



# Bioeconomy regions in Europe

November 2017



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## Editorial

Dear reader,

It is an honour to present you the document “*Bioeconomy regions in Europe*”.

Regions play an important role in the further development of the bio-based economy in Europe as they can support the establishment of (regional) innovative value chains. They are also best situated to identify the locally available feedstocks (from agriculture, agro-food, forestry, residual and side streams, etc.) that can trigger the bio-based economy. Finally, regions can play a crucial role in attracting investments in local demonstration or flagship projects by benefiting from the European Structural and Investment Funds (ESIF) or the European Agricultural Fund for Rural Development (EAFRD), creating jobs, economic growth and new opportunities for the primary sector.

Fortunately, there is a growing number of regions in Europe that put bioeconomy high on the agenda. In this context, the Bio-based Industries Consortium (BIC) has already signed a Memorandum of Understanding (MoU) with **ERRIN** (the European Regions Research and Innovation Network). In November 2014, BIC and ERRIN developed guiding principles on “*Combining BBI (H2020) and European Structural and Investment Funds (ESIF) to deploy the European bioeconomy*” ([available](#) on BIC’s website).

To stimulate a closer collaboration between our industry members and the individual Regions, and to attract investments in innovation, deployment and economic development, BIC has signed in 2016 a MoU with the **Vanguard Initiative**. Regions participating in this Initiative are driven by a political commitment to use their smart specialisation strategy to boost new economic growth through entrepreneurial innovation and industrial renewal in European priority areas, such as the bioeconomy. The Vanguard Bio-Economy pilot project concerns the implementation of synergies in new bio-based value chains across Regions based on their smart specialisations. In addition, BIC also co-signed a Letter of Intent with eight **Polish bioregions**. BIC is also actively engaged in the project of six “**model demonstrator regions**” to promote sustainability in Europe’s chemical industry

This document gives an overview of what regions have to offer in the area of the bioeconomy. It is available on the BIC website and will be updated regularly. BIC encourages other regions - with the support of our partners - to join this initiative, to fully exploit their capabilities and opportunities for growth. Interested regions can join BIC as Associate Members ([more info](#) on BIC’s website) to become more actively engaged in BIC and the Bio-Based Industries Joint Undertaking (BBI JU) programme.

Yours sincerely,



**Dirk Carrez**  
Executive Director  
Bio-based Industries Consortium

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## Background information

### Vanguard Initiative

The **Vanguard Initiative - New Growth Through Smart Specialisation** - is a network driven by a political commitment made by some **30 European regions** to use their smart specialisation strategies to boost new growth through bottom-up entrepreneurial innovation and industrial renewal in European priority areas.

It has its foundations at the regional level. EU regions are the closest policy link to the bottom-up growth dynamics necessary for the renewal of our industrial fabric through their proximity to innovative partnerships and clusters. Such partnerships and clusters form eco-systems that are the catalyst for fast-growing innovative SMEs. Regional innovation ecosystems can and do develop solutions for significant societal challenges while delivering on the EU's ambitions for improved international competitiveness.

The Vanguard Initiative seeks to develop interregional cooperation and multi-level governance for supporting clusters and regional eco-systems to focus on smart specialisation in priority areas for transforming and emerging industries through a two-way interactive process. In the first phase regional authorities identified strategic topics (called "Pilot" in the Vanguard jargon). So far, the following pilots have been selected:

- Efficient and Sustainable Manufacturing (ESM)
- High Performance Production through 3D-Printing
- Components for marine renewables and offshore energy applications
- Bio-Economy - Interregional cooperation on innovative use of non-food Biomass
- New nano-enabled Products

In the second bottom-up phase, triple helix stakeholders of different complementary regions identify - with a Vanguard Methodology of four subsequent phases: learn, connect, demonstrate and commercialise - specific topics or interregional value chains to work on (called "Demo cases"). The Vanguard Initiative [Bioeconomy pilot](#) aims to promote the development of new biobased value chains in Europe by taking pilot and demonstration activities, thereby creating more critical mass, exploiting complementary assets and accelerating technological developments.

For further information, please contact the Vanguard Initiative Bioeconomy Pilot coordination team: Bart Verschoor, [bj.verschoor@pzh.nl](mailto:bj.verschoor@pzh.nl); Valentina Pinna, [Valentina.Pinna@regione.lombardia.it](mailto:Valentina.Pinna@regione.lombardia.it); Daniele Colombo, [Valentina.Pinna@regione.lombardia.it](mailto:Valentina.Pinna@regione.lombardia.it); Sophie Vogelaar, [sm.vogelaar@pzh.nl](mailto:sm.vogelaar@pzh.nl).

### 'Sustainable chemicals' model demonstrator regions (MDR)

The concept of the 'model demonstrator region' or 'large scale demonstrator' is the cornerstone of a systemic approach launched by the European Commission (DG Growth) that aims to foster economic growth by addressing a specific problem or societal challenge through service innovation and under 'real life' conditions.

In December 2015 the European Commission has selected [6 "model demonstrator regions"](#) in Europe to lead the way towards a sustainable chemical production in Europe. The selected regions are **Andalusia** (Spain), **Groningen-Drenthe** (The Netherlands), **Kosice** (Slovakia), **Scotland** (United Kingdom), **South and Eastern Ireland**, and **Wallonia** (Belgium).

These regions receive advisory support from the 'European Sustainable Chemicals Support Service' (ESCSS), a consortium led by CIRCE (Research Centre for Energy and Resource

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Efficiency) and including PNO Consultants and Cefic. The aim is to encourage investments in sustainable chemicals production in Europe that will contribute to the development of the circular economy, for example by taking advantage of domestically available feedstock such as biomass, residues or effluent gases (such as CO<sub>2</sub>).

The 18-month project is focused on two main activities:

- (1) **Development of a Self Assessment Tool** which aims to steer regional authorities and cluster managers towards a larger use of three feedstocks such as biomass, residues and CO<sub>2</sub>, to produce sustainable chemicals and how to attract investments in the field of bioeconomy; the consortium has **defined a list of 12 good practices** for promoting a chemical industry that is not based on fossil raw materials in specific parts of Europe and the world, to act as a source of inspiration encouraging other regions to use the tool.
- (2) **Provision of advisory support services to the model demonstrator regions**, including the elaboration of an investment readiness assessment, the support in the organisation of workshops to show the way towards sustainable chemical production in Europe, by taking advantage of domestically indigenous available feedstock such as biomass or residues. The results will be presented in the form of **Master Plans**, in which concrete investment possibilities will be identified and assessed to determine ways for leveraging funding while evaluating the necessary support through public investment in infrastructures.

For further information, please contact Ignacio Martin, CIRCE, coordinator of the project ([imartin@fcirce.es](mailto:imartin@fcirce.es))

### **Lodz Declaration of Bioregions**

The [Lodz Declaration of Bioregions](#), signed 6 October 2016, shows the joint determination of regions in Central and Eastern Europe to integrate regional efforts to build local biocommunities by focusing on common priorities and strategies. Many of the regions in Central and Eastern Europe have a strong agricultural tradition and have selected the bioeconomy as a smart specialisation strategy.

Alongside the publication of the Lodz Declaration of Bioregions, the Bio-Based Industry Consortium (BIC), the Bio-Based Industries Joint Undertaking (BBI JU) and eight Polish regions signed a **Letter of Intent** to develop new bioeconomy partnerships.

Signed by the Lodzkie Region, the Lubelskie Region, the Małopolska Region, the Mazowieckie Region, the Opole Region, the Pomeranian Region, the Wielkopolska Region, the West Pomeranian Region, the BBI JU and BIC, the Lodz Letter of Intent paves the way for regional actors to identify synergies between financial instruments and political frameworks to set up local bioeconomy value chains. All eight of the Polish signatories have selected the bioeconomy as a smart specialisation strategy ([RIS3](#)), ensuring limited resources are channelled into the sector they believe will provide the best opportunity for regional development.

For further information, please contact Andrzej Siemaszko ([andrzej.Siemaszko@kpk.gov.pl](mailto:andrzej.Siemaszko@kpk.gov.pl)) National Contact Point for EU Research Programmes or Izabela Kozłowska ([izabela.kozlowska@lodzkie.pl](mailto:izabela.kozlowska@lodzkie.pl)), Marshal's Office of the Lodzkie Region.

## 1. Short description of the Region

- Country: AUSTRIA
- Region's Capital: Linz
- Location (Figure):



Upper Austria is the industrial heart of Austria. It is located at the river DANUBE and borders on Germany and the Czech Republic, as well as on the other Austrian states of Lower Austria, Styria, and Salzburg. Upper Austria and Lower Austria are both located at the river Danube, thereby forming a macro-region where 4 multimodal industry harbours (Linz, Enns, Ybbs and Krems) serve major production plants of chemical and wood based industry. Furthermore there are strong connections along the river Danube especially to inland harbours in Eastern Europe and Germany (e.g. Straubing)

- Population: 1.42 million (2013),
- GDP: 54,8 billion Euro (2013)

## 2. Importance for the biobased industries

- Importance of some strategic sectors (incl. quantitative details) important for the (future) bioeconomy, major companies, etc.



Upper Austria (UA) has a strong focus on industry (340.000 employees). Major wood based companies like Lenzing (fibre), Delfort Group (paper) Smurfit Kappa (Nettingsdorf, paper), Heinzl Paper (Laarkirchen, paper), UPM (Steyrermuehl, paper) contribute to the prosperity of the region. Cross sectorial activities can be carried out especially with the polymer sector in Upper Austria. About 220 companies (37.000 employees) achieve an annual turnover of more than 7.6 billion

Euros. The average research quota of the sector exceeds 5.2%. Further potential for cross-sectorial activities can be raised in the pharma sector (annual turnover of the sector: 1.97 billion Euro, production sites of Sandoz, Takeda and Patheon), brewery sector and dairy industry.

- Research organisations engaged on “bioeconomy related topics“

RTOs: WOOD Kplus, ACIB and Bioenergy2020 have been involved in Horizon 2020 and BBI projects. Universities: JKU, BOKU; Universities of applied sciences in Upper Austria Lower Austria and Salzburg.

- Presence of bioeconomy clusters

Together with partners from Bavaria and Eastern Europe the bioeconomy players of UA have worked on establishing the “Green Chemistry Belt”(3 Interreg Projects), which covers multiple value chains

- Regional bioeconomy strategy or ongoing bioeconomy regional projects / policies.



The national bioeconomy (“FTI”) strategy of Austria is expected to be published in 2017. Upper Austria has included bioeconomy issues in its regional S3 strategy (“Innovative Upper Austria 2020”)

- Collaborations with other regions in the area of the bioeconomy

Austrian regions: Lower Austria (joint cluster initiatives; production plants of Stora Enso, Metadynea, Kemira, SCA) Styria (joint R&D initiatives; production sites of e.g. Sappi, Heintzelpaper (Zellstoff Poels), Norske Skog) Carinthia (Mondi, Fundamax).

Interregional: e.g. Vanguard

### 3. Available feedstocks

- **From the agro-based industries** (for Austria based on numbers of 2015)

Wheat straw: 1 Mio. t (Lower Austria 583.000 t, Upper Austria: 266.000 t)

Corn straw: 655.000 t (30 % in Styria, 26 % in Lower Austria, 24 % in Upper Austria)

Rapeseed straw: 58.000 t (63% in Lower Austria, 22% Upper Austria)

Beet leaves: 454.000 t (78 % in Lower Austria)

- **From the forest-based industries** (for Austria based on numbers of 2010)

Stemwood: Coniferous-softwood: 21 Mm<sup>3</sup> /non-coniferous-hardwood 3Mm<sup>3</sup>

Forest residues: Coniferous-softwood and non-coniferous 4 Mm<sup>3</sup>

Co-products, side streams, and residues from the forest and forest-based industries: bark 1 or 2.4 Mm<sup>3</sup> (incl. bark derived from imports), sawmill by-products: 7.3 Mm<sup>3</sup>; other ind. res.: 2 Mm<sup>3</sup>; black liquor: 2.4 Mm<sup>3</sup>; post-consumer wood: 1.1 Mm<sup>3</sup>

- **Bio-waste and CO<sub>2</sub>** (for Austria based on numbers of 2015)

Wastes: food production: 500.000 t; beverage production: 330.000t , prod. of plant oils: 160.000t

### 4. Financial and other incentives

- **What can the region do to support/attract investments in demo & flagships projects**

Upper Austria has signed the MoU of Vanguard and BIC. ERDF money is used for funding large scale R&D projects of the RTOs and university of applied sciences. Specific investor programmes for setting up companies and developing locations and business sites (e.g. at inland harbours) are provided.

