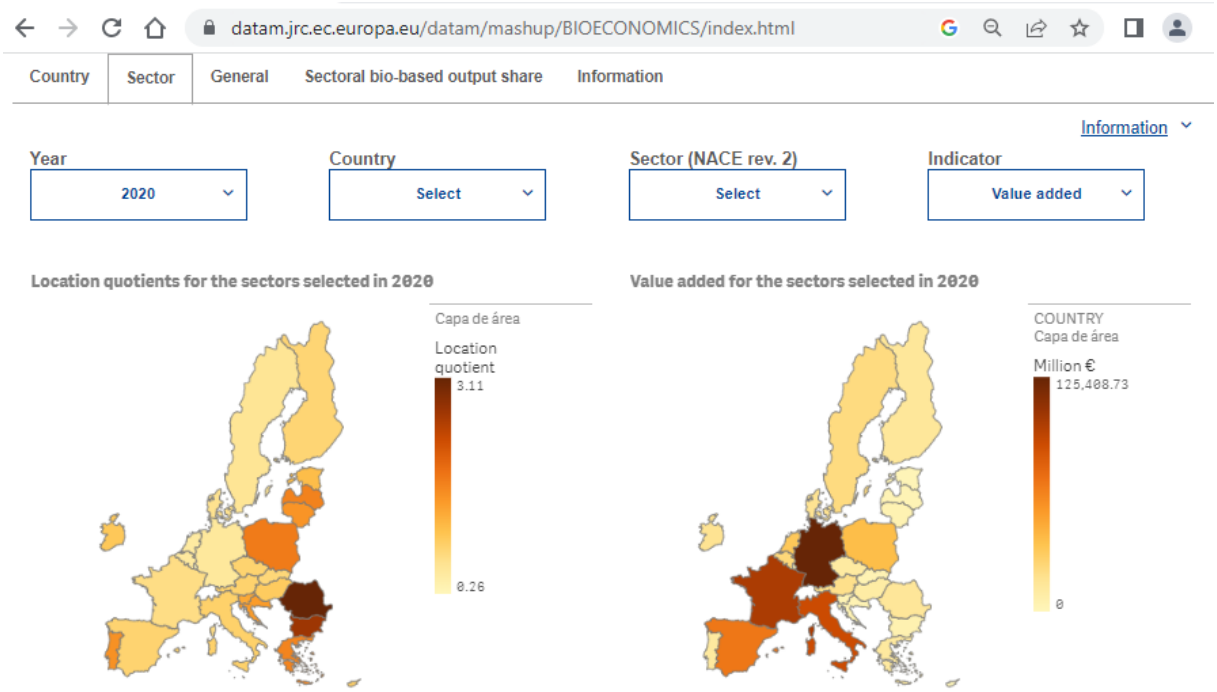
It is complemented by a representation of the growth rates in each bio-based sectors over the period selected by the user (start and end years to be selected on the blue sliding bar above the figures).



3.3.2 "Sector" sheet

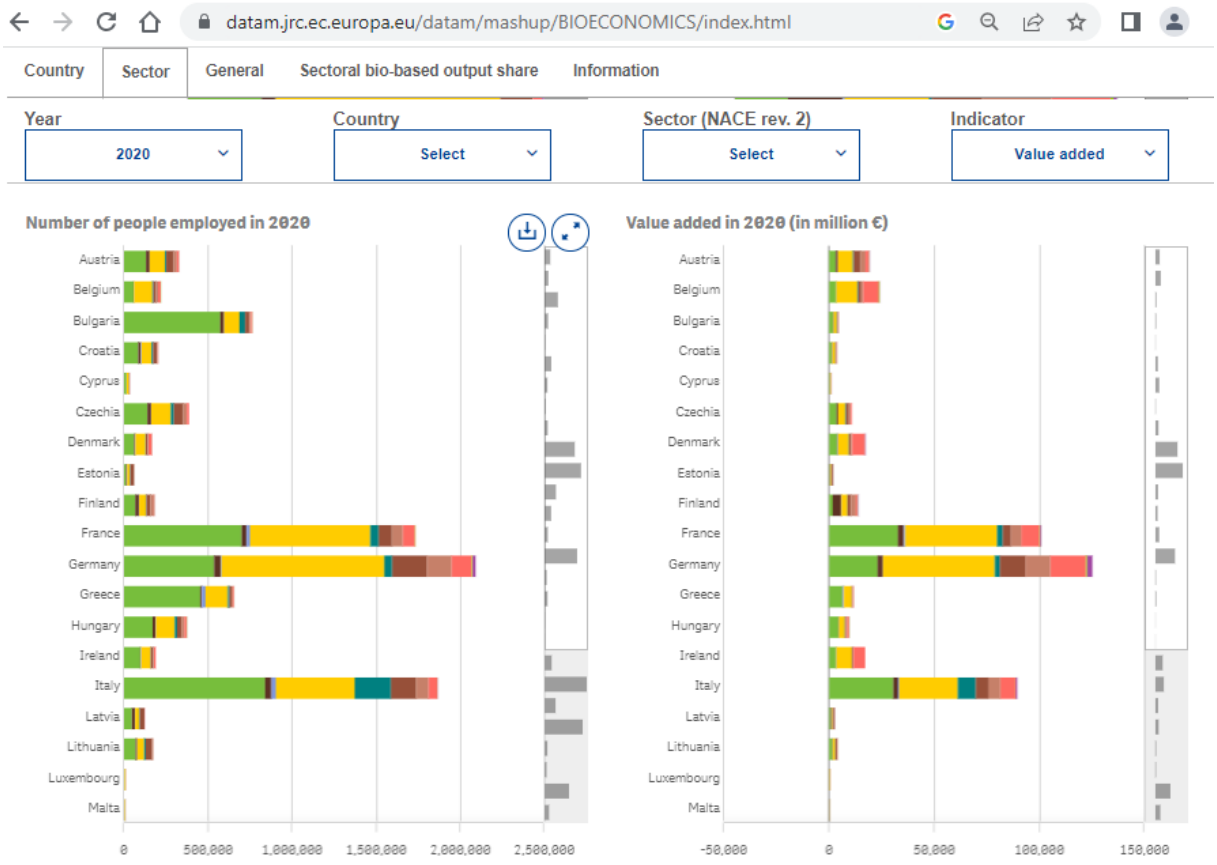
The second page of the web interface, labelled "Sector sheet" emphasizes on the status of a given sector in all EU Member States.

