

# European Bioeconomy in Figures

## Authors

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# 1 Sources and methodology

Eurostat was used as the main source of data for all of the sectors of the bioeconomy shown in the following figures.<sup>1</sup> For those sectors that can be fully attributed to the bioeconomy, the data on turnover and employment was directly obtained from the respective Eurostat datasets. These sectors comprise primary biomass production (**agriculture, forestry and fishery**) as well as the sectors **food, beverages, tobacco, paper and paper products**.

The sectors **textiles and textile products, forest-based industry, chemicals** (including enzymes) and **plastics** as well as **pharmaceuticals** contain only to some extent fully or partly bio-based products. Therefore, the bio-based shares of these sectors need to be estimated and only these estimated shares are accounted for in the pie charts.<sup>2</sup>

The sector forest-based industry includes wood products that are considered to be fully bio-based, but also furniture, which is only partly bio-based (based on wood and/or natural fibres).

The sectors chemicals and plastics and pharmaceuticals include a multitude of fully bio-based (e.g. natural dyes and pigments, enzymes, fatty acids) and partly bio-based products (different chemicals and plastics that are traditionally petro-based but in recent years also partly bio-based).

Both **biodiesel and bioethanol** have dedicated product codes within PRODCOM. Therefore, their shares in the total production values of their respective NACE Classes were calculated and then the assumption was made that the same shares apply to employment and turnover.

In the case of **bioenergy for heat and power** (biogas and solid biomass), their shares in employment and turnover out of total energy production have been estimated by taking into account a higher labour intensity of renewables compared to fossils due to the more complex handling and more decentralised plants.

While there are other data sources available for bioenergy and biofuels (mainly the annual reports of Eurobserv'ER<sup>3</sup>), these sources are not compatible with Eurostat since they include both direct and indirect jobs and there is no clear indication how to separate both. Because of these reasons, those data were not used.

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<sup>1</sup> The Bio-based Industries Consortium (BIC) will update the data annually in cooperation with nova-Institute.

<sup>2</sup> Note that the percentages in the following pie charts do not always add up exactly to 100% due to rounding.

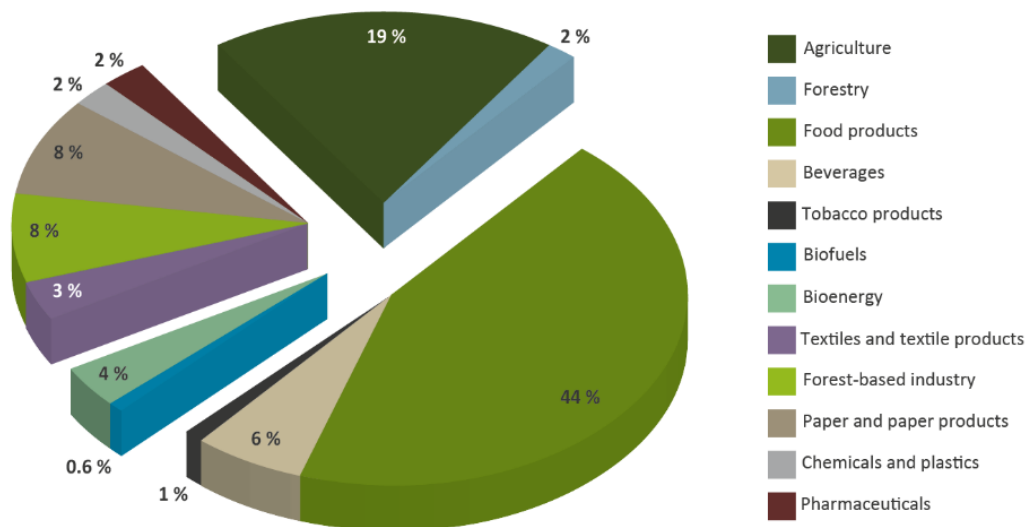
<sup>3</sup> <http://www.eurobserv-er.org>

## 2 Turnover

### 2.1 Turnover in the EU bioeconomy (EU-28, 2013)

The analysis of the Eurostat data of 2013 shows that the turnover of the total bioeconomy (including food<sup>4</sup> and beverages and the primary sectors agriculture and forestry) in the EU-28 results in 2.1 trillion EUR. Roughly half of this is accounted for by the food and beverages sector, almost a quarter of the turnover is created by the primary sectors (agriculture and forestry), while the other quarter is created by the so-called bio-based industries (such as chemicals and plastics, pharmaceuticals, paper and paper products, forest-based industries, textile sector, biofuels and bioenergy).

