



Flanders
State of
the Art

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Abstract

September 2016 - Limited update of the 2012 study

DEPARTMENT OF
ECONOMY
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Complete study is available on <http://bit.ly/studyBBI2016> (only Dutch)

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Purpose of the study

In 2012, the Department of Economy, Science and Innovation, the Department of Agriculture and Fisheries and the Department of Environment, Nature and Energy set up an interdepartmental working group for bioeconomy (iWg BE) with the purpose of coordinating coherent cooperation between policy entities and promoting consultation with stakeholder sectors.

Also in 2012, a study¹ was carried out at the request of the Department of Economy, Science and Innovation (“Sustainable use of and value creation from renewable raw materials for bio-based industrial production such as biomaterials and green chemicals in Flanders: Options and recommendations for an integrated economy and innovation policy, in coherence with other policy areas and EU regions”) on the state of play of the bio-based economy (BBE) in Flanders in terms of quality and, wherever possible, in terms of quantity. This study also formulated policy recommendations for stimulating the further transition of the bio-based economy with increased focus on bio-based materials and chemicals, smaller production volumes and higher economic added value, and more employment. The results showed that the bio-based industry in Flanders is still limited, but growing.

In 2013, the iWG developed a Flemish bioeconomy strategy² for a coherent Flemish BE policy with a related action plan. This strategy was also fed by the aforementioned 2012 study.

Meanwhile, the bio-based economy has made considerable progress in Flanders, the EU and all over the world. Its potential to help solve various societal challenges can no longer be denied. Several EU Member States have designed their own strategies or are in the process of doing so. Regional and international partnerships arise in which Flemish actors are playing or willing to play a role. Moreover, most of the results that were gathered in the above-mentioned study date back to 2010.

By updating the available figures this study aims to give a quantitative assessment of today’s bio-based economy in Flanders and to analyse trends, if any. In addition, changes and emphases in the current policy environment (Flemish and EU) as well as regional and international trends are discussed in greater detail.

¹ <https://www.vlaanderen.be/nl/publicaties/detail/duurzaam-gebruik-van-en-waardecreatie-uit-hernieuwbare-grondstoffen-voor-de-biogebaseerde-industrie-productie-zoals-1>

² <http://www.vlaanderen.be/nl/publicaties/detail/bio-economie-in-vlaanderen>

Abstract

Meanwhile, a lot of Member States and Regions have developed a **bioeconomy strategy** or specific activities. These national and regional bioeconomy strategies vary and each have their own specific characteristics. Whereas national strategies focus more on policymaking, financing and, in many cases, innovation, regional strategies mostly concentrate on the development of efficient and sustainable bioeconomy clusters which bring together the different actors and networks within a region, either in a formal context or not. Both at national and regional level, support for research and innovation is a major pillar of policy which is mostly driven by industrial demand and accompanied by a substantial budget.

Regions are characterised by the emergence of numerous **bioeconomy clusters**. Several actors play an important role within a cluster: entrepreneurs play a key role in the management and development of the cluster; policymakers support the development of the bioeconomy with an appropriate policy and financial support; and knowledge institutions contribute scientific expertise and innovation.

Some Member States have appropriated **specific funds** for bioeconomy-related research within the framework of their bioeconomy strategies, whereas only a couple of regions make a specific budget available for funding bioeconomy projects. Some regions support bioeconomy projects as part of a more global initiative, whereas others offer ad hoc support in the context of a European partnership programme, e.g. granting innovation vouchers within the framework of an INTERREG project.

The evolution of **biomass availability** between 2010 and 2013/2015 is presented in the table below as increasing, decreasing, unchanged.

Biomass availability in Flanders: evolution between 2010 and 2013/2015

	Area in Flanders	Imports
Agricultural crops		
<i>Wheat</i>	↘	Fluctuating
<i>Barley</i>	↘	
<i>Corn</i>	↘	↗
<i>Beet</i>	↘	↘
<i>Potatoes</i>	↗	↗
<i>Oil seeds</i>	=	↘
<i>Grasslands and verges</i>	No new data	Not applicable
Animal fats		
Recycled vegetable and animal oils and fats	↗	
Wood waste	↗	↘
Pulp for paper and cardboard		↘

The area for most **agricultural crops** that can be used in a bio-based economy has grown smaller over the past years, with the exception of the area for potatoes. On the other hand, the yield per hectare for the cultivation of several agricultural crops has seen a great deal of progress these past years. This is the case for beet cultivation and potato cultivation.

