



Good Practice: Ghent Bioeconomy Valley

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1. Introduction

The BERST project explains the bioeconomy development path of a) BERST regions and b) selected Good Practices. Aim is to provide a practical guide and source of inspiration for other regions that wish to develop their bioeconomy potential. Under this analysis:

- **BERST regions** are structured narratives for development pathways of clusters in different bioeconomy sectors in the regions of partners in the BERST project;
- **Good Practices** are examples of regions that contain one or more successful bioeconomy clusters at the mature production stage.

Especially, Good Practices have been analysed in order to:

- understand how the various key assets interacted and performed during the development stages;
- draw a number of lessons for the development of bioeconomy clusters within their respective regions; and
- provide recommendations to other regions and clusters for each key asset and each bioeconomy sector on which issues they have to take into account in order to establish, develop and successfully operate similar clusters.

1.1 Bioeconomy clusters

The bioeconomy can be described in terms of an economy that ‘encompasses the production of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy. In BERST, a **bioeconomy cluster** is perceived as a geographical concentration of actors in vertical and horizontal relationships aiming to develop the bioeconomy. Bioeconomy clusters have been categorised to allow comparison and better understand synergies and interactions of the various elements involved in the formation of bioregions. BERST recognises eight bioeconomy sectors, namely:

- primary biomass;
- food and feed;
- construction;
- chemicals and polymers;
- pulp and paper;
- textile and clothing;
- energy;
- R&D biotechnology.

Given the broad coverage of sectors within the bioeconomy, bioeconomy clusters might be rather heterogeneous in their specific focus. The development and marketing of bioeconomy products does not differ from other products: the challenge is to introduce competitive bioeconomy products that can be sold in profitable quantities on the basis of its price, quality, and service combination preferred by buyers over that offered by competing products. This implies that in the analysis of the development of the bioeconomy clusters the same three factors play a role as in the case of clusters aiming at the introduction and marketing of televisions or cars: input-output linkages among firms, social capital and institutional thickness.

1.2 Key assets and development paths of bioeconomy clusters

The input-output linkages among firms, social capital and institutional thickness in the cluster are all embodied by actors with varying properties. In the analysis of the development path of a bioeconomy cluster, we assume that the actors of the region, in which the cluster is located, apply a strategy to develop the bioeconomy by transforming biomass into competitive bioeconomy products. Such a transformation process takes time. Hence, our analysis is guided by two starting points:

1. a focus on five key assets of a bioeconomy cluster, as outlined in our conceptual model for the analysis of the strategy of a bioeconomy cluster (Fig. 1). These are:
 - a. **entrepreneurs**: the presence of an entrepreneurial culture with active, innovative, flexible and risk taking entrepreneurs plays a pivotal role in driving clusters towards successful development;

- b. **policymakers:** political leaders who are willing to support the development of the bioeconomy by providing governance, institutional structures and financial support;
 - c. **knowledge institutes:** organizations that provide the technical knowhow and innovation for the development of bioeconomy products;
 - d. **availability of biomass resources:** a continuous supply of biomass resources of constant quality is critical for the development of bioeconomy products;
 - e. **competitive bioeconomy products:** commercially viable products, such as chemicals, medicines, food, bioplastics, transport fuels, electricity and heat.
2. a long run time horizon of a bioeconomy cluster, with 3 phases (Fig. 2):
- a. **initial stage and take off:** the bioeconomy is introduced in the regional planning agenda and the policy, socio-economic and R&D landscape for its establishment and operation is created;
 - b. **drive to maturity:** the first competitive bioeconomy products are sold at the market. The cluster grows with the setup of new companies, cluster infrastructure (with incubator, training centre etc.) has been established, and the cluster is able to attract both private and public funding
 - c. **age of mature production:** the cluster is able to produce competitive bioeconomy products at an extensive scale.

The exact duration of each of these phases differs from cluster to cluster; according to estimates of PwC (2011) the duration of the initial stage and take off is about 5 years, that of the drive to maturity 5-10 years, and that of the age of mature production 10-20 years.