- **What can the region do to connect BIC industry members to local stakeholders/value chains**

Special programmes to support cross sectorial „show cases“and „demonstration regions“ (e.g. waste heat utilisation, utilisation of by industrial products) and funding of clusters (e.g. value chain building)

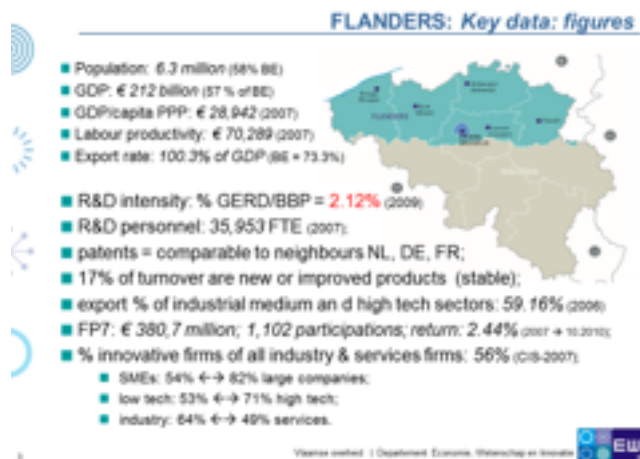
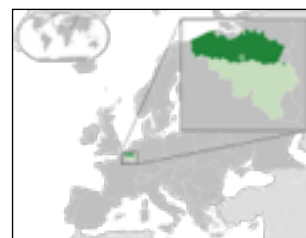
5. Web site(s): [www.biz-up.at/en](http://www.biz-up.at/en) (Investors); [www.uar.at/en](http://www.uar.at/en) (R&D)

### 6. Key contact

- Name: Patrick Pammer
- Function: Business Development at Wood Kplus, Representative of Upper Austria in Vanguard Initiative (Bioeconomy Pilot)
- Email: [p.pammer@kplus-wood.at](mailto:p.pammer@kplus-wood.at)
- Phone: +43 732 2468 6775

1. Short description of the Region

- Country: BELGIUM
- Region's Capital: BRUSSELS
- Location (Figure)
- Population: 6,3 m inhabitants, 13.500 km<sup>2</sup>
- GDP: 239 billion € (2015)



2. Importance for the biobased industries

• **Strategic sectors:**

- **Chemistry, plastics and life sciences (2015):** 42 billion € turnover, 59.500 jobs (+ 100.000 indirect jobs), 1.6 billion € R&D; 11 billion GVA (30 % of total industry)
- **Agro-food industry (2014):** 60 billion € turnover; 145.500 jobs; GVA 8,2 billion €

Total economy	GVA 208.824m €	FTE 2.179m
Chemistry and materials	4.3%	3%
agriculture	1%	5.2%
food	2.7%	2.9%
Pharma	1.6	0.4%
energy	1.4%	0.4%
Water	0.2%	0.2%
Waste and waste water	0.7%	0.6%
Textiles	0.6%	0.9%
Paper	0.3%	0.4%
Wood	0.2%	0.3%

- **Harbors of Antwerp** (chemistry cluster) and Ghent (biorefinery production complex): Joint Venture BASF & Avantium biopolymers (Antwerp) and Arcelor Mittal & Lanzatech C1 technology (Ghent).
- **Major companies:** Avantium, GlobalYeast, Cargill, Sioen, Danisco Bruges, EcoTreasures, Proviron, Ecover, ..
- **Research organisations:** VITO, ILVO (including Food pilot), both develop project based bio-economy strategies; VIB world class biotech (Flanders counts 134 companies with biotech activities of which 20% in IB)
- **Bioeconomy clusters:** FBBV + BBEPP, designated spearhead clusters FlandersFood, Catalisti sustainable chemistry. CINBIOS platform Industrial biotech
- **Policy:** transition policy to Circular Economy including B-E towards 2050; Regional bioeconomy strategy and action plan (2013), horizontal policy group; (sub-regional) provincial development agencies, Vanguard bio-economy pilot 2 cases lead by Flanders. FIT (Flanders Investment&Trade) makes BE and sustainable chemistry new focus of its internationalization strategy; roadmaps for IB, and value chains (polymers, micro-algae, renewable chemistry); innovative/green public procurement guidelines

- **Collaborations with other regions** in the area of the bioeconomy: the NL, North Rhine Westphalia 'BioInnovation megacluster' BIG-C (see figure); North of France; crossborder FL -NL (delta region); ARRA huge chemical cluster; Biorizon FL-NL; Interreg projects; strategic plan for sustainable chemistry FL-NL



- **Recommendations** from finished/ ongoing projects": Visions (CINBIOS/IWT) , Genesys (ILVO), KET's IB Roadmap, FISCH Roadmaps, BioBase NWE , SmartPilots, BioBase4SME; Interreg cofinancing from Vlaio (Flemish agency for innovation and research)

### 3. Available feedstocks

In general, Flanders and Belgium depend largely on imports for their biomass<sup>1</sup>. Total surface used for agriculture 609.000 ha. Flanders is a leading region in selection and recycling of household and industrial waste.

**Agro-based industries**, 53 % of businesses active in animal production (40 mio animals).

Primary feedstock originating from the agriculture and agro-food industries 10.822.000 ton/y ; flax 25.600 ton;

Organic residues, side streams: 6.9 million ton/y (2011): animal 11%, food 36%, organic waste from consumers, roadside clippings, community greens 15.6%; 310.000 ton of manure go to anaerobic digestion; biodegradable industrial waste 248 kton/y; Food and kitchen waste from households 463 kton/y; Fat and oil 7 kton/y from households and 13 kton from industrial use.

**Forestry**: 4.2 m<sup>3</sup>/ha /Y; 177.000 ha wood in Flanders; residues 90 kton/y directly for energy;

Primary wood and wood waste are both important feedstocks for paper, woody products such as chip boards (700 kton/y from recycled wood), and for energy (pellets) ; wood waste supply vs demand variable

- rest streams 1.350 kton/y, of which 690 ktn from industry, 160 kton post consumer

**Fishery**: own catch limited (BE: 20 kton/y); up to 90% import; 75% of catch discarded; 3 kton not sold goes to fishmeal

#### **Biowaste and CO<sub>2</sub>**

- Waste water and sludge from food, textiles, paper industries : high collection and recycling rate eg slib from food industry amounts to 30,2 kton DS
- CO<sub>2</sub> from processing operations-> JV from Arcelor Mittal (steel) with Lanzatech technology for use of CO<sub>2</sub> for biobased products ( in first instance bio-ethanol)

### 4. Financial and other incentives

- **What can the region do to support/attract investments in demo & flagships projects**

Fiscal incentives come from federal government

Based on the regional priorities (smart specialization), develop thematically oriented financial vehicles to invest in demonstration and flagship projects, such as biotech funds. Stimulate EU and international co-operation. Remove regulatory obstacles to share pilot facilities with other regions to scale up investments in bio-economy (example Smart Pilot)

- **What can the region do to connect BIC industry members to local stakeholders/value chains**

Organizing a workshop on 22 March 2017 on BBI JU

Simulate synergies with other regional innovation support mechanisms to close the innovation gap. This should be actively promoted by the cluster organizations. Horizontal policy working group for the Bio-economy (iWG) strategy and action plan. Put recommendations from roadmaps (FISCH, KET's IB, projects) into action. Closer contact with regional stakeholders, link with EU policies and research programmes (H2020, BBI), NCPs.

Facilitate development towards new value chains through regional clusters including mobilization of local stakeholders.

- 5. **Web sites** (Dutch): <http://www.ewi-vlaanderen.be/wat-doet-ewi/ondernemende-economie/bio-economie>; <http://www.flanders.be>

### 6. Key contact:

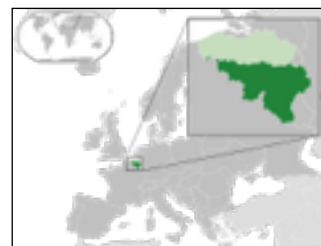
Monika Sormann; Senior policy advisor bio-economy

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<sup>1</sup>Source: 'Biomass inventory 2011-2012' (OVAM) and 2013 (in Dutch only).

## 1. Short description of the Region

- Country: Belgium
- Region's Capital: Namur (Wallonie)
- Location (Figure)
- Population: 3.6 million inhabitants
- GDP: 93,551 billion euro



## 2. Importance for the biobased industries

- **Importance of some strategic sectors/Presence of bioeconomy clusters**

In Wallonia, several structures contribute to the regional bioeconomy development:

- **Agri-food** is Wallonia's 5th biggest export sector, and 2nd in terms of employment (approximately 21,000 people). **Agro-industry Innovation Cluster: [Wagralim](#).**
- **Pharmaceuticals and life sciences** employs around 15,000 people in the region. Life sciences and medtech represent 23 % of Wallonia's exports and much of new foreign investment. Between 2000 and 2013 foreign investments in life sciences generated more than 3,000 new jobs. **Health Innovation Cluster: [BioWin](#).**
- **Biotech, carbon capture and use, resource efficiency and waste recycling:** Green chemistry amounts for 3.000 employees and 10 % of the chemical turnover in Wallonia, which also host a number of large, small and medium enterprises along the whole value chain as well as a large panel of knowledge producers (5 universities, 11 higher education schools and 11 research centres) active in the field. **Green chemistry and sustainable materials Innovation Cluster: [GreenWin](#)** (member of BIC).
- [ValBiom](#) Association for biomass valorization
- [TWEED](#) Energy Cluster
- [Plastiwin](#) Plastic Cluster
  - **Research organisations engaged on "bioeconomy related topics"**
- GreenWin members (+- 200) among which:
  - **Research centers:** Materia Nova (BIC Member), Certech (BIC Member), Celabor (BIC Member), CoRI, CRA-W, CER, ...
  - **Higher Education Schools: 5 Universities:** Ulg (Liège), UMon (Mons), UCL (Louvain-la-Neuve), ULB (Bruxelles), UNamur (Manur) and their laboratories.
  - **Innovation platform** (under construction) dedicated to sustainable chemistry
    - **Regional bioeconomy strategy or ongoing bioeconomy regional projects / policies**
- The '[Coq Vert initiative](#)' (public-private) aims to develop a regional bio-based economy strategy and to identify innovation projects and required investments. The focus is put on recycling biomass materials from non-food resources (by-products, residual products, waste etc.) and on second-generation biorefineries.
- [NEXT program](#) dedicated to the deployment of circular economy in Wallonia through optimization and management resources.
- **Smart Specialization strategy** aims at further developing the competitive advantages of the chemical industry in Wallonia, particularly of green chemistry.
- **6 model Demonstrator regions: [Wallonia](#)** as one of the 6 "model regions" to lead the way toward a sustainable chemical industry.
- **GreenWin R&D projects'** (natural resins from vegetable sources; bioethanol production; valorization of lignin, CO<sub>2</sub> capture and transformation, PLA ...) with industrial implication.
- **GreenWin's SME and BIC members:** Syngulon, Celabor, Biorem Engineering, Realco, Artechno, Xylowatt, Pollet, Lambiotte, ...
- **Wagralim R&D projects** (bioplastics/biobased packaging, flax valorization, wheat bran valorization, ...)
- **BioWin R&D projects**
- [S3chem Interreg Europe project](#): improve the implementation of RIS with focus on chemical related subjects (interregional exchange of experience, mutual learning between public authorities from 7 European chemical regions)
- **FEDER projects:** Tropical plant factory (Ulg), Algae factory (UNamur), Intense4chem (Certech)
  - **Collaborations with other regions in the area of the bioeconomy**

To foster the emergence of innovative projects. Among others, GreenWin is working with:

- **Flanders** (Belgium): Flanders Biobased Valley, BioBaseEurope Pilot Plant, Catalisti, VITO, ...
- **France**: Axelera, IAR Cluster, Matikem, ...
- **Germany**: Fraunhofer Institutes, DECHEMA, Chemie Cluster Bayern, CLIB2021
- **UK**: University of Sheffield, Yorkshire Chemical Focus, ...
- **Others**: Netherlands, Spain, Italy, Brazil, Canada, ...

BioWin and Wagrallim have also developed strong international networks. International cross-sectorial collaborations can easily be achieved in Wallonia through the existing synergies between the 3 clusters and their respective networks of enterprises, academics and research centres.

### 3. Available feedstocks

#### From the agro-based industries

- **Feedstock originating from the agriculture and agro-food industries**
  - Significant potential in terms of agriculture biomass: cereals (150,000 t/year), straw (60,000 t/year) and beets (300,000 t/year)
- **Agricultural crops such as flax, hemp and fibre**
  - Culture of sugar beets, flax straw, rapeseed, chicory as well as cereals (wheat, barley, spelt)
- **Co-products, side streams, and residues from the agriculture**
  - Significant potential coming from the byproducts of the agro-industry (dairy, beer, potato) (400,000 t/year)

#### From the forest-based industries

- **Feedstock originating from the forest and forest-based industries**
  - Potential in terms of forest biomass (50,000 to 120,000 m<sup>3</sup> hardwood)
- **Co-products, side streams, and residues from the forest and forest-based industries, including the wood industry, saw mills, Paper and Pulp**
  - Lignocellulosic value chains could be established towards paper, composites, polymers or chemicals
  - 1 T (labo scale) available for lignin valorization
  - Important production of other waste streams from paper & pulp industry (black liquor 400,000 m<sup>3</sup>), sewage sludge and sorted MSW fractions (300,00 t/year), flax

#### Bio-waste and CO<sub>2</sub>

- **CO<sub>2</sub> from processing operations**
  - The objective of the [SCOT European project](#) (Smart CO<sub>2</sub> Transformation), coordinated by GreenWin, was to define a Strategic European Research and Innovation Agenda (SERIA) for Europe in the field of CO<sub>2</sub> Utilisation, CO<sub>2</sub> being considered as a resource rather than a waste or emission.
  - In Wallonia: CO<sub>2</sub> from processing industry (as concrete, lime, commodity chemical products, ...), food industry (beer /biogenic CO<sub>2</sub>), ethanol, ...