The most important trend change regarding biomass can be recorded in the area of **wood waste**. Whereas in 2010 a shortage of wood waste for the production of chipboards and energy was still reported, this situation has been reversed to a surplus in 2015-2016. Still, time will have to tell whether this situation is temporary or permanent. Things are moving again in the wood waste market, both home and abroad, to set to work with this surplus.

Due to the lack of data no new figures could be examined in this study with regard to the end application and the distribution of the different biomass streams between nutrition, animal feeds, chemistry, materials and energy. However, a number of biomass streams, like potatoes, were added, because it became clear that potato starch was not only used for nutrition but also for materials and chemistry. That is why it is strongly recommended to collect these data at regular intervals.

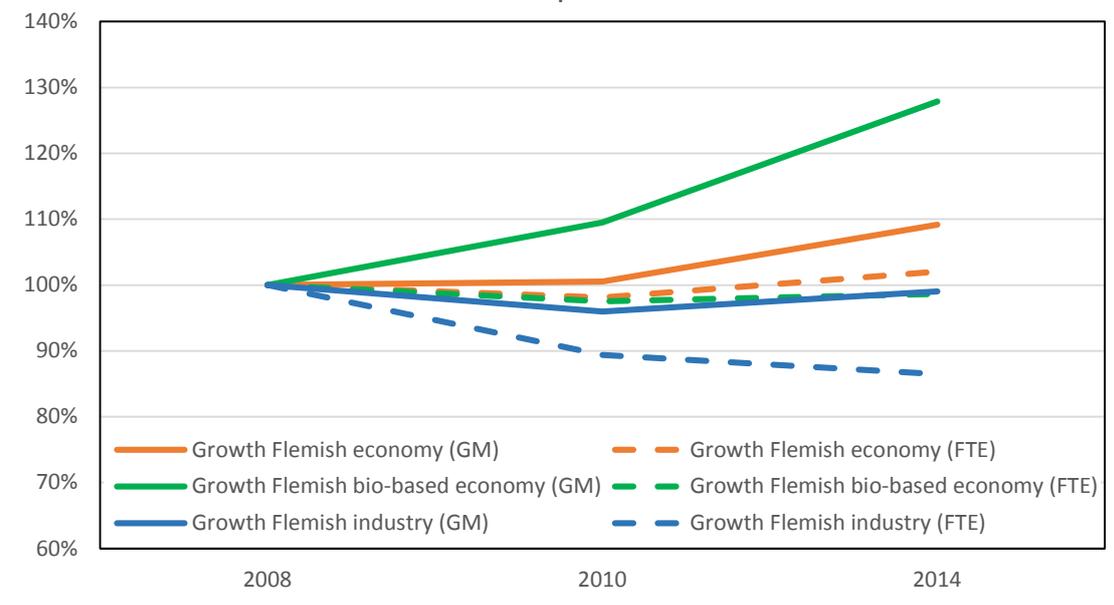
The use of **biomass for energy** (both electricity and heat) peaked for electricity in 2012 and for heat in 2010, but has declined since then. The use of biomass for heat is strongly connected to cold and hot winters and fluctuates with the weather. The decline in biomass use for electricity, on the other hand, is a structural downward trend. A number of large-scale installations which used biomass to generate electricity were decommissioned.

The conclusion from the previous study that Flanders and Belgium continue to depend on imports from abroad for most of their biomass still stands.

However, Flanders has also built substantial expertise in waste collection, sorting and treatment. The high-quality valorisation of these **biomass waste streams** could be a great asset for the future. Using biomass waste for materials is already nicely applied for wood and paper waste. Such applications are still in full development for bio-based chemical products.