**Turnover in the EU bioeconomy (EU-28, 2013)**  
Total: 2.1 trillion Euro

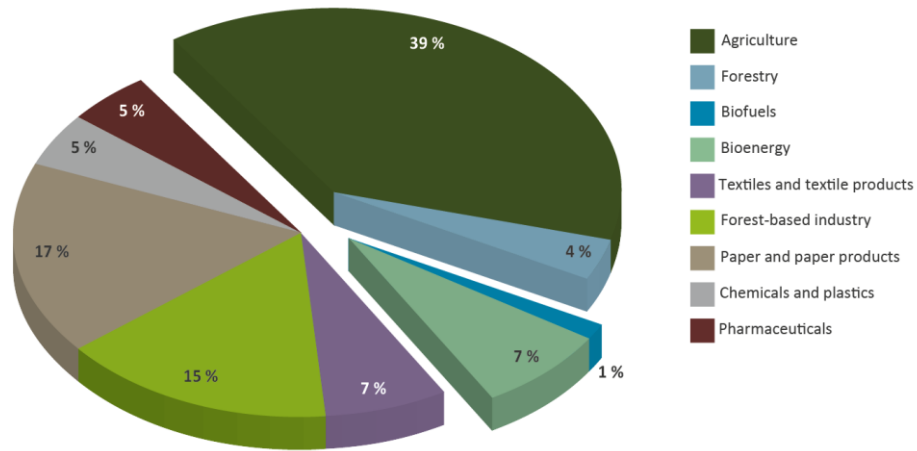


### 2.2 Turnover in the EU bio-based sector (EU-28, 2013)

If we exclude the sectors food, beverages and tobacco products, the analysis shows a total turnover of 1 trillion EUR. 43% come from agriculture and forestry.

<sup>4</sup> Note that this always refers to the NACE Division 10 (Manufacture of food products), which, at least partially, also includes feed products in the form of Group 10.9 (Manufacture of prepared animal feeds).

**Turnover in the EU bio-based economy\* (EU-28, 2013)**  
**Total: 1 trillion Euro**

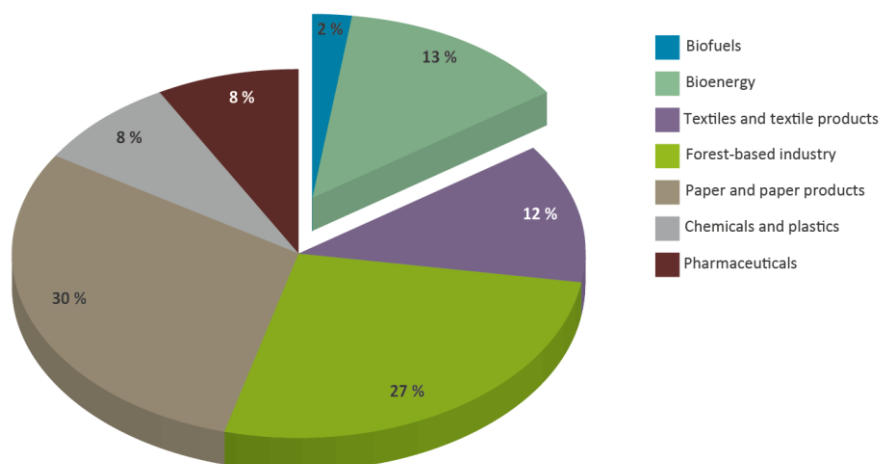


\*excluding Food, Beverages and Tobacco Products

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When also the primary biomass production/extraction is excluded, the analysis shows that biofuels and bioenergy together account for 15% of the turnover of the EU bio-based economy. The largest shares in turnover are made up for by the sectors paper and paper products (30%) and forest-based industry (wood products and furniture) with 27%. The total turnover of the bio-based industries reaches 600 billion EUR in 2013.