### 4. Financial and other incentives

#### What can the region do to support/attract investments in demo & flagships projects

- In the **Vanguard Initiative**, through detailed examination of capability, competence and capacity within partner regions, and through working with industry stakeholders, Wallonia has the possibility to develop joint demonstration projects (if appropriate funding tools and mixes are making available), industry-led pilots, networks of demonstrators. Wallonia is member (among others) of the Vanguard Bioeconomy initiative.
- **AWEX** (Wallonia Foreign Trade and Investment Agency) has a section dedicated to '[investment in Wallonia](#)' aiming to attract industries related to green technologies and sustainability.
- **Connect your structure with the relevant cluster** and its members as potential local partners.

#### What can the region do to connect BIC industry members to local stakeholders/value chains

- Use the Innovation clusters such as GreenWin which contributes to the development of **cross-sectorial R&D projects** between enterprises, universities and research at a **regional and international scale**. GreenWin wants to foster the internationalization of its members through technological partnerships, participation in European projects (H2020-BBI, ...), representation in European networks (BIC, Vanguard, ECRN, KIC, etc).
- GreenWin is working closely with Wagrallim and BioWin clusters by identifying cross-sectorial synergies at a regional and international scales.

### 5. Web site - <http://www.greenwin.be/>

### 6. Key contact - Caroline Hollela, International Business Developer; *Email* - [caroline.hollela@greenwin.be](mailto:caroline.hollela@greenwin.be); *Phone* - +32.495 16 37 34

### 1. Short description of the Region

- Country: Finland
- Region's Capital: Kajaani ( <http://www.kajaani.fi/en> )
- Location of the Kainuu region (see the map)
- Population: 75 324
- GDP: 27 160 euros, per inhabitant



### 2. Importance for the biobased industries

- **Strategic bio economy clusters** are: forest, renewable energy, food & agro, nature based welfare services (green care, nature tourism). All these sectors are regionally coordinated by regional development program and regional coordinator. **Forest bio economy is stronger in Kainuu than Finland in average.** Forest share of all bio economy output: **41%**; Forest share of all economic output: **7 % (266 million €)** and employment **6 %** (FI in average **3%**); Forest bio economy's share of investment: **7% (34 million € / year) and growing.** **Major companies:** **ST1 ltd.** is building a bioethanol plant, with a production capacity of 10 million liters a year. Production bases on unique, carbon-neutral & piloting system: ethanol is produced from sawdust of saw mill near; ST1 is also planning to the same lot a similar bioethanol mill but five times bigger; **Pölkky ltd. & Kuhmo Wood ltd.** (two growing saw mills with over 135 million euros annual turnover); **CrossLam Kuhmo ltd.** (see: <http://www.crosslam.fi/en/> ) produces cross laminated timber (CLT) and **Elementti-Sampo Ltd.** refine and equip those CLTs, which makes it possible to build multi-storey wooden buildings (both companies are parts of **Kantola industry area**, where operate 12 companies, jobs around 240 and turnover 100 M EUR). **KaiCell Fibers ltd.** (<http://www.kaicellfibers.net/> ) intends to build a state-of-the-art sulphate pulp mill & business ecosystem (bio-industrial park, BioFutureFactory™ ) in Paltamo, Kainuu. **Taaleri & Loiste ltd.** (renewable energy): in Suomussalmi started 13 wind power plants with a total of 150 M € investment. During the 2020s will be built altogether 31 wind power plants in Hyrynsalmi and Suomussalmi. Some other companies operating in Kainuu: **Ponsselt Ltd.** (forest machines), **VALMET ltd.** (in Kainuu: measurement of paper & pulp technologies), **Prometec** (biomass quality controlling)
- **Research organisations** engaged on bioeconomy related topics: Kajaani University Consortium, Kajaani University of Applied Sciences, Natural Resources Institute Finland (LUKE), CEMIS (Centre for Measurement and Information Systems), Woodpolis. **Projects:** **BRIDGES**, Interreg Europe project, 2016 - 2021 (see: <http://www.interregeurope.eu/bridges/> )
- **Strategies guiding bio economy activities:** Kainuu Programme 2014-2017, S3 Strategy of Kainuu, Kainuu Bio economy Strategy 2015 -2020, Regional Forest Programme 2016-2020. Program of forest bio economy and renewable energy grow in Kainuu 2016 -2020. All regional strategies are in line with FI governmental targets for the bio economy.
- **Collaborations** with other regions in the area of the bio economy: Kainuu makes cooperation with all north and east Finland regions in the field of bio economy. As well collaboration is done with south Finland regions and with regions from other EU countries. Bridges project and the operations of KaiCellFibers ltd. are good examples of international cooperation in bio economy.

### 3. Available feedstocks

- **From the agro-based industries**
  - Farmland: 31 600 hectares
  - Animal production (average per year): Beef production 1.6 M kg ; Milk production 69, 6 M litres (mostly processed outside the region). Animal manure: 336 000 m<sup>3</sup> (average / year)

- Berries, average annual harvest: Blueberry 16.2 M kg, Lingonberry 24.6 M kg
- Food industries: Kiantama ltd. (berries processing)
- **From the forest-based industries**
  - Forest growth is 6.9 M m<sup>3</sup> / year. Forest deforestation is now 3 M m<sup>3</sup> / year. Sustainable allowable cut is 4.8 million M m<sup>3</sup> / year - opportunity to increase is to 1.8 M m<sup>3</sup> / year (+ 50%).
  - Wood processing in Kainuu is 1.2 M m<sup>3</sup> / year. 1.8 M m<sup>3</sup> / year (60%) is exported and processed outside the region
  - Plan is to grow loggings to 5.5 M m<sup>3</sup> / year by 2030, this means 80% increase in logging from the current situation
  - Energy wood potential: 1.8 M m<sup>3</sup> per year (wood by-products: 0.6 M m<sup>3</sup>, energy wood, small trees, branches, stumps: 1.2 M m<sup>3</sup>)
- **Bio-waste and CO<sub>2</sub>**
  - Bio-waste: approx. 5 500 tons annually and community sewage sludge approx. 15 000 tons annually
- Figure. Business eco systems of forest bio-economy in Kainuu (see below)

#### 4. Financial and other incentives

- **To support/attract investments in demo & flagships projects** Kainuu offers: RDI services & funding, Infrastructure, triple helix co-operation and networks, skilled workforce and world-class educational services, renewable raw materials, Invest In Kainuu services for investors by Kainuun Etu ltd. (business development company, see: <http://kainuunetu.fi/english> ). Focuses in RIS3 & bio economy strategy are new innovations of bio economy and highly refined products. Innovations and products are developed by partners of bio economy business ecosystems, which are developed by attracting driver companies or institutes to Kainuu and by creating triple helix co-operation around these industrial investments.
- **To connect BIC industry members to local stakeholders / value chains** Kainuu offers: Regional Council of Kainuu and Kainuun Etu ltd. coordinate the cooperation. Many driver companies and institutes of bio economy, for example ST1 and CrossLam Kuhmo, are operating in the region and are interested to cooperate with other companies which are capable to utilize side flows of the production of ST1 or CrossLam. The region is as well constantly attracting new driver companies and investments to the region (this work is done for example by KaiCell Fibers or Kainuun Etu). BIC industry members could be these partners in bio economy business ecosystems or BIC industry members could be driver companies and base of new business ecosystems in the region. For BIC industry members region offers RDI services & funding, Infrastructure, triple helix co-operation and networks, skilled workforce and world-class educational services, renewable raw materials, Invest In Kainuu services etc.

Figure. Business eco systems of forest bio-economy in

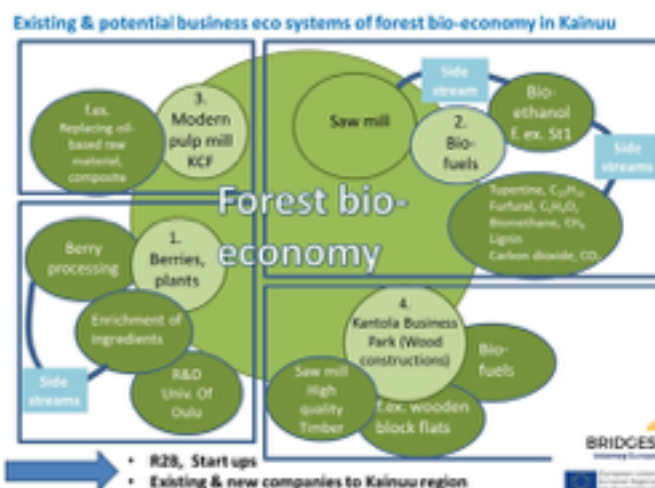
#### 5. Web site:

<https://www.kainuunliitto.fi/en>

#### 6. Key contact(s)

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Regional Mayor  
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## 1. Description of the region

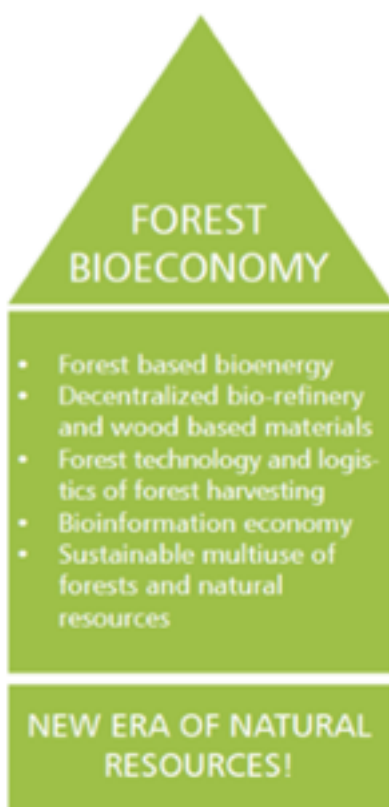
North Karelia is the easternmost region of continental Europe. Niirala border crossing point in Tohmajärvi is the third busiest in the Eastern border of Finland. North Karelia has 164,755 inhabitants, region's GDP being 4 775 million euros. Forests cover 84% of the total land area of the region, and forest bioeconomy is North Karelia's undisputable strength. Other traditionally strong industries include metal, extractive and food industries. North Karelia is committed to becoming an oil free region, and is a pioneer in renewable energy production and use.



## 2. Importance of the bio-based industries

North Karelia is Europe's leading hub of forest expertise. In North Karelia the forest resource, forest industries, forest technology and forest research and education come together unlike in any other European region. The region's wood processing and forestry manufacturing industry comprises remarkable companies such as Stora Enso, UPM Kymmene, Anaika Wood Ltd., Pankaboard, Binderholtz and John Deere. A virtual catalogue of North Karelia's bioindustrial sites is available at <http://pohjois-karjala.fi/en/bioteollisuusalueet>.

In North Karelia, approximately 600 forest bioeconomy specialists work in the European Forest Institute headquarters, Finnish Natural Resources Centre, Finnish Environment Institute, [University of Eastern Finland](#), Karelia University of Applied Science and North Karelia Municipal Education and Training Consortium. In addition to providing world-class education and research, enabling scientific, social and [commercial](#) innovations and developing new research and learning environments, the centres of expertise work to provide information about the preconditions for sustainable, low carbon growth of bioeconomy (e.g. [DIABOLO](#) and [FORBIO](#)).



### Bioeconomy in numbers:

- Annual turnover of bioeconomy sector over 1,7 billion € (27 % of the total regional turnover) with targets set to 2,7 billion € in 2025
- 6000 jobs and 500 companies in forest bioeconomy
- 10,9 million € directed to 47 forest bioeconomy and energy production projects funded from EU programmes in 2014-2016

Forest bioeconomy is on the top of regional development agenda and [Regional Strategic Programme](#), financed by EUR 170 million annually. It is North Karelia's choice for [Smart Specialisation](#), and a significant contributor to the region's aim at becoming a [Fossil Oil Free Region](#) and achieving an 80 % net reduction in the region's greenhouse gas emissions by 2030.

North Karelia's [Climate and Energy Programme](#) set the region to a course towards carbon neutrality and energy self-sufficiency. Joensuu, the regional centre of North Karelia, has signed a growth agreement with the Finnish Government with an aim to create a GREEN HUB for providing innovation services in the field of forest bioeconomy.