For example, the first two maps illustrate the labour concentration of a given sector (including the Bioeconomy) in the different Member States (map on the left) and the level of value added generated by that sector (map on the right).



Then the percentage contribution of the selected sector(s) to the total Bioeconomy is informed by two bar charts in terms of employment (left side) and value added or turnover (right side).

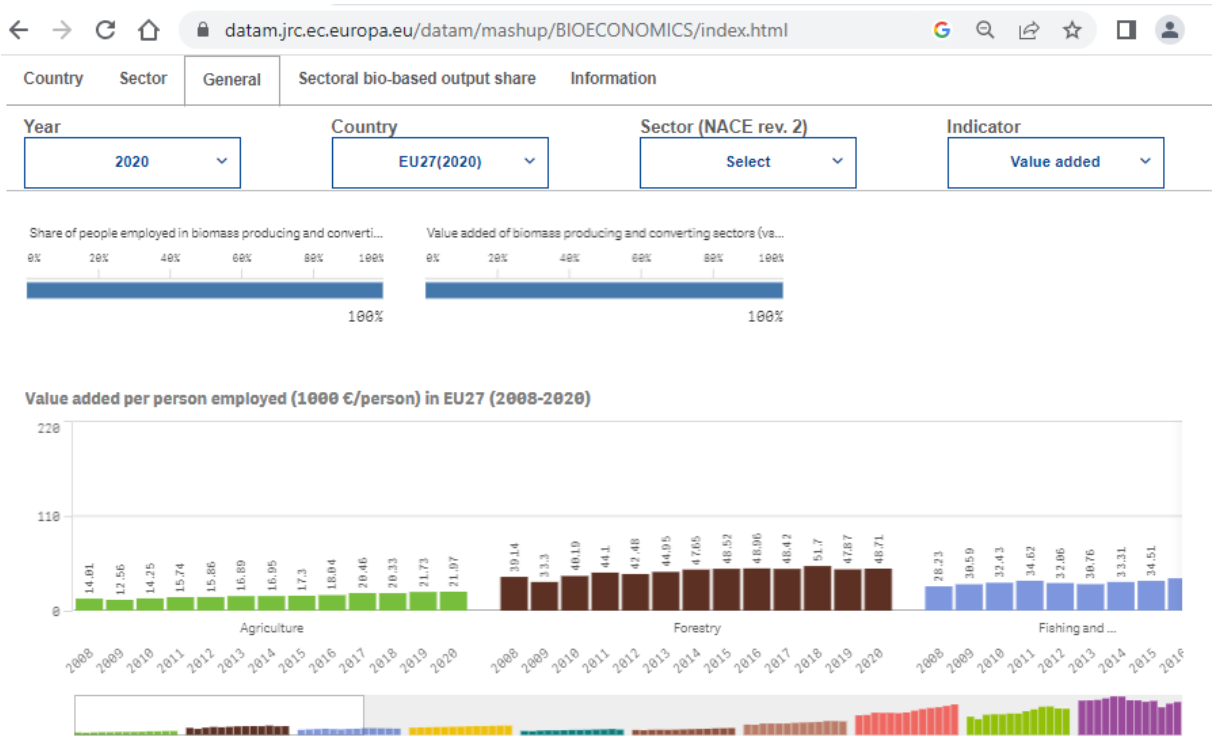
It is complemented by two other bar charts showing their contribution in absolute terms. These charts permit to point to big players for examples (the longer bars).