**Turnover in the EU bio-based economy\* (EU-28, 2013)**  
**Total: 600 billion Euro**



\*excluding Agriculture, Forestry, Fishery, Food, Beverages and Tobacco Products

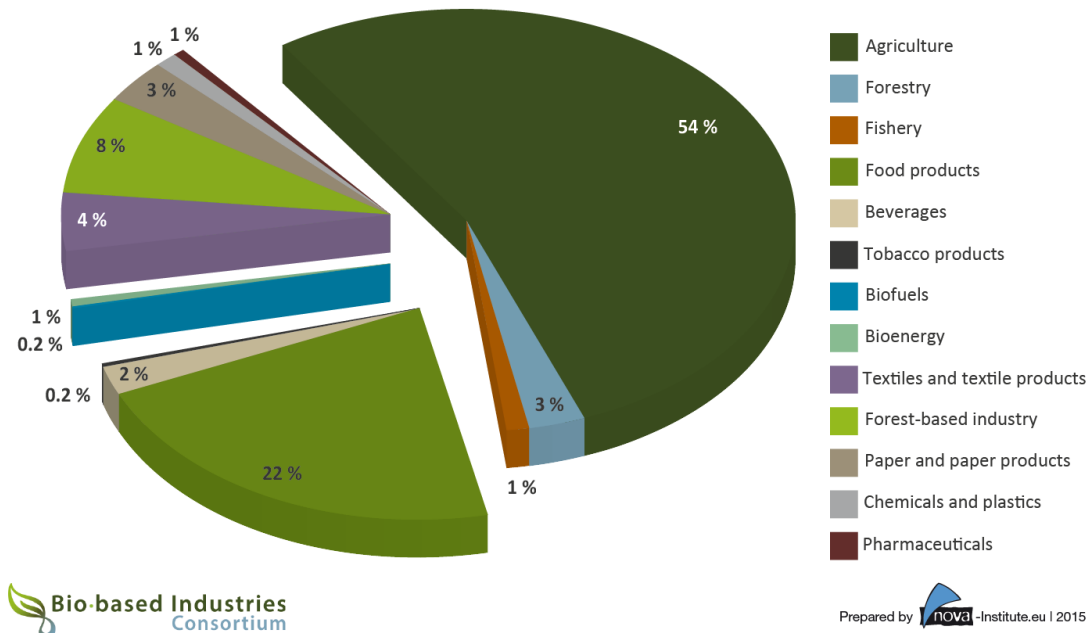
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## 3 Employment

### 3.1 Employment in the EU bioeconomy (EU-28, 2013)

The next chart shows the distribution of total employment in the EU bioeconomy for the same sectors as depicted in the pie chart for total turnover, using the same methodology as before. The comparison of both charts shows clearly that the primary biomass production, mainly agriculture, generates a lot of employment but low turnover.

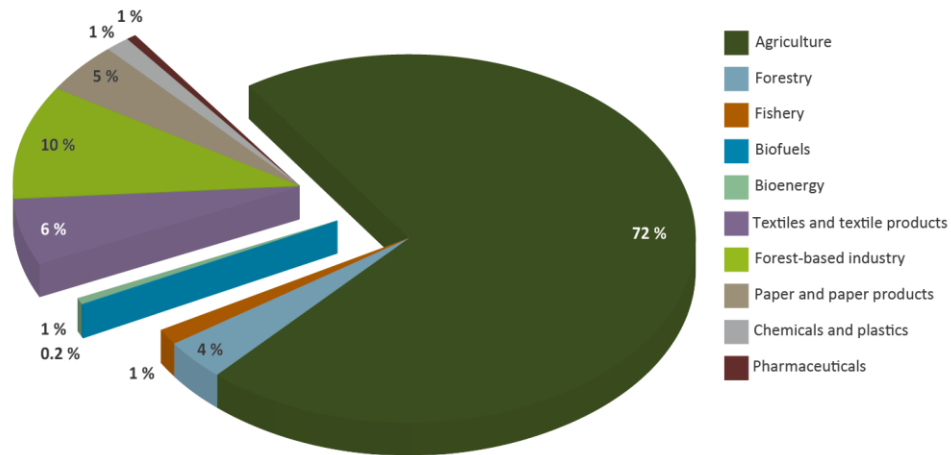
**Employment in the EU bioeconomy (EU-28, 2013)**  
Total: 18.3 million



### 3.2 Employment in the EU bio-based sector (EU-28, 2013)

For the following pie chart, the sectors food, beverages and tobacco products have been excluded. The total employment accounts for 13.8 million jobs with more than three quarters of that in the primary sector.