### 3. Available feedstocks, forest resources

- Forestry area 15 960 km<sup>2</sup>; total wood stock 187 million m<sup>3</sup>
- Annual increment 9,3, million m<sup>3</sup>
- Total removals 6,8, million m<sup>3</sup>
- Round wood removals: 5,3m<sup>3</sup>, target for 2020 6,61 million m<sup>3</sup>



### 4. Financial and other incentives

In North Karelia regional actors are committed to the development of forest bioeconomy. North Karelia has been successful in raising project funding from several European programmes, which is contributing greatly to the quality and sustainability of development actions. Over 50 projects related to forests and energy production were funded from EU and regional programmes in 2014-2016. The total EU funding directed to forest and energy production projects exceeds 10 million euros, making the sector North Karelia's biggest benefiter of EU funding programmes. ESIF and Rural Development funds play a significant role in regional development, and European Territorial Cooperation Programmes, Life, Erasmus + and Horizon 2020 have contributed significantly to the quality and sustainability of development actions and internationalisation of the region. In Horizon 2020 programme funded projects, also some SMEs have been able to participate along with regional key players in research and development.

Regional commitment for the development of bioeconomy results from strong stakeholder cooperation. In addition to making regional plans, strategies and programmes, regional actors cooperate with national authorities and promote the region's interest in order to attract investments, increase the exports, ensure the availability of raw material, and improve the competitiveness of logistics in the region.

### 5. Website

<http://pohjois-karjala.fi/en/web/english>

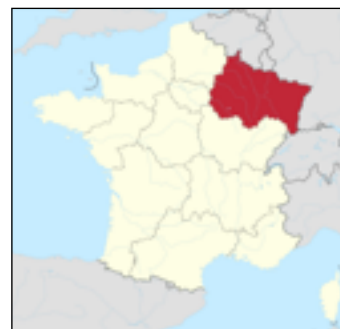
### 6. Key contact

Regional Planning Director Mr. Pirkka Aula +358505759703 [pirkka.aula@pohjois-karjala.fi](mailto:pirkka.aula@pohjois-karjala.fi)

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## 1. Short description of the Region

- Country: France, Region of Grand Est
- Region's Capital: Strasbourg
- Location (Figure)
- Population: 5,5 million
- GDP: 148 287 million euros (2013)



## 2. Importance for the biobased industries

The Region welcomes several universities as well as research and technology centres with dedicated expertise in renewable resources, the bioeconomy and biorefining, including but not limited to: European Center of Biotechnology and Bioeconomy (bringing together the expertise of schools such as AgroParisTech, Centrale Supélec), EPF, ENSAM, University of Reims Champagne-Ardenne, University of Technology of Troyes, University of Strasbourg, University of Lorraine, Neoma Business school and its dedicated chair to the Bioeconomy, etc. The Region is also home to several technology centres like A.R.D. (Agro-Industrie Recherche et Développement), FRD (Fibre Recherche Développement), CRITT MDTs as well as BRI (Bioraffinerie Recherche & Innovation), an open innovation platform within the Bazancourt-Pomacle biorefinery focused on industrial biotechnologies and which covers a large part of the TRL scale from the lowest (ideas and proof of concept) to the highest levels (demo).

Industries SMEs and startups such as Chamtor, Vivescia, Cristal Union, Avril, Soufflet, Soprema, Tereos, Norske Skog, Faurecia, Neweaver, Biolie, Celodev, etc. are active in numerous fields of the bioeconomy are also present. These include, first transformation of agricultural products, food and feed industry, chemical industry, automotive industry, building industry, packaging industry, energy industry and textile industry.

The Grand Est Region is also home to the famous Bazancourt Pomacle biorefinery: an archetypal territorial biorefinery and an example of industrial ecology where a network of connections between the biorefinery actors has been established. This integration enables several by-products to be valorised on site; water, energy and steam consumption can be optimised and specific activities such as effluent management are shared. The presence of the innovation platform BRI within the biorefinery has been a key driver of this trend. The biorefinery also welcomes the Futurol projects which aims to produce ligno-cellulosic ethanol.

In the Reims area, and close to the Bazancourt Pomacle biorefinery, a dedicated “Bioeconomy Park” has been established to welcome activities dedicated to the bioeconomy.



Biorefinery of Bazancourt-Pomacle - Copyright: D. Dutartre

Finally, the bioeconomy is part of the Region priorities, its smart specialisation strategy and its economic development, innovation and internationalisation plan.

### 3. Available feedstocks

With more than 3 million hectares of land dedicated to agriculture and 2 million hectares for forestry, the Region of Grand Est is one of the largest agricultural and forestry regions of France. Agriculture represents nearly 5 billion euros of added value for the Region. Nearly 25% of the French sugar production; 20% of rapeseed production; 10% of wheat production and 3% of maize production are coming from the Grand Est Region. The Region is also the largest hemp producer in Europe.

The bioeconomy starts in the field. In order to face today and tomorrow's challenges, a former military airbase has been turned into a large experimental farm (500 hectares). The "Ferme 112" objectives are to work on most issues linked to "farming of tomorrow", aiming to produce more with less and dealing with topics such as precision farming, biofertilisers, agri-machinery, etc.

### 4. Financial and other incentives

For more than 30 years, the Region of Grand Est has been supporting and taking a role in large biobased initiatives and bioeconomy projects through the establishment of supportive framework conditions, including capex and opex. For 2017, a budget of €50 million has been adopted to support enterprises in their innovation projects and offer a supporting and predictable regional cosystem.

The Region is also very well connected to BBI and BIC through 2 founding members: A.R.D. and IAR, the French Bioeconomy Cluster. IAR is indeed a member of BIC's board and programming working group as well as a member of BBI's board. Working more specifically in the Hauts-de-France and Grand Est regions, IAR is the perfect gateway to access local and regional stakeholders active in the bioeconomy.

### 5. Web sites

- [www.grandest.fr](http://www.grandest.fr)
- [www.iar-pole.com](http://www.iar-pole.com)

### 6. Key contact

- *Name: Boris Dumange*
  - *Function: Director General*
  - *Email: dumange@iar-pole.com*
  - *Phone: +33 3 23 23 25 25*
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## 7. Short description of the Region

- Country: France, Region of Hauts-de-France
- Region's Capital: Lille
- Location (Figure)
- Population: 6 million
- GDP: 150 908 million euros



## 2. Importance for the biobased industries

The region welcomes several universities as well as research and technology centres with dedicated expertise in renewable resources, the bioeconomy and biorefining, including but not limited to: University of Lille, University of the Littoral Opal Coast, University of Compiègne, the University of Picardie-Jules Verne, UniLaSalle, Agro-Transfert Ressources & Territoires, INRA - the National Institute for Agronomic Research-.

Recently the region has set up a number of specialized OPEN Innovation platform to support companies in the industrialisation of their innovation from lab scale to demo plant (TRL7) in major sectors of the bioeconomy:

- IFMAS - the French institute for biobased materials,
- IMPROVE - the first open European platform for research and development fully dedicated to the valorisation of proteins,
- PIVERT which aims to valorise the oilseed plant into renewable chemicals and energy
- EXTRACTIS, NOUVELLES VAGUES, ADRIANOR & CTCPA, forming together the Food Expert Club in the region Hauts-de-France.

Industries such as Roquette, Welchem, Bostik, Ajinomoto, Tereos, Total, Mäder, Dickson Constant, Avril Group, Lesaffre, Findus or Direct Ocean as well as SMEs and start-ups active in numerous fields of the bioeconomy are also present. These include, first transformation of agricultural products, food and feed industry, chemical industry, automotive industry, building industry, packaging industry, energy industry, textile industry, fishery industry and aquaculture, etc.

These industries are supported through a well-developed and articulated network of innovation clusters covering all aspects of the bioeconomy (renewable resources production, food, feed, fibres, materials, chemicals and bioenergy). IAR - The French Bioeconomy Cluster - is the cluster dedicated to the production and valorisation of renewable resources into bio-based chemicals, bio-based materials, advanced biofuels and biogas as well as food and feed ingredients. Aquimer is dedicated to aquatic products. Matikem focuses on materials development and sustainable chemistry, while UP-Tex is the cluster dedicated to textile innovation. Together, these clusters support the development of competitive, innovative and sustainable bio-based industries in the Hauts-de-France region and in Europe. In the past ten years, they have supported innovation projects in the field of the bioeconomy for more than €1.650 billion. IAR - The French Bioeconomy Cluster is also deeply involved in bio-based innovation projects at European level, seating at the boards of the Bio-Based Industries Joint Undertaking and the Bio-based Industries Consortium.

The bioeconomy is part of the region priorities and its smart specialisation strategy. It was also identified as a top priority of the “third industrial and agricultural

revolution” (REV3) which is driving a large part of the economic and environmental policy of the region.

### 3. Available feedstocks

With more than 2 million hectares of land dedicated to agriculture, the region of Hauts-de-France is a major agricultural region of France. Over 1 million hectares of land are allocated to cereals only (9 million tons). Half of the French sugar production (15% of the European production) is coming from the Hauts-de-France region where 10 of the 25 sugar refineries of the country are located. Nearly two third of the French production of potatoes is based in the region. With almost 10000 hectares of flax production, the region represents more than 20% of the area devoted to the production of flax plants in France. Furthermore, with over 140 kilometres of coastal areas, the region is host to the largest fishery port of France with more than 35 000 tons of fish captured every year and the biggest European port in terms of transformation with over 380 000 tons of aquatic products per year.

### 4. Financial and other incentives

For more than 30 years, the region of Hauts-de-France has been supporting and taking a role in large biobased initiatives and bioeconomy projects through the establishment of supportive framework conditions, including capex and opex.

The region is also very well connected to BBI and BIC through IAR, the French Bioeconomy Cluster. IAR is indeed a member of BIC, its board and programming group. Working more specifically in the Hauts-de-France and Grand Est regions, IAR is the perfect gateway to access local and regional stakeholders active in the bioeconomy.

### 5. Web sites

- [www.hautsdefrance.fr](http://www.hautsdefrance.fr)
- [www.iar-pole.com](http://www.iar-pole.com)
- [www.matikem.com](http://www.matikem.com)
- [www.up-tex.fr](http://www.up-tex.fr)
- [www.poleaquimer.com](http://www.poleaquimer.com)
- 

### 6. Key contact

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## 1. Short description of the Region

From 2010 to 2012 Brandenburg was the Federal state with the greatest economic momentum in Germany. This also reflects the productivity of Brandenburg's industrial sector, which has been above the German average since reunification, recording an increase in the gross value added per employee of around 770% in the period 1991 to 2015. Now, with a value-added rate of 13.6% (2015) the industrial production is a key sector of Brandenburg's economy.

- Region's Capital: Potsdam
- Population: 2.5 Mio.
- GDP (€): 62 billion



## 2. Importance for the biobased industries

Innovations have always been the driving force behind the region's achievements in the context of the national and international competition. However, innovation requires close ties between science and industry. In Brandenburg a clearly positive future development is expected in the biobased sector. Brandenburg's distinctive industrial agriculture and forestry offers excellent resources when it comes to implementing alternative chemical value chains and achieving not only traditional but also bio-based sustainable added value. To this end, the full picture of bio-based value-added chains is set to be brought to life in Brandenburg. With a few large, companies and numerous small and medium-sized enterprises the region has a varied industrial structure that represents a stable basis for future development. Major companies with a high level of biobased economy development include the BASF Schwarzheide GmbH, IOI Oleo GmbH, Greibo-chemie GmbH, Linotech GmbH, and the LXP Group GmbH. The Region is also the backbone of the German Capital region and has several excellent research facilities in this sector, including the Biorefinery Teltow, BTU Cottbus - Senftenberg, FI biopos, Fraunhofer IAP and the Leibniz Institute for Agricultural Engineering (ATB).

Several clusters, including the food industry Cluster, the Cluster healthcare industry, the Cluster energy technology as well as the Cluster plastics and chemistry are involved in promoting the biobased economy development in the region. The development of commercially viable products that can compete with conventional chemical solutions on the market is a key focus. This can be achieved by means of cost-effective production processes and a range of properties that do not replicate conventional chemical products. The production of and demand for bio-based plastics and other polymer materials from renewable raw resources is also a key focus. An existing strength exist in the research of biobased polymers, which is supported by the initiative "Innovationszentrum Bioplastics Lausitz", the biopolymers sector promotes the clustering of research facilities, manufacturing companies and end users. The aim here is to really make the most of this fascinating class of materials in Brandenburg.

Some on-going Projects relevant for the bio economy are:

- Decentralised production and further processing of oligo lactic acid
- Development of new bio-based polyamides for use in WPCs
- Development of improved PLA types
- Developments in the field of compostable tableware

- Proteins out of waste materials for industrial products
- Development of new lignocellulose pretreatment method for the 2G-Sugarplattform

### 3. Available feedstocks

As a territorial state Brandenburg can offer a wide range of different resources. In 2010 the Ministry of Rural Development, Environment and Agriculture of the Federal State of Brandenburg (MLUL) published a Biomass strategy of the state of Brandenburg<sup>2</sup>, which also offered quantities as well as availabilities of feedstocks inside the Region:

- Forest-based industries
  - Forest wood (for material use): 2.17 Mio. tatro
  - Scrap wood from manufacturing industry: 429,600 ta (there of rind: 176,400 ta; sawdust: 207,600 ta; further feedstocks out of the production: 45,600 ta.)
- Agrobased biomass
  - Grains (corresponding straw amounts): 842,185 t
  - Rapeseed (corresponding straw amounts): 123,122 t
  - Maize silage: 1.94 Mio. t
  - Animal manure: 7.6 Mio. t/a
- Bio waste
  - Municipal bio waste: 9,449 t
  - Biodegradable garden and park waste: 71,174 t
  - Slop: 2 Mio. t
  - Sewage sludge: 90,000 t

### 4. Financial and other incentives

The Region participates in different european initiatives. These different initiatives should help to inform companies about new projects, events and potentialities. Moreover they helped to becoming a relay for requirements of the regionale companies.