datam.jrc.ec.europa.eu/datam/mashup/BIOECONOMICS/index.html
Country
Sector
General
Sectoral bio-based output share
Information
Year
2020
Country
Select
Sector (NACE rev. 2)
Select
Indicator
Value added
Number of people employed in 2020
Austria
Belgium
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
0
500,000
1,000,000
1,500,000
2,000,000
2,500,000
Value added in 2020 (in million €)
-50,000
0
50,000
100,000
150,000

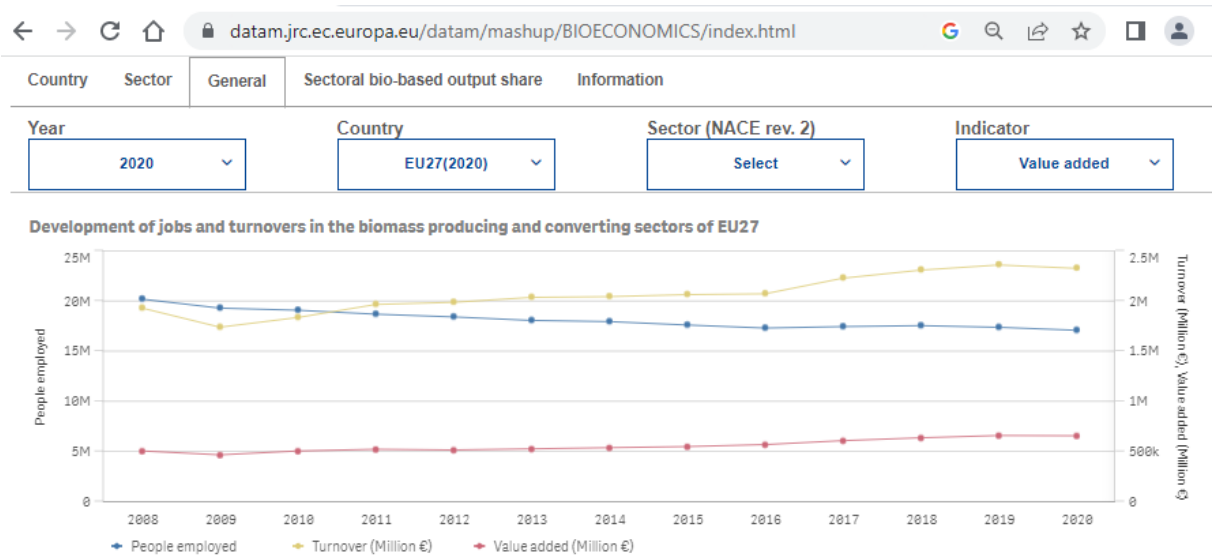
3.3.3 "General" sheet

The "General" sheets combines the three indicators provided.

The first interactive figures shows the apparent labour productivity of the sectors of the Bioeconomy, that is the value added generated by one persons employed in each sector.