**Employment in the EU bio-based economy\* (EU-28, 2013)**  
**Total: 13.8 million**

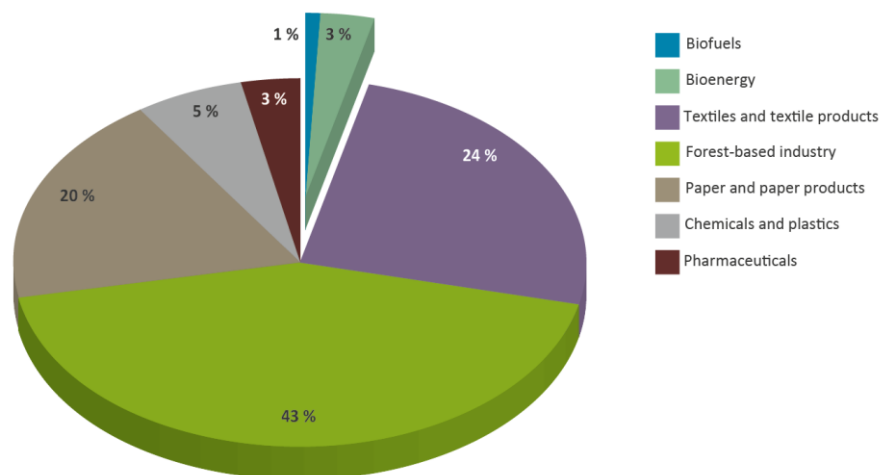


\*excluding Food, Beverages and Tobacco Products

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When focussing the analysis only on the “industrial sectors” (so excluding also the primary biomass production/extraction), the total employment is 3.2 million jobs. The most prominent sectors are the forest-based industry, paper and paper products, and the textile industry.

**Employment in the EU bio-based economy\* (EU-28, 2013)**  
**Total: 3.2 million**



\*excluding Agriculture, Forestry, Fishery, Food, Beverages and Tobacco Products

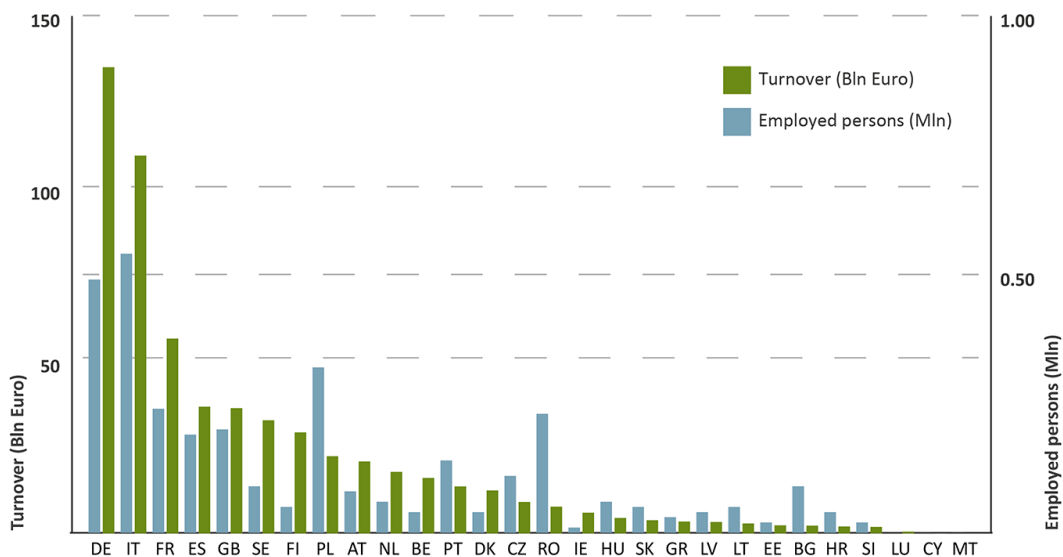
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## 4 Turnover and employment in the EU bio-based economy per Member State (EU-28, 2013)

The following bar chart compares for each Member State of the EU-28 the total turnover and employment of the bio-based economy (excl. agriculture, forestry, fishery, food, beverages and tobacco products). The figure shows clear differences between groups of Member States; e.g. the Eastern European countries Poland, Romania and Bulgaria apparently are stronger in less value added sectors of the bio-based economy that generate a lot of employment.