Also international events about the bio based industrie should help to connect international companies with regional actors.

### 5. Web site

[www.brandenburg.de](http://www.brandenburg.de)

### 6. Key contact

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  - *Phone: 0032 2 737 74 63*
- 

<sup>2</sup> Ministerium für Umwelt, Gesundheit und Verbraucherschutz des Landes Brandenburg 2010. Biomassestrategie des Landes Brandenburg.

### 1. Short description of the Region

Thessaly is located in Central Greece and includes the municipalities of Larissa, Karditsa, Magnesia, Trikala and Sporades. The region's capital is Larissa and has a population of 732,762. The regional GDP is EUR11.6 billion (5% of national GDP).



### 2. Importance for the bio-based industries

Production in the region of Thessaly focuses primarily on agriculture, as the region has 4.7 million m<sup>3</sup> of agricultural land. The region is rich in biomass and hosts 5% of overall Greek biomass energy stations (2.2 MW). The annual energy potential of biomass is estimated at 27,000,000 GJ. Therefore, regarding Bioeconomy the region's priorities lie on the combined support on energy crops and the utilization of secondary biomass from agricultural and other residues. At the same time, it is important to introduce modern technologies such as gasification and anaerobic digestion to produce energy from different sources of biomass (municipal waste, agricultural crop residues and livestock waste).

Several companies (mainly SMEs) engage in Bioeconomy activities; energy companies, such as Agroil Energy and Bioenergy S.A. that produce biofuels from primary and secondary biomass; agricultural companies, such as ALFA SEEDS S.A that are active in energy crops cultivation; and cooperatives, such as the Energy Cooperative Company of Karditsa that is active in processing of agricultural biomass for energy purposes.

Regarding the innovation strategy of the region, the priority lies on the agrofood industry and the exploration of alternative uses for the byproducts that originate from the agricultural sector. Various research organisations are active in Bioeconomy research and projects such as the University of Thessaly and more specifically its department of Biochemistry and Biotechnology. Currently, the University of Thessaly participates in the SIM4NEXUS (Sustainable Integrated Management FOR the NEXUS of water-land-food-energy-climate for a resource-efficient Europe) project, which is funded under H2020 with EUR7.8 million from the EU. Another important research organisation in the region is the Institute for Research and Technology (IRETETH), which has implemented two important projects for innovation strategy implementation; Pole for Thessaly Region (RIP Thessaly) which was running from 2006 to 2010 and 'Smart Innovation Pole of Thessaly Region: Research, Innovation, Strategies' that was running from 2011 to 2015.

### 3. Available feedstock

The available agricultural residues come from cultivation of cereals (straw), cotton, sunflower, nut-cracking industries (nutshells) and olive kernel factories (pomace). This number corresponds to the 17% of the agricultural residues of the country and the potential for biomass use amounts to 22,582,692 GJ (from agricultural residues) and 2,245,353 GJ (from animal waste).

Additionally, it is estimated that 601,531 hectares of the region's land is covered with forests and cultivated trees, while the wood industries, which process 243,447 m<sup>3</sup> of wood, produce forestry residues amounting to 1,324,664 GJ. Finally, the residues originating from processing industries amount to 1,183,500 GJ.



## Main crops in Thessaly with high residue yields

Cotton



Wheat



Sunflower



#### 4. Financial and other incentives

**Supporting and attracting investments in demo & flagships projects:** The effective processing of urban and other waste is at the top priorities of the region's strategy for the next period. That will include the funding of projects for the improvement of waste management in ecologically sensitive areas and areas that are attractive for tourists. Consequently, in the beginning of 2016, a relevant call was announced regarding the establishment of urban waste processing sites, providing funds of more than EUR6 million to local municipalities and municipal water and sewage companies.

The region of Thessaly will be supported through bilateral collaboration agreements that are announced for the period 2017-2020, are and focus on agrofood, energy and the environment. For example:

- joint research projects between Greece and Israel, which is focused on the sectors mentioned above and provides funding of EUR2.45 million to less developed Greek regions including Thessaly
- joint research projects between Greece and Germany, which focuses on agriculture and Bioeconomy and provides funding of almost EUR5 million to less developed regions including Thessaly

The region may purchase bio-based products (e.g. solid biofuels) and act as an anchor tenant for the sale of bio-based products and services until a critical level of public demand is achieved. The role of the University of Thessaly is also important. It has an engineering school, agricultural school, and a biochemistry/biotechnology department that would contribute significantly to the regions effort with R&I activities.

**Connecting BIC industry members to local stakeholders/value chains:** The region will explore the local business and social networks, such as local chambers of commerce, professional associations, citizens' environmental initiatives to aggregate the local demand and supply of biomass. The mobilization of local stakeholders would facilitate the creation of connecting links between the BIC industry members and local industry.

In this context, the region also sees the possibility of collaborating with the Hellenic Bioeconomy network. The network aims at exploring synergies between businesses and at improving local activity in the Bioeconomy, including the creation of clusters around regional pockets of Bioeconomy value chains.

5. Website: <http://www.thessalia-esp.gr>

6. Key contact: Directorate General for the Environment and Spatial Design, Director: Koutsotassios Athanasios, email: [periv.xorsxed@thessaly.gov.gr](mailto:periv.xorsxed@thessaly.gov.gr), phone: +30 2413-506249

### 1. Short description of the Region

Western Macedonia is located in the north of Greece. The region includes the prefectures of Kozani, Florina, Grevena and Kastoria. Its capital is Kozani and has a population of 283,689. The regional GPD is EUR 5.5 billion (2.4% of national GDP).



### 2. Importance for the biobased industries

The region of Western Macedonia is one of the biggest energy producing regions in the country, providing 45% of the national electricity demand. Therefore, the efforts of the region to promote bioeconomy focus primarily on producing bioenergy from agricultural and forest residues. Several bioeconomy sectors - primary biomass production, energy, textiles and clothing, food and R&D - have significant presence in the region. The biomass produced in the region is underexploited.

Several companies (mainly SMEs) engage in bioeconomy activities. Wood companies such as ALFA Wood S.A., Giotas S.A. and Chliapas S.A., cooperatives such as the Agricultural Cooperative DIMITRA and the Pentalofos Forest Management Cooperative, waste management companies such as DIADYMA S.A and development companies such as ANCO S.A. are some examples.

The Regional Authority, research institutes and other key stakeholders have made considerable efforts to improve the policy, socio-economic and R&D landscape regarding the Bioeconomy. Two projects on Bioeconomy have been funded under the Regional Development Fund: BIOCLUS (Developing Innovation and Research Environment in five European Regions in the field of Sustainable Use of Biomass Resources), which was funded with EUR 2.8 million by the EU; and BERST (BioEconomy Regional Strategy Toolkit) which was funded with EUR 1 million by the EU.

There is interest in applied Bioeconomy research, as well. The Technical Research Centre of West Macedonia, and the Laboratory of Thermodynamics of the University of West Macedonia, are two strong R&I players in the region. In addition, the innovation cluster Bioenergy and Environment of Western Macedonia (CluBE) operates in the region. CluBE is active since 2000 and is participating in the project SECURECHAIN (Securing future-proof environmentally compatible bioenergy chains), funded under Horizon2020 with EUR 1.8 million.

### 3. Available feedstock

The region of Western Macedonia is considered to possess the highest levels in biomass resources in Greece originating mainly from the agricultural and livestock activities. Based on estimations, the Region of Western Macedonia produces 6.46% of the available residues of Greece. Approximately half of this quantity comes from Kozani, followed by Florina and Grevena. The residues from the agricultural and livestock sectors consist of: 117,000 tonnes of wheat (dry), 54,000 tonnes of maize (dry), 24,500 tonnes of barley (dry) and 114,000 tonnes of solid animal waste (cattle, sheep and goats).

Additionally, it is estimated that the total quantity of logging residue amounts to 125,000 tonnes per year. Finally, regarding the urban waste, the region of Western Macedonia is estimated to produce 300,000 GJ per year from the biomass generating from urban waste.

## Main crops in Western Macedonia with high residue yields

Wheat



Maize



Barley



#### 4. Financial and other incentives

**Supporting and attracting investments in demo & flagships projects:** One of the most important funding tool for local development is the “Joint European Support for Sustainable Investment in City Areas” -JESSICA, and EUR 10 million belonging to the fund will be allocated to the region Western Macedonia.

The region of Western Macedonia will be supported also through actions of bilateral collaboration that have been announced for the period 2017-2020 and focus on agrofood, energy and the environment. For example:

- joint research projects between Greece and Israel, that focuses on the sectors mentioned above and provides funding of EUR 675,000 to transition regions including Western Macedonia.
- joint research projects between Greece and Germany, which focuses on agriculture and Bioeconomy and provides funding of almost EUR 1.350 million to transition regions including Western Macedonia.

The region may purchase bio-based products (e.g. solid biofuels) and act as an anchor tenant for the sale of bio-based products and services until a critical level of public demand is achieved. The role of the engineering school of the University of West Macedonia is important as it is expected to contribute significantly to the regions effort with R&I activities.

**Connecting BIC industry members to local stakeholders/value chains:** The region will explore the local business and social networks, such as local chambers of commerce, professional associations, citizens’ environmental initiatives to aggregate the local demand and supply of biomass. The mobilization of local stakeholders would facilitate the creation of connecting links between the BIC industry members and local industry.

In this context, the region also sees the possibility of collaborating with the Hellenic bioeconomy network. The network aims at exploring synergies between businesses and at increasing local activity in the bioeconomy, including the creation of clusters around regional bioeconomy value chains.

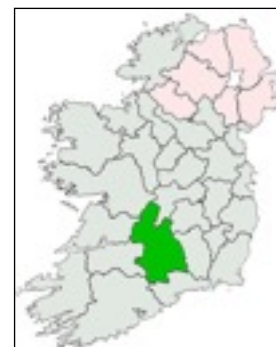
5. Web site: <http://www.pepdym.gr>

6. Key contact: Directorate General for the Environment and Spatial Planning, Director: Theodoraki Maria, email: [mtheodoraki@apdhp-dm.gov.gr](mailto:mtheodoraki@apdhp-dm.gov.gr), phone: +30 2651090241

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1. Short description of the Region

County Tipperary, in Ireland’s province of Munster, is a landlocked rural county that’s home to mountains, rivers, lakes and farmland. **Area:** 1,662 mi<sup>2</sup>; **population:** Population: 160,441 (2016).



2. Importance for the biobased industries



Following surface and underground rehabilitation, the Lisheen mine site is being reconverted to a bio-economy campus that is well served by power, water and waste disposal infrastructure. Vedanta, an Indian based company is the owner and operator of Lisheen. The headquarters for Glanbia, an agri-food multinational with revenues of €3.6 billion, is based circa. 20Kms away. The company is Ireland’s leading dairy company, annually processing 2 billion litres of milk (40% of total national output).

Parts of the MDR circle contains some of the richest agricultural land in Ireland and the world. Ireland’s biological sectors are responsible for significant employment, produce substantial volumes of outputs with formidable financial value, and play a role in feeding an ever-growing global population. The agri-food industry (incorporating fisheries and forestry) employs over 8% of the national workforce, is responsible for 7.6% of total gross value added, and produces exports worth more than €10 bn annually. A number of government strategies are in place to increase production levels and outputs of the agriculture, food, forestry, marine, and renewable energy industries. A specific strategy is required which views these industries as sub-sectors of the bioeconomy as a whole.

The bioeconomy offers opportunities for greater resource recovery from the agri-food processing sector and to underpin both the economic and environmental sustainability of production, through valorising waste streams.

Ireland’s food and beverage industry processes significant amounts of agricultural commodities into finished food and beverage products that are exported globally. The residues which arise from such processing include spent grains from the brewing and distilling industry, whey residues from cheese or casein production, dairy fat from milk processing, spent mushroom compost and stalk cut-offs from mushroom production, various sludges from wastewater treatment, and food crop residues from apple, potato, and other food processing.

3. Available feedstocks

**Agriculture**

The following table provides some of the figures for the amount of farm animals that exist in Ireland.

	Cattle	Sheep & Goats	Pigs	Horses & Ponies	Poultry
Model Demo Region	1,350,000	430,000	320,000	20,000	50,000
Nationally	6,400,000	5,000,000	3,500,000	210,000	70,000,000

Approximately 132 million tonnes of agricultural slurries, wastewaters, effluent, and sludge are generated in Ireland on an annual basis. Forty million tonnes of this is made up of animal slurry that requires active management. Dairy cow waste is expected to increase in coming years due to the abolition of milk quotas.