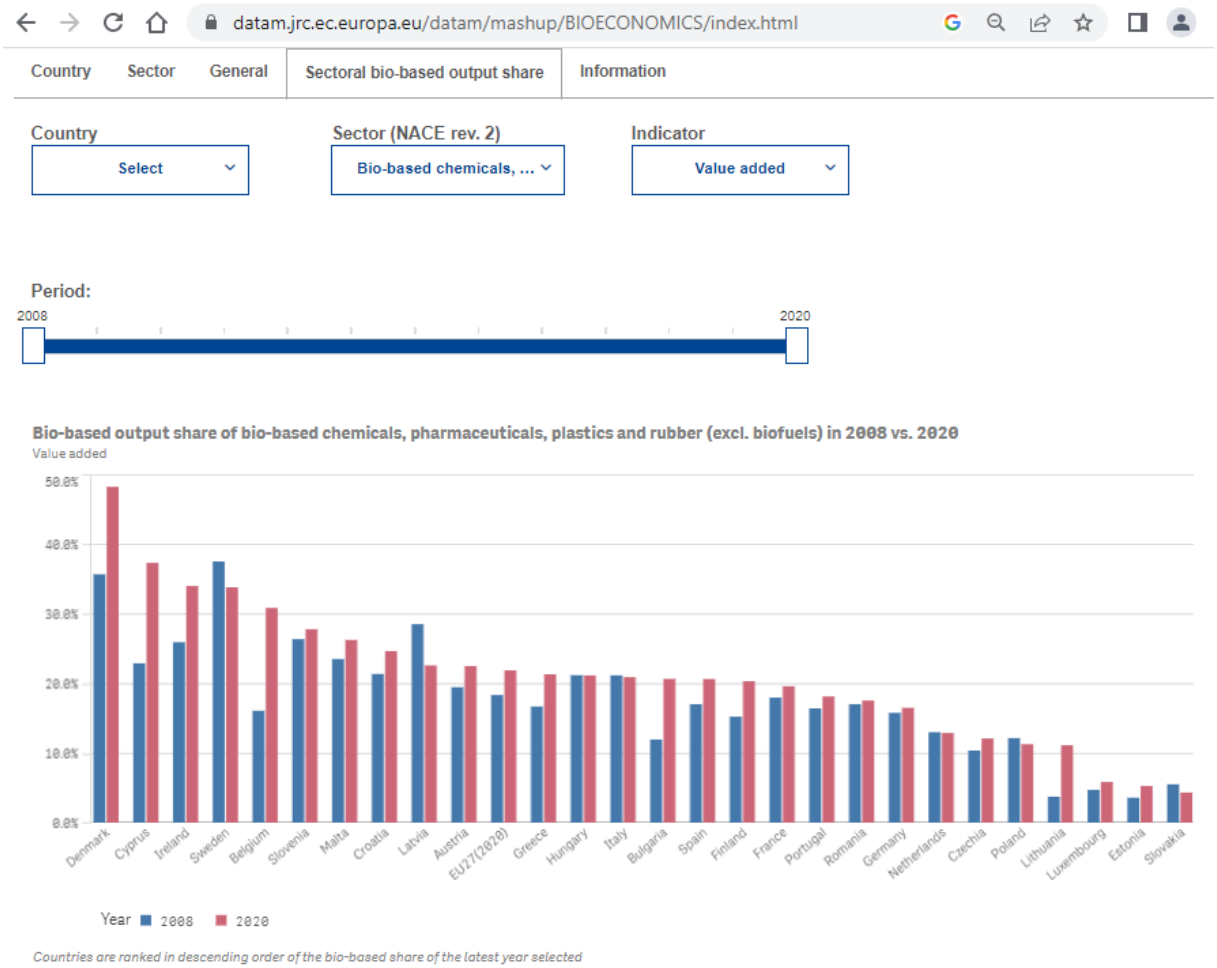
The second graph shows the evolution of the three indicators over the 2008-2019 period.



Finally, tables displays subsets of the BMS-Jobs&Growth dataset per indicator and according to the country or aggregate of country selected (not shown).

3.3.4 The “Sectoral bio-based output shares” page

The “Sectoral bio-based output shares” page allows the user to compare the bio-based share of a given sector across EU Member States and over time (start and end years to be selected on the blue sliding bar above the bar chart).



4 Conclusions

The updated BMS-Jobs&Growth dataset provides a user-friendly and interactive tool at hand to describe and analyse the socioeconomic developments of bioeconomy in the last decade for the EU and its Member States. The new dataset prolongs the data series up to 2020, covering now the time period from 2008 to 2020. Therefore, we finally have some first insights on the impact of the COVID-19 pandemic on the bioeconomy. The number of persons employed in the bioeconomy decreased around -1.7%, from 17.46 million in 2019 to 17.16 million in 2020. By contrast, value added showed a higher degree of resilience, as it decreased only by -0.4% (from 667 billion euro in 2019 to 665 billion in 2020).

The BMS-Jobs&Growth dataset, apart from featuring in the KCB and as headline indicators in EU's Bioeconomy Monitoring System, is providing statistics to different policy documents such as the CAP strategic plans or the communication on the long-term Vision for the EU's Rural Areas (European Commission, 2021). This dataset was also mobilised for the "EU Bioeconomy Strategy Progress Report", a report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions that is under writing.

Further developments are also under investigation. One stream of work is the addition of additional sectors of activities that are considered under the scope of the Bioeconomy in the wide definition of the European Bioeconomy Strategy (European Commission, 2018). So far, methodological improvements have been investigated and peer-reviewed. They yield to satisfactory results regarding the inclusion of the production of bioenergies activities (NACE D), Construction (NACE F) and water and waste treatment (NACE E) (Ronzon, Iost, & Philippidis, 2022a). Another line of research is the bioeconomy services. A methodology was proposed by Ronzon, Iost, & Philippidis, (2022b). Finally, JRC is also working on the estimation of jobs and value added in the bioeconomy at the regional level (NUTS2). A first methodological proposal is provided in Lasarte-López et al. (2022). It is expected that the results from all these work streams will be also publicly available in the future.

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