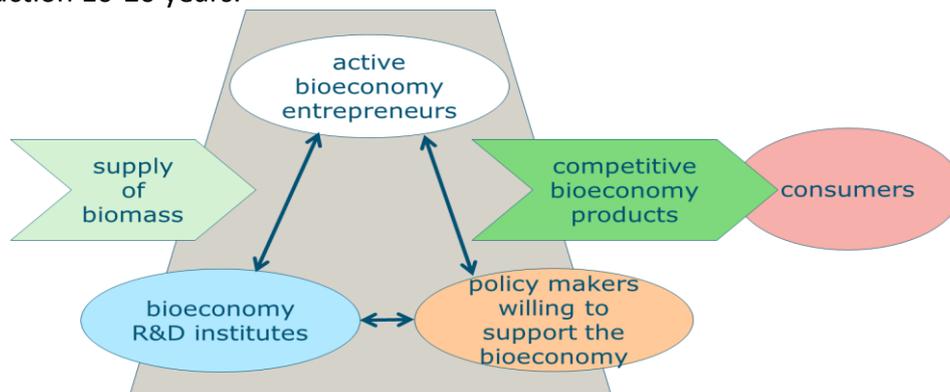


Figure 1 Conceptual model for the analysis of the strategy of a bioeconomy cluster

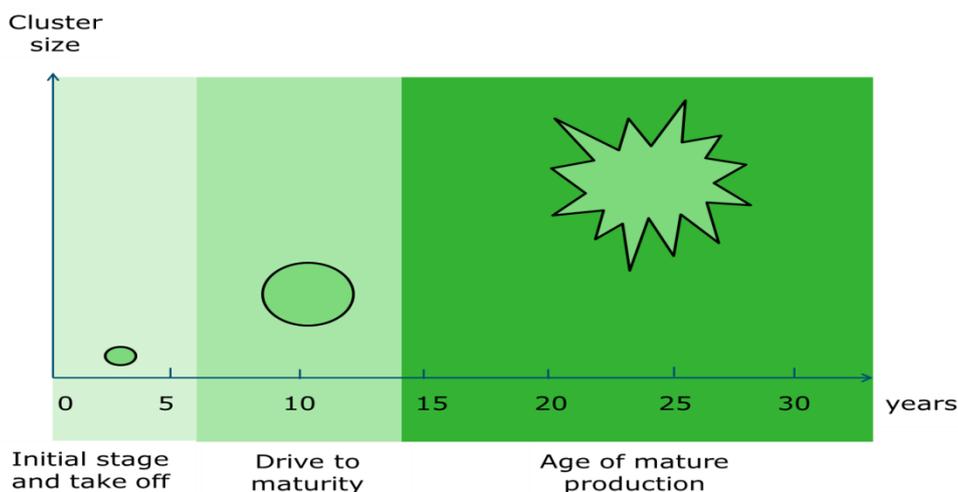


Figure 2 The development path of a bioeconomy cluster

1.3 Bioeconomy clusters in BERST project

The bioeconomy clusters that are analysed in BERST are distinguished in ‘Good Practices’, i.e. bioeconomy clusters within the age of mature production, and ‘BERST regions’, i.e. bioeconomy clusters in the regions of partners in the BERST project (Table 1).

Table 1 Studied bioeconomy clusters in BERST

<i>Good Practices</i>	<i>BERST regions</i>
Ghent (Belgium)	Central Finland (Finland)
North Rhine Westfalia (Germany)	Straubing (Germany)
Toulouse (France)	Biobase Westland (Netherlands)
Manchester (UK)	Biobased Delta (Netherlands)
	Madrid region (Spain)
	Western Macedonia (Greece)
	Slovenia

The bioeconomy clusters in the BERST regions are in varying stages of development, and some of them can also be regarded as Good Practices (Central Finland, lower Bavaria, Biobase Westland and Biobased Delta). Statistical data, literature and interviews with key actors have been used to collect information on the functioning of each bioeconomy cluster. The analyses of the bioeconomy clusters of the Good Practices have provided a number of key findings on the interaction of actors in the cluster. Subsequently, in the analysis of the BERST regions it has been explored to which extent the key findings of the Good Practices also apply for these bioeconomy clusters and which barriers they face in developing the bioeconomy cluster. The analysis in BERST focuses primarily on the Good Practice mature bioeconomy sectors within the study countries, but as the clusters encompass more than one sector, the performance and interactions of key assets is expected to influence them as well.