### Marine

Ireland's coastline, inshore, and offshore waters contain some of the largest and most valuable sea fisheries resources in Europe, with sovereign rights to an area ten times greater than its land mass. Government strategy is to obtain maximum value from marine-derived functional foods, ingredients and bio-materials. The industry employs over 11,000 people. Seaweed is one of Ireland's most underutilised natural resources with an existing annual processing of 30,000 tonnes but with capacity to expand in to the production of various value-added products such as proteins, oils, amino acids, minerals, enzymes, bioactive peptides, collagen, and gelatine.

### Energy Crops

360,000 hectares (8%) of the land in Ireland is used for crop, fruit, and horticulture production. *Miscanthus* and short rotation coppice (SRC) willow are the two most common energy crops grown. *Miscanthus* is grown on approximately 2,400 ha. Plantations are located predominately in the east of the country with plantations in counties Kildare, Offaly, Westmeath, Laois, Wexford, and Kilkenny. Lower chloride in *Miscanthus* makes it more suitable for power generation.

Ireland has a very well developed peat industry and its main operator Bord na Móna which is currently committed in the transition to renewable biomass use, further opportunities and resources are available for bioeconomy purpose.

## 4. Financial and other incentives

Rural Economic Development Zone (REDZ) funding. €100,000 funding was secured from the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs in December, 2016 to facilitate the completion of a feasibility study in to the provision of a Pilot Scale facility in Lisheen. The scope of this study is to assess the viability of repurposing the Lisheen lead and zinc mining site for production of biobased chemicals through new forms of cooperation among industry, research and agriculture, ultimately creating over 1,000 jobs in the region. The Lisheen site boasts a landbank of some 1,125 acres (455 hectares), zoned industrial and the site location benefits from a low population density rural setting with easy access to a high quality road infrastructure.

The output of the feasibility study will assist with the formulation of a business plan for submission to Enterprise Ireland (state body with responsibility for enterprise and job creation) for the Regional Action Plan for Jobs. A fund of approximately €5m will be available for each of the eight NUTS 3 regions in the country, specifically targeted at projects which stimulate rural economic development. The feasibility study will be completed by the Irish Bioeconomy Association with input from the existing members of the association and industry with an interest in developing the bioeconomy in Ireland.

Members of the Association have collectively applied to various funding mechanisms in Ireland for support in Research, Development and Innovation.

Marketing material and collateral is currently under development for the Association.

## 5. Key contact

- *Anthony Fitzgerald*
  - *Business Development Officer, Tipperary County Council and member of the Irish Bioeconomy Association.*
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  - 00353 86 6791757
-



## 1. Short description of the Region

- Country - ITALY
- Region's Capital - BOLOGNA
- Population - 4.450.508
- GDP - 144.257 (mil€)

## 2. Importance for the biobased industries

The bio-economy is a clue topic for the Emilia-Romagna region because of several traditional, consolidated industrial sectors and value chains. The Agrofood industry sector currently has a significant level of production specialization index, high absorption capacity of the enabling technologies and provides specific answers to the social challenges, high export capacity and high propensity to the internationalization with an employment rate of 16.7% (more than 300.000 jobs). It includes several value chains linked to the bio-economy like : agro-forestry feed/food production, transformation (agro industry, machine and packaging); water and solid waste streams; integrated and precision farming; marine fishery and microalgae; etc...

Major companies operating at national/international level (few of them members of the BIC) are: feedstock - Barilla, Granarolo, Conserve Italia, HERA group; biorefinery - Eridania Group, Caviro, Unigrà; bio and traditional products - Liondell Basel, Bio-on, Temix Oleo, CCCP group, Versalis, etc... Emilia-Romagna is also the second region in Italy for biogas production and valorisation.

Emilia-Romagna research system counts 6 universities (with a total number of 140.000 students and more than 3000 researchers) and a number of National Research Institutes (CNR, ENEA, etc...). The excellence and capacity of the overall research system to finance regional bio-economy project is better shown by the capacity of the research/innovation system to succeed in the European programs, namely: from 7FP a fund leverage capacity of more than 24Mil€ and in H2020 a value of more than 14Mil€ so far. Relevant is also the agro-bio sector number of EU patents 89 whereas 707 students got a PhD degree (2016 data).

The Emilia-Romagna hosts 2 Technological Platforms recorded in the European Cluster Collaboration Platform (<http://www.clustercollaboration.eu/>). Moreover, several actors are member of the National Thechnology Cluster - SPRING (Green Chemistry, ), leveraging the regional context toward the national one.

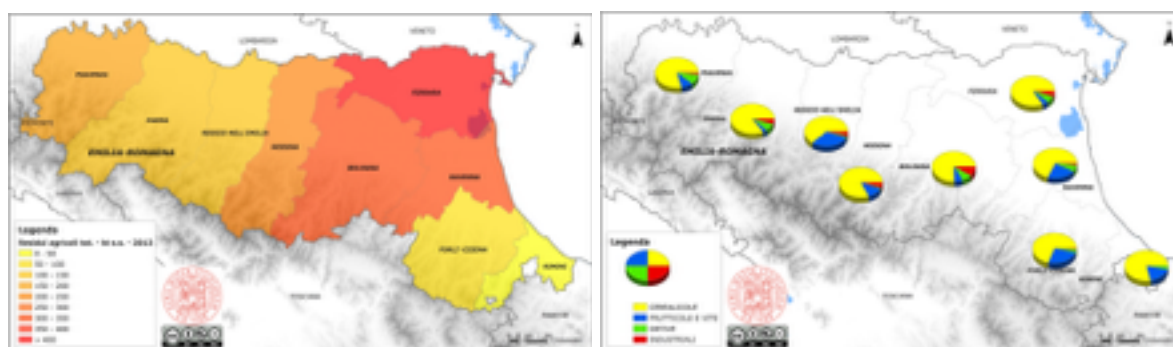
The bio-economy is included the Emilia-Romagna Smart Specialisation Strategy (S3). It is part of the ESIF programme in both ERDF and EAFRD. Moreover, the regional policy is fully integrated in the national Bioeconomy Italian Strategy recently launched ([http://www.agenziacoesione.gov.it/opencms/export/sites/dps/it/documentazione/NEWS\\_2016/BIT/BIT\\_EN.pdf](http://www.agenziacoesione.gov.it/opencms/export/sites/dps/it/documentazione/NEWS_2016/BIT/BIT_EN.pdf)).

As far as strategic projects, due to the presence of two industrial area (hosting traditional refinery), located in Ferrara and Ravenna, an investment on the reconversion in bio-refinery multipurpose and multi-technology is foreseen. These industrial areas are closely connected with 2 others in the rest of Italy (Mantova, Lombardy and Porto Marghera, Veneto) showing a strategic synergies in terms of logistics, private investment and policies (source University of Bologna, University of Ferrara and ASTER private communication).

The Emilia-Romagna region is member of the Vanguard Region Initiative. A pro-active collaboration on the 7 Bioeconomy foreseen demo cases is ongoing. Moreover, the Region is participating at the Thematic Platform of the Smart Specialisation Platform cooperating in the bio-economy topic of the Industrial Modernisation thematic platform (<http://s3platform.jrc.ec.europa.eu/industrial-modernisation>).

### 3. Available feedstocks

A detailed mapping of the overall regional feedstock has been specifically financed by the region. The novelty of the mapping is the qualitative and quantitative calculation and their GIS localisation (relevant to design the logistic). Some figures are here presented in few pictures (source University of Bologna private communication, detailed data available on request).



As far as forestry feedstock, despite the forest-based industries is not a strategic one it can counts on around 1million of ton/y of available biomass. Urban bio-waste is largely collected and used as composting material; no data is available on CO2.

### 4. Financial and other incentives

The implementation of the ESIF policy is ongoing: priorities have been set both at ERDF and EAFRD programs and a lot of funds have been already allocated in the territory. Currently the total amount of ERDF found that have been already invested are 52Mil€ allocated to more than 120 innovation projects financed in bio-economy at a glance. Article 70, giving the opportunity to allocate 15% of the funds out of the regional territory, is applicable. The total amount of the regional EAFRD is around 513Mil€ (40% allocated to agriculture sustainability, i.e. including bio-economy).

The region counts BIC members, with particular reference to the University of Bologna. Moreover, the region host the Innovation and Technology Transfer Agency ASTER having the mission to build the Regional Innovation System, by launching shared actions, projects and collaborations for integrated innovation of industry and competitiveness.

### 5. Web site: [www.aster.it](http://www.aster.it)

### 6. Key contact: Name - Daniela Sani, Function - National and International Project Manager, Email - [daniela.sani@aster.it](mailto:daniela.sani@aster.it), Phone +39 051 6398099



### 1. Short description of the Region

- Country: Italy
- Region's Capital: Milan
- Location
- Population: 9.871.278 (Istat 2013)
- GDP: 359.047 M€, 21,9% National GDP (<http://www.asr-lombardia.it/> 2015)

### 2. Importance for the biobased industries

- Importance of some strategic sectors
  - i) Precision farming; ii) Nanotechnologies; iii) Composite industry
- Research organisations engaged on “bioeconomy related topics“
  - i) PTP Science Park (<http://www.neptune-project.eu/>); ii) Politecnico Milan - Bioenergy Factory; iii) CNR - National Council of Research; iv) University of Milan, v) University of Insubria
- Presence of bioeconomy clusters?
  - i) Green Chemistry; ii) Agri-food (CAT.AL)
- Regional bioeconomy strategy or ongoing bioeconomy regional projects / policies
  - i) Production systems for sustainable bioresources; ii) Sustainable ingredients for competitive agri-food industry; iii) Renewable resources technological evolution; iv) Novel biorefineries for integrated production of added value products from no food crops and agri-food residues
- Collaborations with other regions in the area of the bioeconomy
  - National Technology Cluster of “Green Chemistry” SPRING

### 3. Available feedstocks

- From the agro-based industries
  - Maize stalks, Livestock manure, Tomatoes processing, Rice residues, Fruit processing, Dairy product processing
- From the forest-based industries
  - Residues from forest, Vineyard, Fruit trees management
  - Co-products, side streams, and residues from the wood industry (e.g. furniture)
- From the aquatic-based industries
  - Feedstock originating from fresh water aquaculture, the fish and the fish processing industries
  - Co-products, side streams and residues from the fish and the fish processing industries
- Bio-waste and CO<sub>2</sub>
  - Biodegradable garden and park waste
  - Food and kitchen waste from households, restaurants, caterers and retail premises



- Waste water and sludge
- CO2 from processing operations

#### 4. Financial and other incentives

- *What can the region do to support/attract investments in demo & flagships projects*
  - 17,2 M€ invested, among others, in pilot projects and Innovation Development, integrated projects within agri-food value chains; 66 M€ invested, among others, in the creation, cooperation and management of Local Action Groups (GAL) within the community led local development strategy
- *What can the region do to connect BIC industry members to local stakeholders/ value chains*
  - Regional Technological Clusters; Open Innovation Platform

#### 5. Web site: <http://www.regione.lombardia.it/>

#### 6. Key contact(s)

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### 1. Short description of Region :

- Netherlands
- Delta Region (part of West Netherlands (Randstad) and part of South Netherlands): <https://biobs.jrc.ec.europa.eu/country/biobased-delta-zeeland.nl>
- Location (Figure)
- Population : 6.5 Million
- GDP: 240 B euro



### 2. Importance for the biobased industries

- Importance of some strategic sectors: Agro and Agro-Food (Cosun, Cargill, Lamb Weston) the Chemical sector (Antwerp -Rotterdam- Rhine-Ruhr cluster); all international operating chemical companies, the logistics sector with deep sea harbors, Energy sector
- Research organisations engaged on “bioeconomy related topics“ TU Delft, TNO, ECN, BE-Basic, WUR, VITO, CoE BBE, “Bioeconomy related relevant recent and/ or on-going projects” <http://biobaseddelta.nl/pagina/over-biobased-delta/redefinery>; [www.Biorizon.eu](http://www.Biorizon.eu); <http://biobaseddelta.nl/pagina/over-biobased-delta/sugar-delta> ; <http://biobaseddelta.nl/pagina/over-biobased-delta/sugar-delta> ;
- Presence of bioeconomy clusters : Biobased Delta [www.biobaseddelta.nl](http://www.biobaseddelta.nl) , a Triple Helix cooperation of companies, knowledge institutions, regional economic development agencies and governments in the three provinces of the Dutch Delta region: Zuid-Holland, Noord-Brabant and Zeeland.
- Regional ongoing bioeconomy policy: RIS3 Policy Document Z-NL (September 2013) and OP West (November 2014).
- Available regional infrastructure for various biobased activities/developments incl. Bio Process Facility, CoE Plantcompounds, Nieuw Prinsenland, Green Chemistry Campus, Bioport Rotterdam) BioBase Europe, Rusthoeve and various application centers
- Collaborations with other EU regions in the area of the Bioeconomy: Flanders, NRW, Sachsen-Anhalt , Humber valley (Biovale), Northern France (IAR).