In Flanders the **share of the bio-based economy** is estimated at nearly 2% of the gross margin of the Flemish economy and 0.8% of the total employment expressed in full-time equivalents. When comparing these figures with the industry sector alone, this means that 10% of the Flemish industry was bio-based and over 5% of the people employed in the industry were involved in the bio-based economy in 2014. Compared to 2008, the gross margin of the bio-based economy in Flanders increased by 28% in 2014, which is clearly more than the overall increase of 9% in the Flemish gross margin. The Flemish industry retained a status quo position compared to 2008. The employment in the bio-based economy remained the same in comparison to 2008, whereas in the total Flemish economy the number of full-time equivalents rose by 2%. In the Flemish industry, employment fell by 14% compared to 2008. Although clear trends can be discerned, the exact figures must be treated with the necessary caution, given the large significance of the chemical industry within these data and the estimate of the bio-based share within this industry.

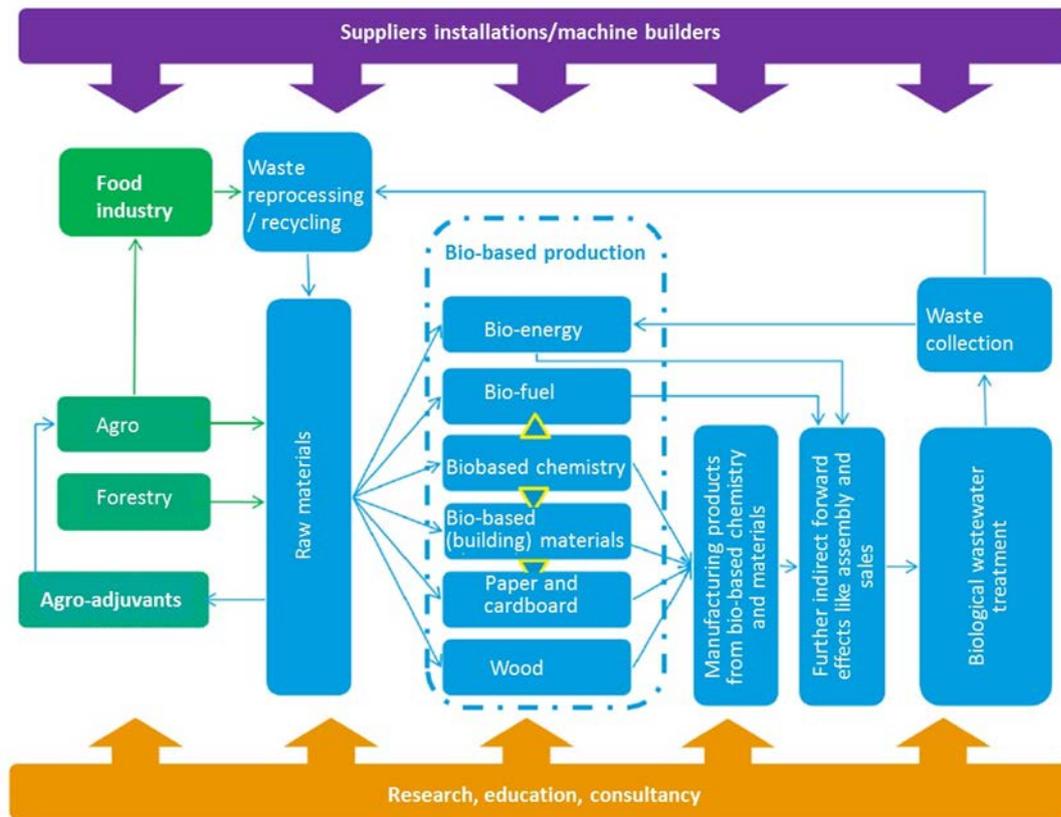
Growth compared to 2008



This study also presented a **simplified calculation**. This calculation is based on the gross margin of the various NACE sectors involved, whereby a bio-based share was each time estimated. With this calculation the gross margin corresponds well with the detailed calculation. In the simplified calculation, on the other hand, employment is estimated considerably higher than in the detailed calculation. It is approximately 30% higher. The simplified method establishes an increase in gross margin of 25% compared to 2014, whereas this amounts to 28% in the detailed calculation. The evolution of employment compared to 2014 decreases by 6%, whereas only a 1% decrease is reported according to the detailed calculation.