2. Ghent Bioeconomy Valley

With kind contribution from Prof. Wim Soetaert

2.1 The region and the cluster

The region

East Flanders is a province of Flanders, one of the three regions of Belgium. It borders Zeelandic Flanders (the Netherlands) and the Belgian provinces of Antwerp, Flemish Brabant (both in Flanders), Hainaut (Wallonia) and West Flanders (Flanders). It has an area of 2,991 km² which is divided into six administrative districts containing 65 municipalities. The provincial population is 1,408,484 and the capital is Ghent.



Figure 1 Map of East Flanders¹

The region of East Flanders has a good geopolitical location and the location and infrastructure (industrial zone and Port of Ghent) and the awareness and commitment of the local authorities have all been strong assets for the development and successful operation of the cluster.

The cluster

Ghent Bioeconomy Valley (GBEV) has operated since 2005 and is in stage of mature production. Both the initial and the drive to maturity stages lasted on average three years, which is short compared to other clusters analysed in this work. There are currently several companies which produce biofuels and bioenergy at large scale but they still maintain all the functions from the initial stage such networking, incubators etc.

The cluster was founded through the initiative of Prof Wim Soetaert as a Public Private Partnership between Ghent University, the City of Ghent, the Port of Ghent, the Development Agency East-Flanders and a number of industrial companies

¹ http://en.wikipedia.org/wiki/East_Flanders#/media/File:Provincie_Oost-Vlaanderen_in_Belgium.svg

related to the Ghent region, active in the fields of generation, distribution, storage and use of bio-energy.

The driving force for the establishment of GBEV was mainly of a political nature. By joining forces, companies were hoping to maximise their production quota for biofuels from the Belgian government. In addition, the partnership was intended to help them to tackle common problems related to production, feedstock and infrastructure. Finally, GBEV also provided a platform to inform the general public about new products and technologies.

GBEV finally succeeded in acquiring 80% of the Flemish quota for biofuels in October 2006, representing an investment of €120m in the port of Ghent. Production at Bioro and Alco Bio Fuel started in the spring of 2008.

In 2008, GBEV obtained a legal identity becoming a non-profit organization, supporting all biobased activities, including bioenergy. GBEV activities include collaborative programmes, joint initiatives and synergy creation between the partners in the fields of Research & Development, structural measures and policy, logistics and communication towards the general public.

2.2 Performance of key assets during the development pathway of the cluster

Ghent Bioeconomy Valley is a Good Practice for the energy (bioenergy, biofuels) sector.

Table 1 Cluster performance in the under study key assets

Key asset	Energy		
	IS	DMS	MS
Cluster Organisation	High	High	High
Actors			
Entrepreneurs	Low	Low	Low
Large industrial actors	High	High	High
Policy makers	High	High	High
Knowledge institutes	High	High	High
Biomass supply	High	High	High
Competitive bioeconomy product	Low	Moderate	High
Funding	Moderate	Moderate	High
Policies and measures	High	High	High

Low

Moderate

High

Table 1 presents the performance of the various bioeconomy sectors which are present in the cluster across the key assets, during the initial (IS), the drive to maturity stage (DMS) and the mature stage (MS), based on the results from the

questionnaire survey. Details on how the individual key assets performed across the two development stages are provided in the following sections alongside with barriers and enabling factors which have framed their progress. Traffic light colour coding illustrates the strength and performance of each key asset during development stages and how this has impacted in the progress of the cluster’s activities. The ranking of the traffic light coding reflects the replies given by the interviewed stakeholders from the cluster.

Biocluster organization

The cluster organisation was strong from the beginning, with the leadership being experienced both in academic and industrial research.