### 3. Available feedstocks

- From the agro-based industries
  - Feedstock originating from the agriculture and agro-food industries
  - Agricultural crops: sugar beet (3 Mio ton), potatoes (> 1 Mio ton) wheat and corn (starches)
  - Co-products, side streams, and organic residues from the agriculture, including animal manure and from the agro-food industries, including residues from food processing plants
- From the forest-based industries
  - Feedstock originating from the forest and forest-based industries, both local (Staatsbosbeheer) and imported pellets and chips

- From the aquatic-based industries
  - Feedstock originating from the aquatic and aquatic-based industries, including among other aquaculture , the fish and the fish processing industries and macro-algae
- Bio-waste and CO2
  - Biodegradable garden and park waste (GFT), waste from greenhouse crops
  - Food and kitchen waste from households, restaurants, caterers and retail premises (Duynie, Bewa)
  - Waste water and sludge
  - CO2 from processing operations (fermentation, process industry)



#### 4. Financial and other incentives

- What can the region do to support/attract investments in demo & flagships projects

<https://www2.deloitte.com/nl/nl/pages/manufacturing/articles/competitive-position-of-the-biobased-delta.html>

- What can the region do to connect BIC industry members to local stakeholders/ value chains Connection2SME, Multi-stakeholder Network, Relevant programs, Business development Day, Internationalization (BIG-C, 3BI and Vanguard Bioeconomy Pilot)

<http://www.3bi-intercluster.org/home/>; <http://www.be-basic.org/international/big-c.html>; <http://www.s3vanguardinitiative.eu/cooperations/bio-economy-interregional-cooperation-innovative-use-non-food-biomass>;

Additionally, the region has various Economic Development Agencies working together on the Biobased Economy: InnovationQuarter, REWIN, BOM and Impuls (i.e. co-funding, business development for innovative SME's).

#### 5. Web site

[www.biobaseddelta.nl](http://www.biobaseddelta.nl)

#### 6. Key contact(s)

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### 1. Short description of the Region

Northern Netherlands - also known as Chemport Europe - contains 1.7 mln inhabitants. The region has a total of 125.000 companies (99% is SME), with 454.000 employees and a production value of ca. € 65 bln. (without yield of natural gas). The region is formed by the provinces of Groningen (capital Groningen), Drenthe (capital Assen) and Friesland (capital Leeuwarden).



### 2. Importance for the biobased industries

Chemport Europe is well equipped to become one of the leading regions in Europe of cross-sectoral industrial cooperation when it comes to green chemistry/biobased economy. The economic activity is determined by a strong chemical industry (with international companies like Teijin, DSM and AKZO Nobel), an efficient arable and dairy farming sector, and a strong agro-food industry (e.g. COSUN, AVEBE, FrieslandCampina). Our region has two major integrated chemical clusters complementing each other: The Delfzijl cluster focuses on intermediate chemicals and aims for expanding towards green alternatives; The Emmen cluster holds a top-3 position in Europe in innovative (bio)polymers and industrial fibres. The enormous potential of the region is also being recognized by the EU. In 2016 Groningen-Drenthe received the status of Model Demonstrator Region Sustainable Chemistry.

A dense web of small and medium sized enterprises is very active in regional biobased projects. This includes SMEs that develop breakthrough technologies assisting:

- ✓ new biorefinery processing (e.g. Bioclear, Imenz, Syncom: process technology, biotechnology, advanced separation technologies),
- ✓ actual production of green chemicals (e.g. BioBTX, Cumapol, BioFuran: aromatics from wood-chips, collaborative production of bio-PET, furans),
- ✓ use of new (biobased) functional polymers building blocks and materials (API, Dynaplak, KNN Bioplastics, Machinefabriek Emmen, Drentea: biopolymers for industrial applications, advanced starch technology for coatings, paints, binders and glues, production of bioplastics from wastewater, bio-composites in civil construction applications, 100% biobased office furniture)
- ✓ use of natural fibers in industry (Dunagro, Hempflax, KNN Cellulose: use of hemp fibres in automotive, constructions and textile-industry: and refinery of cellulose from waste for use in paper & board industry and in road construction, in biocomposites and production of biofuels and bioplastics)

The video North4Bio gives an fairly well impression of the biobased developments in the Northern Netherlands: <https://www.youtube.com/watch?v=NDPol-JaF6o> .

#### *Knowledge Institutes*

BERNN is the alliance of the University of Groningen and the four Northern Universities of applied sciences (GreenPAC/Stenden, van Hall Larenstein, NHL, and Hanzehogeschool). All universities are specialized in specific biobased topics (e.g. biotechnology, smart polymeric materials) and therefore are mainly complementary. The shared ambition is to strengthen the position of green chemistry in the region. It is a demand-driven cooperation between business and knowledge institutes.

### 3. Available feedstocks

The Netherlands are second in world ranking on agricultural export. Within our country Chemport Europe is even more well-known for its high agricultural productivity, which in particular applies to sugar beets, potatoes, grain and dairy products.



### 4. Financial and other incentives

In various ways regional governments support biobased project and business development. First of all by co-financing OP-EFRO and INTERREG projects. Also they act as launching customer for new innovative products. Furthermore required preconditions are offered. BIC industry members who want to connect to local value chains best contact regional cluster organizations like Greenlincs and business development green Chemistry Drenthe (the latter in particular when it comes to (bio)polymers, (bio)composites and fibres). Both organisations focus on project- and business development and act as intermediates.

### 5. Web sites: [www.chemport.eu](http://www.chemport.eu) (English) and [www.biobaseddrenthe.nl](http://www.biobaseddrenthe.nl) (Dutch)

Recently enterprises, knowledge institutes and governments joined forces by setting up an overall value proposition regarding green chemistry/biobased, called Chemport Europe ([www.chemport.eu](http://www.chemport.eu)).

### 6. Key contact(s)

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  - Roel Haverkate (Province of Drenthe; [r.haverkate@drenthe.nl](mailto:r.haverkate@drenthe.nl); +31 6 31671268)
-



### 3. Available feedstocks



The region's most advantageous natural resource is a rich marine biomass. Møre og Romsdal has the highest volume of fish landed in Norway, and has an excellent position to achieve a significant role in the production of marine proteins and the global supply of food. Møre og Romsdal is the region in Norway with the highest exports of seafood. In 2015, the region alone generated NOK 16.6 billion in seafood exports, more than 23% of the national total. It is also the region with the highest level of processing activity, and consequently the largest producer of trimmings.

### 4. Financial and other incentives

The ambition for the BLUE LEGASEA members is to maximize value creation from marine raw materials and by-products that can help in addressing socioeconomic and quality of life-related health issues in a sustainable manner, and thereby become a major driver in establishing a global model for the bioeconomy. This requires innovation and technology development in all levels of the value chain. One of the main strategies of the Blue Legasea is to utilize the power of a regional industrial cluster to strengthen, create and leverage regional-national-international partnerships that build new competence in resource utilization, processing technology, applications and market/ consumers demands. Crossover benefits of generic ideas, technology development and production strategies are expected impacts of cooperation across bioeconomy sectors.

Implementation of the new regional R&I strategy will comprise relevant actions from regional authority for supporting and building the necessary competence, knowledge and networks in the biomarine industry.

5. Web site <http://www.legasea.no>

### 6. Key contact(s)

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Illustrations by the courtesy of Blue Legasea/ÅKP.

## 1. Short description of the Region

Regional capital: Bodø (50 000 inhabitants)

The region is in Northern Norway. Nordland is in area the second largest of Norway's 19 counties. It is situated in the north of Norway, and has about 240 000 citizens. The Arctic Circle is passing through the region. The region has a long coastline of about 800 km. The population is about 243 000. GNP is about on average of EU.



The key industries are fisheries and offshore petroleum exploration. Amongst Norwegian counties, Nordland is one of the largest exporters of raw materials, industrial goods, energy and fish products. 65 % of export from Northern Norway come from Nordland. Nordland is amongst the world's prime salmon producers and exporters. Helgeland, the part of Nordland county that is located south of the Arctic Circle, has the second largest industrial cluster in Norway.

is located south of the Arctic

## 2. Importance for the biobased industries

**Traditional fishery** is an important sector. The sector is dominated by smaller fisher boats. They catch the fish along the coast and deliver the catch to processing industry. The most important fishery is the cod fishery in the winter time. There is also a number of bigger boats like trawlers. Their main fishery is cod and herring.

More than 90% of the catch is exported to the international market.

**Fish farming - aquaculture** - started in Norway about 1968. Today Aquaculture is one of the largest businesses in coastal Norway. The production and is growing rapidly. Nordland County has the largest production among Norwegian counties

Salmon is the main species in Norwegian aquaculture and the largest fishfarm product. Today there is a growing interest for algae farming and aquaculture of new marine species such as spotted wolffish, lumpfish and ballan wrasse. Norwegian Centre of Expertise (NCE) in Aquaculture is located in Bodø, and is the main aquaculture cluster in Norway. A network among algae farmers is established.

Connected to the aquaculture and fish industry is also businesses in fish feed, shipbuilding, equipment for production, transport, financing all other production along the value chain. The utilization of marine resources (e.g. makro- and mikroalgae) as feed ingredients and feed additives is one of the regional innovation activities to increase sustainability and welfare in fish farming and animal husbandry.

The main product from the fishery sector is food processing. The food processing industry employ a large number of people. Some of the factories are owned by international firms, but most of the industries is smaller and local own.

### Agro-based industries & available feedstocks

The agro industry has the basis in the high quality of grassland. The main production is the milk sector. Sheep production is the second largest farm product after milk and meat from cattle. The Sami people have an ethnic-based reindeer production.

The agro business in Northern Norway have focus on the clean nature in the arctic as quality criteria for production in the north



Processing of farmed product from Nordland is done by two cooperative industries (TINE milk and NORTURA meat), plus a few smaller firms.

### Forest

The forest sector is not very big in spite of a quite large natural production. Some volume goes to biofuel (Fire wood). Some volume goes to smaller sawmills and some Spruce are delivered to paper mills outside the county.

## 4. Financial and other incentives

Nordland County Council is an active participant on the international arena using internationalisation as a tool to improve the region's competitiveness and attractiveness.

### Education and research

At the Nord universitet/ Nord University ([www.nord.no](http://www.nord.no)), the Faculty of Biosciences and Aquaculture (FBA) has activities within both the blue and the green sector. The scientific fields covered by FBA are Aquaculture, Ecology, Genomics and Animal science, production and welfare.

### Regional strategy

Nordland County Council has made a Smart Specialization Plan. Bio economy with focus on the blue sector is one of three prior sectors.

### Nordland Strategies regarding aquaculture<sup>3</sup>

In its continuous efforts to upgrade aquaculture activities, Nordland has:

- Evaluated alternative and more sustainable management systems
- Contributed to the establishment of coastal zone plans (aerial planning)
- Prevented the spread of salmon lice and escape of farmed salmon (R&D-support)
- Identified bottlenecks for value creation based on marine resources
- Established a Marine Innovation Programme
- Contributed to the development of closed sea cages for environmental friendly production (R&D-support)
- Established a venture capital fund for the marine industry (under work)

## 5. Web site [www.nfk.no](http://www.nfk.no)

## 6. Key contact(s)

Eivind Sommerseth, senior advisor in the Confederation of Norwegian Enterprises [esommers@gmail.com](mailto:esommers@gmail.com)

Margarita Novoa-Garrido associated professor at Nord University and Leader for the Aquaculture Group. [Margarita.Novo-Garrido@nord.no](mailto:Margarita.Novo-Garrido@nord.no)

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<sup>3</sup> Source: <http://s3platform.jrc.ec.europa.eu>

### 1. Short description of the Lodzkie Region

- Region's Capital - Lodz
- Location - Central Poland
- Population - 2.5 million
- GDP per capita - 9 991 EUR (2014)



### 2. Importance for the biobased industries

- Lodzkie is an agricultural region (72% of its area). It is specialized in production of fruits (apples, plums, berries), vegetables (tomatoes, potatoes, onion, carrots, cabbage) and champignons. Forests (3.9 thousands km<sup>2</sup>) occupy 21% of the region area. Major companies of the agri-food sector: MASPEX, AGROSAD, ROJA.
- Development of bioeconomy is supported by 3 universities in Lodz, BioNanoPark, Institute of Biopolymers, Institute of Horticulture (Skierniewice) and UNESCO Ecohydrology Center.
- Technical University of Lodz is coordinating activities of the Polish Technology Platform for Bioeconomy bringing together stakeholders from industry, academia, NGOs, and farmers.
- Lodzkie has declared itself as a bioregion, however, it has no regional bioeconomy development strategy. Implementation is carried out according to the smart regional strategy RIS3 which is oriented on bioeconomy (agriculture, medicine, pharmaceuticals, cosmetics, textile, green energy, green buildings)
- Lodzkie is coordinating the Central and Eastern European Bioregions Forum which is aimed at networking bioregions, developing common strategies and carrying out joint projects in this part of EU.