Again, the same remark applies as for the previous calculation method: given the great importance of the chemistry sector, the exact figures should be treated with the necessary caution. The big challenge in both the simplified and detailed calculations is to annually adjust the bio-based percentage, since it is precisely the transition that we seek to monitor. This share has now been kept constant over the years for a number of sectors instead of letting it vary. However, this exercise requires additional time and resources, since it will have to be based on a survey.

To assess the **impact of the bio-based economy in related sectors**, a multiplier analysis was carried out on the basis of Flemish input-output tables. Because of the bio-based economy an additional 700 million gross margin and 4,500 full-time jobs are indirectly created. Both directly and indirectly, the bio-based economy accounts for 2.6% of the gross margin and 1.4% of employment in the Flemish economy. A disadvantage of this calculation is that the input-output tables work on the basis of the traditional sector level. A typical element of the bio-based economy is precisely that more raw materials or waste streams are valorised from sectors other than the traditional production, and it can be assumed that multipliers will be generally higher. Therefore, this calculation is an underestimate. Within the bio-based economy, logistics, transport and storage will indeed be needed to a much larger extent than in the traditional sectors. An overview of this chain is given in the figure below.



This study also took a more detailed look at the **importance of two Flemish ports**. Typical of the Port of Antwerp is the strong interconnection of the chemical cluster in which the end product of one company serves as input for the next. It is also apparent that mainly naphtha (originating from crude oil distillation) and natural gas are used as raw materials. The value chain for a chemical cluster such as Antwerp can be used to further explore the biotechnological potential. The basis is most definitely the great potential in terms of bio-based aromatics which holds many opportunities for end users further down in the chain. The Ghent region in its turn offers plenty of opportunities for sugar-based derivatives through fermentation, whereby the sugar originates from starch or sucrose, or from lignocellulose. This is illustrated by the presence of one of Europe's largest clusters for biofuel production.

Flanders has good and active **research institutions** in the field of bio-based economy. Moreover, it has the opportunity to have one of the few European pilot plants on its territory (Bio Base Europe Pilot Plant). However, Flemish businesses invest less in innovation in this field, which clearly shows from the weak participation in European research projects like the BBI JU. Participation is focused on research projects rather than innovation projects. One of the weaknesses is that the industry is not organised as such that it contributes to the contents of the annual calls for proposals at the European level, which of course strongly reduces the chances of success.

Over the past years several **roadmaps** were designed (renewable chemicals, use of by-product streams, the use of micro-algae, and industrial biotechnology). These very clearly map the myriad of opportunities for Flanders and generate large added value for the further development of a competitive and innovative bio-based economy. Four value chains are regarded as promising in Flanders. In the short to medium term, the production of fine chemicals from sugars and starch and possibly other renewable raw materials, and the production and use of second generation

sugars as raw material for industrial biotechnology and green chemistry. And in the medium to long term, the use of lignin-rich raw materials for high-quality materials and chemicals, and the conversion of (waste) gas to chemicals. Flanders also has a regional trump card in terms of waste collection which could play a role in the development of the renewable chemicals sector.

A lot of **policy areas** and policy measures have a direct or indirect impact on the development and competitiveness of the bio-based economy. These policy areas often stem from the European level and are then implemented at the Belgian (federal) or Flemish (regional) level.

These are the most important activities at **European** level:

- In February 2012, the European Commission published a Bioeconomy Strategy and Action Plan. This Plan focuses on three elements: investments in research, innovation and skills; enhancement of markets and competitiveness in the bioeconomy; and reinforced policy interaction and stakeholder engagement.
- The Circular Economy Package (2015) includes sectoral chapters on biomass, bio-based products and food waste. Moreover, the Package proposes a mandatory separate collection of biological waste. Other relevant aspects of the circular economy include sustainable production, biodegradability, and the use of biological waste.
- In 2014, a specific public-private partnership was established for bio-based industries (BBI JU) in the field of research and innovation. The European Commission invests almost EUR 1 billion in R&D projects (including demonstration projects and so-called flagships), and the businesses jointly invest EUR 2.7 billion.
- Europe has imposed on the regions the obligation to prove that they have a smart specialisation strategy as a prerequisite for qualifying for funding from the Cohesion Fund. Some regions have either directly or indirectly included bioeconomy as one of the sectors in their smart specialisation strategy and can subsequently provide financial support to this sector.
- The Investment Plan for Europe of Commission President Juncker, which is aimed at reinforcing the EU economy, was given the green light in 2015. Investments in the bio-based economy can also benefit from this.
- In April 2016, the Working Group Public Procurement of Bio-based Products within the Commission Expert Group for Bio-based Products published a report containing 15 recommendations for an increased uptake of bio-based products in public procurement.