Table 2 Cluster performance in biocluster organisation

Issue	Energy		
	IS	DMS	MS
<i>Central organisation that coordinates, manages, and facilitates the biocluster</i>			
<i>Role of key actors</i>			
• <i>Entrepreneurs</i>			
• <i>Big industrial actors</i>			
• <i>Policy</i>			
• <i>RTD</i>			
<i>Funding</i>			

Table 2 indicates how central organisation and key actors performed an important role as the cluster moved through the development stages. It is evident that GBEV had highly efficient central organisation with the active participation of big industrial actors, policy and knowledge providers. The only category that the cluster ranks low in all development stages is entrepreneurs who - mainly due to the nature and scale of production - have not been active in the cluster.

Barriers

- Lack of secure funding for cluster management prohibits the full time employment of personnel in developing the cluster’s activities, as they also have to secure funding from other sources.

Enabling factors

- Strong commitment of individuals that lead the cluster organisation, typically without being directly employed by GBEV.
- Consistent participation of large industrial actors and good cross sector collaboration on projects among primary and end use sectors.

- Good cooperation between the cluster management and frequent information exchange between knowledge institutes and business support/cluster management.
- Strong and consistent political commitment towards the development of all aspects of the cluster.

Actors

The cluster is a joint initiative of Ghent University, the City of Ghent, the Port of Ghent, the Development Agency East-Flanders and a number of industrial companies related to the Ghent region that are active in the fields of generation, distribution, storage and use of biobased products and bio-energy. As noted above, entrepreneurs have not participated in the cluster.

Table 3 Cluster performance in actors involved

Issue	Energy		
	IS	DMS	MS
<i>Entrepreneurs activity</i>			
<i>Interaction of entrepreneurs with RTD</i>			
<i>Geopolitical position of the region</i>			

The geopolitical position of the region is favourable. The region has good infrastructure and industrial networks as well as a major port which is a key asset for both the provision of imported raw materials and export of products.

Entrepreneurs

The cluster members are mostly big and small companies, mainly due to the fact that its core activities were built around large production facilities. So far the cluster has not been very effective in stimulating entrepreneurs or start-up companies. However, this is likely to come in the future, once the pilot plant is at mature stage.

Policy makers

Regional and local politicians have mainly a representative role but individuals are also members of the supervisory board, so they influence financing, representative, and strategic activities and are thus major actors.

R&D institutes

The focal R&D institute is the University of Ghent but the cluster also collaborates with several universities and research institutes across Europe.

Barriers

- Lacking active participation by entrepreneurs in cluster activities due to strong focus on big industrial actors for energy and fuels
- Slow development of start-up companies as the activities are developed within large industries.

Enabling factors

- Strong collaboration with industry, R&D and regional partners in several EU funded projects
- Ghent is a very attractive region for establishment of new companies as one of the large ports of northern Europe

Biomass supply

Since the cluster is established within close proximity to the Port of Ghent biomass supply options are various including both indigenous and imports making use of the strong infrastructures.

Table 4 Cluster performance in biomass supply

Issue	Energy		
	IS	DMS	MS
<i>Biomass availability</i>			
<i>Indigenous supply</i>			
<i>Biomass trade</i>			

Barriers

- Both primary and secondary biomass types already have several end uses which creates raw material competition for potential new bioeconomy applications and high prices.

Enabling factors

- Port of Ghent facilitates the flow of biomass imports while the well-developed road and rail infrastructures facilitate the provision of locally produced raw materials.

Competitive bioeconomy products

The key bioeconomy products are bioenergy and biodiesel (totalling 500,000 tonnes per year). Most of the activities of the cluster have focused on developing these products and cross over between sectors have been low during the initial stage and limited in the drive to maturity one. The interactions with the chemicals & polymers and textiles have started only at the mature production stage and innovation became high at that point.