In comparison, Western and Northern European countries generate much higher turnover compared to the employment generated. The countries with the highest ratio between turnover and employment are Ireland, Finland and Belgium.

Turnover and employment in the EU bio-based economy\*  
(EU-28, 2013)



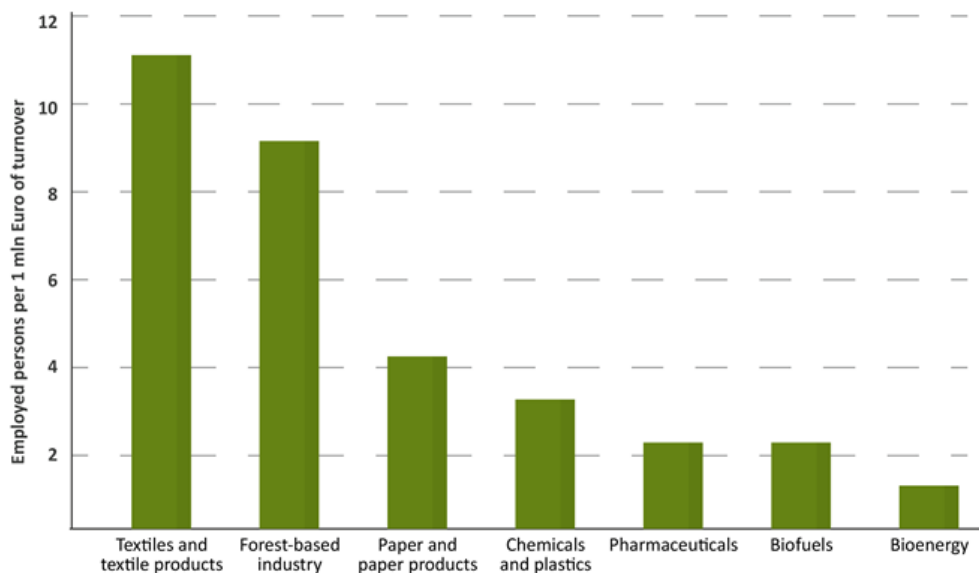
## 5 Employment per turnover in sectors of the bio-based economy (EU-28, 2013)

The next figure compares the number of employed persons per 1 million EUR of generated turnover for the bio-based sectors textiles and textile products, forest-based industry (wood products and furniture), paper and paper products, chemicals and plastics, pharmaceuticals, biofuels and bioenergy.

This analysis shows that bioenergy and biofuels generate relatively little employment compared to their turnover. The differences between the sectors shown in this figure can be well explained. The sectors textiles and textile products as well as forest-based industry are relatively labour intensive sectors with comparably low value added. On the other hand, the production of bioenergy and biofuel products requires relatively little labour (only a few processing steps required) compared to their turnover. Note that employment and turnover here always only refer to the end product manufacturing stage, i.e. neither the employment and turnover in primary biomass production nor indirect effects in other sectors due to machinery purchases etc. are accounted for in any of the industrial sectors.

Chemicals and plastics can be found in an intermediate position. Their production requires more labour than bioenergy (more and more complex processing steps) but also generates more value added than textiles and textile products as well as the forest-based industry.

**Employment per turnover in sectors of the bio-based economy (EU-28, 2013)**





## 6 Bio-based shares in the manufacture of chemicals and chemical products (comparison between 2008 and 2013)

The following figure compares the estimated overall bio-based share in the NACE Division 20 (Chemicals and chemical products) between 2008 and 2013 for the EU-28 as well as for the single Member States. Since it is very difficult to estimate changes in bio-based shares per product between these two years, for each product the same share has been assumed in 2008 as in 2013.