These are the main policy measures at **Flemish** level:

- With the establishment of the Flemish Interdepartmental Working Group (iWG) for bioeconomy in 2012 the Government of Flanders took an initial step towards the development of an integrated, cross-policy area approach to a sustainable and competitive Flemish bioeconomy. In 2013 this resulted in a Vision and Strategy for a Flemish Bioeconomy which was adopted by the Government of Flanders. This vision and strategy were developed in collaboration with various stakeholders.
- A number of initiatives were set up to increase the visibility of the Flemish bio-based industry, both in Flanders and abroad.
- Partly on the initiative of Flanders, the Vanguard Initiative 'New Growth through Smart Specialisation' was launched in November 2013. This is a platform of European regions that want to act as pioneers in the application of smart specialisation as a strategic principle in European innovation and industrial policy to boost new growth through a bottom-up

dynamic from the regions. Meanwhile, 5 pilot projects have been initiated, including 'Bioeconomy – Interregional cooperation on innovative use of non-food biomass'.

- Through a targeted cluster policy the Government of Flanders wants to enhance the knowledge-driven character of the Flemish economy. Specific sectors and clusters will be selected for this which tie in with the strengths of the Flemish industry and knowledge institutions. The Government of Flanders regards the cluster policy as a means to place increased focus on the marketing of innovation.
- In late 2016, the Government of Flanders approved the spearhead cluster for chemistry and plastics as the first of the five new spearhead clusters. The competence centres FISCH and Flanders' Plastic Vision were amalgamated under the name Catalisti. Catalisti brings together around one hundred businesses, institutions (like VITO) and all the Flemish universities. The cluster will, among other things, reflect on the challenges of the future, including global warming and the valorisation of (waste) materials, and examine which role the sector can play in this through joint projects.
- Flanders is working on a policy to promote systems innovation. One of the identified priorities is 'to continue the transition to a circular economy'. In this context it is clearly stated that a sustainable circular economy can only be realised if we also use renewable resources, such as biomass.
- The Government of Flanders has a rich tradition of financially supporting participation in large bio-based projects, like Interreg projects.

These are the **main conclusions** from this study:

- There are numerous industrial clusters at Flemish level (Including FISCH/Catalisti, Flanders Food, Ghent Bioeconomy Valley/FlandersBioBasedValley), but there is **no overarching cooperation** in the field of bio-based economy between the sectors. As a result, a lot of opportunities are wasted, like for instance using waste or by-product streams from the food sector for the production of renewable chemicals. Consequently, the link with Europe is underutilised as well. This is mainly a missed opportunity for our spin-offs and SMEs, since the existing sector-specific clusters that are linked to the bio-based economy focus on Flanders itself.
- Fine applications have already been developed for converting wood waste and paper waste to new materials. However, the **transformation of organic waste to bio-based chemical products** is still in full development. This a major asset for our region.
- One of the weaknesses that also emerges from this study is that Flanders does not frequently collect data on the **use of biomass in non-food sectors** (like chemicals and materials), which makes it difficult to closely monitor relevant trends. That is why it is recommended to regularly collect these data.
- However, compared to other Member States and Regions, Flemish businesses invest less in innovation in this field, which clearly shows from the **weak participation in European programmes** like the BBI JU. Participation is focused on research projects rather than innovation projects. One of the weaknesses is that the Flemish industry is not organised as such that it contributes to the contents of the annual calls for proposals at European level, which of course strongly reduces the chances of success.
- As far as **financing opportunities** are concerned, it is important that Flemish businesses keep closely abreast of the opportunities offered to them by the Investment Plan for Europe (e.g. through the European Investment Bank).
- It is of crucial importance that the bioeconomy or bio-based economy is included as a horizontal theme in the Government of Flanders' policy initiatives in order to implement the **Flemish Action Plan for the Bio-Based Economy**.

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