Table 5 Cluster performance in competitive bioeconomy products

Issue	Energy		
	IS	DMS	MS
<i>Innovation of bioeconomy products</i>			
<i>Cross over/ Transfer between sectors</i>			
<i>Degree of innovation</i>			

Barriers

- Variability of bio-based market sectors increases the complexity for cross over technological transfers, scaling up of new conversion pathways.
- Commercialisation of new bio-based products is a slow process which requires secure policy and financing conditions to minimise the investment risk

Enabling factors

- Consistent and continuous transfer of knowledge and strong collaboration between R&D and big industrial actors within the biofuels and energy sectors
- Significant cross-overs and synergies in the product development under the guidance or leadership of GBEV.

Funding

Throughout its operation, GBEV benefited from both public and private funds. At the initial stage there was no public funding; companies paid a modest fee which supported the start-up of the cluster. The initial stage was based heavily on efforts and strong personal commitment from Prof Soertart and his immediate collaborators.

At a later stage, GBEV applied successfully for competitive, project-based research funds, and during recent years turnover has been approximately €1m per year.

Table 6 Cluster performance in funding

Issue	Energy		
	IS	DMS	MS
<i>Public funds</i>			
<i>Accessibility of funds / Procedures</i>			
<i>Private funds</i>			

Barriers

- Lack of consistent public funds financing for the long term operation of the cluster management.

Enabling factors

- EU funding for large demonstration facilities in project contexts.

- Proximity of the cluster to large industrial facilities with interest in biofuels facilitated joint activities and respective funding.

Policies and measures

The most helpful policy drive for GBEV has been the EU target for liquid biofuels and the implementation of the Renewable Energy Directive. As a consequence, two biodiesel companies have been established and grown. Moreover, this success attracted attention and support from government and public funds.

Table 7 Cluster performance in policies and measures

Issue	Energy		
	IS	DMS	MS
<i>Presence of policy instruments</i>			
<i>Effectiveness of policy instruments</i>			
<i>Consistency of policy</i>			
<i>Monitoring procedures</i>			

Barriers

- Adoption of EU legislation at local and regional levels required long term and consistent efforts from the cluster management.

Enabling factors

- Strong political drive from EU has been successfully adopted by the regional government.

2.3 Difficulties, Opportunities and Lessons Learned

Difficulties and opportunities during the initial and drive to maturity stages

The most important difficulty has been to raise awareness among the stakeholders in industry and policy and convince them to join efforts and intensify activities. This was mostly due to lack of technical knowledge, access to information, lack of trust in academic research outputs and credibility.

The major opportunity was to take advantage of the favourable legislation for biofuels at EU level, combine existing capacities and enable the development of large scale biodiesel plants.

Lessons learned

In this section a set of specific learning points have been collected based on the interviews with stakeholders in the Good Practice clusters / regions. The learning

points are linked to the key assets, the development stages and the respective bioeconomy sectors.

Table 8 provides specific learning points learnt from the development of the biocluster in Ghent per key asset, development stage and bioeconomy sector.

Table 8 Specific learning points from the Ghent Bioeconomy Valley cluster

Specific lessons per key asset	Stage related to	Specific lessons
Organisation	Initial	Establish an effective governance structure including a board or committee from the very beginning
Actors	Drive to maturity	Develop a broad network with other institutions from the relevant field as well as with other clusters, both within the country as well as cross-boundary, as this will provide access to latest information as well as a platform for dissemination and promotion of cluster members' activities.
Biomass Supply	Initial	Inform and promote the "collaborative spirit" to biomass producers in order to establish trust between production and demand site.
Products	Drive to maturity	Facilitate open innovation processes between the different sectors; strengthen biorefinery concept and application.
	Maturity	
Funding	Drive to maturity	Ensure political commitment also for the drive to maturity phase that could involve building of industrial production sites and the like which need public acceptance and political will and support.
Policies	Drive to maturity	Ensure business commitment, both from SMEs as well as from big companies.
	Maturity	

2.4 References

<http://www.gbev.org/en>

http://www.easyfairs.com/fileadmin/groups/6/INDUSTRIE%20MILIEU_BE_2010/learnShops/woensdag/LSP_Hal1_Woe_Ghent_BioEnergyValley.pdf