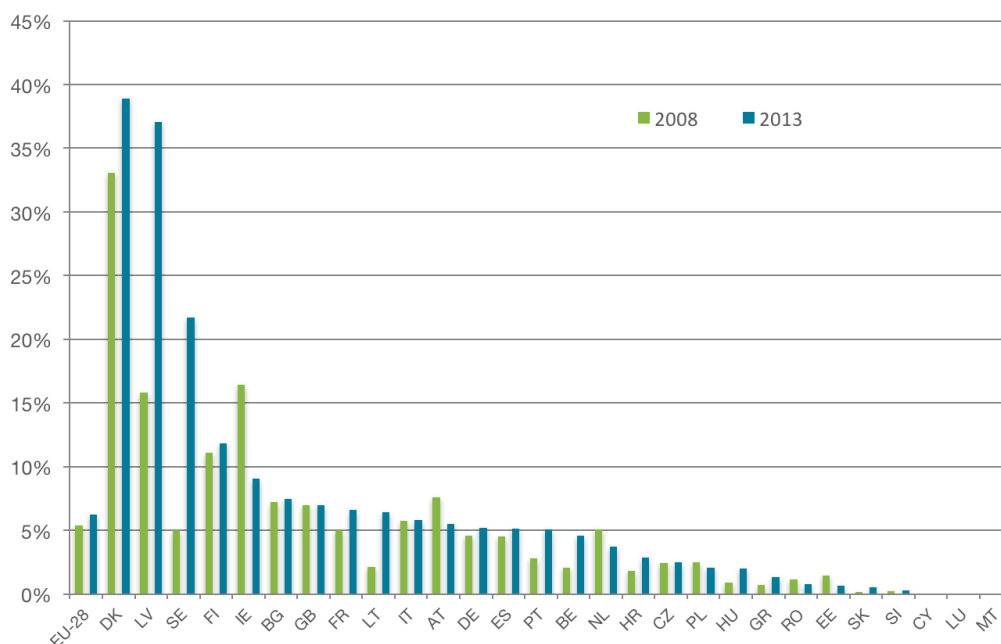
The data show an overall slight increase in the bio-based share in the EU-28 from 5% in 2008 to 6% in 2013. The raw materials used by the chemical industry are about 50% organic (fossil and bio-based) and about 50% inorganic (minerals, metals).

Only taking the organic part into account, the overall bio-based share increased from 10% in 2008 to 12% in 2013.

Denmark stands out as the one Member State with the highest bio-based share in the chemical industry in 2013, which is mainly due to the high production of enzymes. Latvia and Sweden follow primarily due to a large production volume of charcoal and tall oil.

The results, calculated for the first time with this methodology, are in line with different estimations on Member State level.

**Bio-based shares in the manufacture of chemicals and chemical products (NACE code 20)\***



## 7 Investments by the bio-based industries

The last annual survey from beginning of 2015 showed that BIC members are investing more than 2.1 billion EUR in bio-based industries (mainly demo and flagship projects), of which 1.1 billion EUR during 2014 to 2015.

Most of the short-term investments will take place in the lignocellulosic and forestry based value chains, e.g.

- transition of first generation to second generation ethanol production with expansion to chemical building blocks;
- valorisation of side streams from primary production that are extracted for the use as bio-based substitutions of fossil products, including fuel, composites and plastics and the next generation of forest-based value chains e.g.
  - a new production unit for food grade microfibrillar cellulose;
  - specific development programmes for liginosulfonates and specialty cellulose;
  - a new production plant for advanced products – such as new materials and new chemical building blocks – from lignin and cellulose streams of the pulp and paper industry;
  - improved processing and utilization of new raw materials for manufacturing of pulp suitable for textile production.

In the value chain based on agricultural crops, investment will take place in a new industrial scale flagship project making use of cardoon to extract vegetable oils to be further converted into bio-based products (bio-lubricants, cosmetics, bio-plastics).

Table 1 Number of projects and estimated investment for 2014-2015

Value Chain	Number of projects	Estimated total investment for 2014 - 2015 (in Million EUR) Pro rata	Estimated private investment of the member entities for 2014 - 2015 (in Million EUR) Pro rata	Total private investment (in Million EUR)
Lignocellulosic based value chain	11	325 to 330	<b>122 to 127</b>	305
Forestry based value chain	38	725 to 733	<b>679 to 687</b>	1810
Agricultural crops based value chain	3	16 to 17	<b>16 to 17</b>	30
Organic waste based value chain	4	24	<b>8</b>	15
<b>Total</b>	<b>56</b>	<b>1091 to 1105</b>	<b>825 to 839</b>	<b>2160</b>