### 3. Available feedstocks

- **From the agro-based industries.** Lodzkie has large side streams and residues from the fruit (horticulture) and vegetable agriculture as well as from the agro-food industries mostly composted and recycled to the fields, a partially fermented and gasified in biogas units (15 MW)



Konopnica  
and Lodz  
Biogas Plants

- **From the forest-based industries.** Timber production reaches 1.2 Million m<sup>3</sup> and slush and crumbled wood 0.1 Million m<sup>3</sup>. Significant part is co-fired in the conventional coal-based power plants.

- **Bio-waste and CO<sub>2</sub>.** Industrial wastes - 8.0 million tons (only 1.3 million tons is recycled), communal wastes - 0.6 million tons (only 12% in selective collection), waste water and sludge - 120 hm<sup>3</sup>.  
In Lodzkie we have the largest point emission source in EU with 37 million tons of CO<sub>2</sub> from the Belchatow Power Plant (lignite based).

#### 4. Financial and other incentives

- The Lodzkie is responsible for the Regional Operational Programme (ESIF) with the 2.1 Billion euro budget. A considerable part of it goes to ecology, water, energy, agriculture, green buildings, research and technology development for bioeconomy.
- The Lodzkie is running two initiatives:
  - The European Bioeconomy Congress in Lodz (November 9-10, 2017) with specialized sessions, focus on industry and awareness campaign. In 2016 we prepared the Lodz Declaration of Bioregions - a strategic document with an Action Plan for Biocommunities.
  - The Central&Eastern European Bioregions Forum aimed at networking, knowledge sharing, support to Biocommunities, education, creating synergy with ESIF. In October 2016, we have signed a Letter of Intent between Bioregions and BBI JU/BIC defining a framework for close collaboration (INFO Days, mobilising clusters, SMEs, definition of R&D topics)



280 km<sup>2</sup> of orchards in Lodzkie

(by Glysiak, CC BY-SA 4.0)

#### 5. Web site: [www.lodzkie.pl](http://www.lodzkie.pl)

#### 6. Key contact

Dr Andrzej Siemaszko

Advisor to the Marshal of the Lodzkie Region

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+48 664 032 122

## 1. Short description of the Region

- Poland, Lubelskie Voivodeship
- The capital of the region: Lublin
- Population: 2 156 150
- GDP per capita: 30, 477



## 2. Importance for the biobased industries

- Regional bioeconomy strategy or ongoing bioeconomy regional projects / policies:

There are four areas of smart specialization of the Lubelskie Voivodeship: bioeconomy, medicine and health, information technology and automation, low-carbon emission energy. Bioeconomy is the key smart specialization and covers all types of economic activity based on biotechnology, especially: crop and animal production, feeds manufacture and agri-food processing, pharmaceutical and chemical industry, renewable energy sources (biorefineries, biofuels), public health and environmental industries and services (eco-business), including the management of pollution level and management of efficiency of resource use.

- Importance of some strategic sectors important for the (future) bioeconomy

According to the results of social debates, based on the applications submitted we can identify the main sectors: highly specialized agriculture, nursery production, cultivation of herbs, energy crops (21% of applications), manufacture of food and food related products (19%), biotechnology (4%), chemical industry and manufacture of fertilizers, pharmaceuticals, cosmetics, biodegradable products (2%), timber industry and manufacture of furniture (2%), environmental protection and smart technologies in agriculture (2%).

The major companies: Nitrogen Puławy SA (Azoty Puławy Group), Frutivitaland Sp. z o.o., "Herbapol - Lublin" SA, Materne - Polska Sp. z o.o., Agram SA, Farm Greenhouse "Leonów" Sp. z o.o, manufacture of beverages: Nałęczów Zdrój, BioMaxima SA, Flamingo Biotech Sp. z o.o, OBST SA.

- Research organisations engaged on "bioeconomy related topics": The Institute of Agrophysics of the Polish Academy of Sciences, the Institute of Rural Health, the Institute of Soil Science and Plant cultivation- State Research Institute, the National Veterinary Institute, the Institute of New Chemical Synthesis, the Biological Threats Identification and Countermeasure Centre of the Military Institute of Hygiene and Epidemiology in Warsaw, the Apiculture Division of the Institute of Horticulture in Skierniewice, Lublin Science and Technology Park
- Presence of bioeconomy clusters: The Lublin Biotech Cluster, the Organic Food Valley, the Lublin Cluster of Food Industry, the Lublin Cebularz
- Collaborations with other regions in the area of the bioeconomy: The Lubelskie Voivodeship takes part in the S3 platform and in the Bioregions Platform.

### 3. Available feedstocks:

NAME	Grain- Total	wheat	rye	sugar beets	rape and turnip rape	oil seeds	flax	field vegetables	tree fruits	berries
	harvest	harvest	harvest	harvest	harvest	harvest	harvest	harvest	harvest	harvest
	total	total	total	total	total	total	total	total	total	total
	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015
	[dt]	[dt]	[dt]	[dt]	[dt]	[dt]	[dt]	[dt]	[dt]	[dt]
LUBELSKIE	30272303	13674509	1534736	16746341	1614672	1724833	3546	3646705	5464619	2195476
POLAND	10,81%	12,48%	7,62%	17,88%	5,98%	6,2%	72,2%	9,6%	15,3%	42,4%

NAME	Co2
	2015
	[t/r]
POLAND	209 961 550
LUBELSKIE	4 978 698
PARTICIPATION	2,4%

FORESTS	TOTAL
	2015
	[m3]
LUBELSKIE	1897286
PARTICIPATION IN TOTAL	4,7%

- kitchen and garden residues-160 754

- residues from green areas maintenance-24 005



### 4. Financial and other incentives

One of the proposals may be an approach based on co-operation of pilot plants, demonstration and production within the network. In addition, proposition including expansion of activities in the regions - in a coordinated way using the latest technology, or through the implementation of bottom-up initiatives. To connect BIC industry members to local stakeholders, the Lubelskie Voivodship can play a role of an informative platform, can provide information about the project to the stakeholders during the meetings, conferences and trainings and present the actual data on the website.

### 5. Web sites

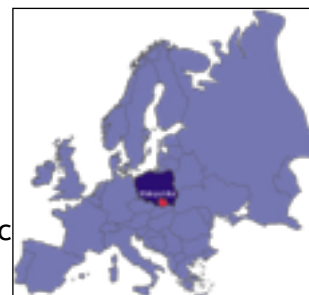
<http://www.invest.lubelskie.pl/en>, <http://www.rsi.lubelskie.pl/>

### 6. Key contact(s)

- *Elwira Rycaj, Head of the Lublin Centre for Research on Innovativeness (LCBI)*
- [elwira.rycaj@lubelskie.pl](mailto:elwira.rycaj@lubelskie.pl), +48 81 5371625
- *Joanna Uniłowska, Department of Economy and International Cooperation*
- [joanna.unilowska@lubelskie.pl](mailto:joanna.unilowska@lubelskie.pl), +48 81 537 16 56

### 1. Short description of the Region

- **Country:** Poland
- **Region's Capital:** Kraków
- **Location:** southern Poland, borders Slovakia, geographic coordinates for Kraków: 50° 4'N 19° 56'E
- **Population:** 3 372 618 (2015)
- **GDP/capita:** € 10.072 (2015)



### 2. Importance for the biobased industries

- **Strategic sectors important for bioeconomy:** Circular economy sectors: biorefineries and energy, biomass processing, waste re-use; organic synthesis (including GMM), biotechnology.
- **Major companies:** AZOTY Group S.A., SYNTHOS S.A., CP Recycling Organizacja Odzysku Opakowań S.A., ELTECO POLAND S.A.
- **Research organisations (projects):** Faculty of Biochemistry, Biophysics and Biotechnology of the Jagiellonian University (Plant Physiology and Biochemistry). Małopolska Centre of Biotechnology (Bioremediation/phytoremediation); Institute of Catalysis and Surface Chemistry Polish Academy of Sciences (Materials and catalytic processes for sustainable development); AGH-EIT InnoEnergy (Renewable energies);
- **Clusters:** Klaster LifeScience Krakow, Sustainable Infrastructure Cluster (both recognized by Ministry of Development Poland's Flagship Clusters); South Poland Cleantech Cluster;
- **Regional bioeconomy strategy:** unofficial document - pending.
- **Collaborations:** *Vanguard Initiative Bioeconomy Pilot* - it concerns the implementation of synergies in new biobased value chains across regions based on smart specialisations of the regions. 20 partner regions co-led by Randstad & Lombardy region. *Central and Eastern European Bioregions Forum* - a memorandum of understanding for coordinated development of bioeconomy based on new technologies and partners' experience. 8 partner regions.

### 3. Available feedstocks

Based on following categories (quantified if possible):

- From the agro-based industries
  - Energy crops > 154ha (potential 6 687 [TJ/year])
- From the forest-based industries
  - Energy and forestry solid biomass waste (potential 17 066 [TJ/year])

- Solid waste: > 8 Mt (13% municipal , 87% industrial, growing supply and implemented segregation and recycling)

In general limited supply of biomass, mostly wood waste - 100% utilization

#### 4. Financial and other incentives

- *The Business in Malopolska Centre (CeBiM)* is a unique initiative in Poland, aimed at improving investor and exporter services and economic promotion of the region.

The Business in Malopolska Centre is comprised of: a regional development institution - the Malopolska Regional Development Agency (joint stock company), local government - the Marshal's Office of the Malopolska Region, and one of the most important institutions supporting foreign direct investments - Kraków Technology Park (limited liability company) and Malopolskie Parki Przemysłowe Sp. z o.o.

- *Life Science Park* is - a complex of buildings with a total area of 20,000 sq m. It offers services for LS (biotechnology, biomedicine, biology, chemistry, pharmacology, physics, nanotechnology and environmental protection) entrepreneurs and scientists such as: rental of specialized laboratories, financial support for innovative companies, contractual research and clinical trials, and numerous educational initiatives.
- *JCI Venture* - Malopolska based Life Sciences-oriented venture and seed capital funds.

#### 5. Web site: [www.malopolska.pl](http://www.malopolska.pl)

#### 6. Key contact(s)

- Robert Maciaszek
  - Director, Department of Economic Development
  - [rg.sekretariat@umwm.pl](mailto:rg.sekretariat@umwm.pl)
  - +48 12 63 03 444
-

## 1. Short description of the Region

- Country: Poland
- Region's Capital: Warsaw (Warszawa)
- Location (Figure):
- Population: 5,3 million (2015)
- GDP: 91 188 million EUR (2014)



## 2. Importance for the biobased industries

- Bioeconomy is a part of the regional smart specialisation, included in the areas of 'food safety' (e.g. agri-food processing industry), 'intelligent management systems' (e.g. waste management systems) and 'high quality of life (e.g. biomaterials, health industry). Bio-based industries are also mentioned as the key development areas in The Strategy for the Development of Central Poland to 2020 with the prospect of 2030, implemented together by Mazowieckie and Łódzkie Voivodeship.
- Mazowieckie is a member of 'Bioregions of Central and Eastern Europe' cooperation platform, coordinated by Łódzkie Voivodeship. The aim of the platform is strengthening regional bioeconomy policies and creating environment for joint development initiatives.
- Mazowieckie regional economy is highly diversified and offer potential in many areas. However, from the point of view of the bio-economy the most significant industries are:
  - agri-food, especially fruit, vegetable, milk and meat processing,
  - pharmaceuticals and cosmetics,
  - chemistry associated with materials and energy.
- Warsaw is the seat of Poland's most notable scientific institution dedicated to the field of bioeconomy - Warsaw University of Life Sciences. In addition to teaching, the University conducts research in the field of natural sciences, as well as in economic, humanities and technical sciences.
- In Mazovia operates a broad spectrum of scientific institutions conducting research in the field of bioeconomy, and the centers involved in the transfer of technology. Among them it is worth mentioning: International Institute of Molecular and Cell Biology in Warsaw, Institute of Organic Chemistry of the Polish Academy of Sciences, Mazowieckie Science and Technology Park - Park Cooperative in Płońsk, Research Centre of the Polish Academy of Sciences - Energy Conversion and Renewable Sources in Jabłonna.
- There are several clusters active in bioeconomy in Mazowieckie, e.g.:
  - AgroBioCluster aiming at development of agriculture bio-economy,



- BioTechMed Cluster Mazovia - a network of cooperation in the field of medicine and medical biotechnology,
- Mazovian Cluster of Energy Efficiency and Renewable Energy Sources (Mazowiecki Klaster Efektywności Energetycznej i Odnawialnych Źródeł Energii),
- Biomedical Engineering Centre Cluster.

### 3. Available feedstocks (approximate production in 2015)

- From the agro-based industries
  - cereals (2,6 million t), including wheat (585 thousand t), rye (318 thousand t), triticale (687 thousand t), oats (233 thousand t), barley (137 thousand t), corn (255 thousand t)
  - legumes (11 thousand t), potatoes (658 thousand t), sugar beets (621 thousand t)
  - oil crops (102 thousand t) including canola (99 thousand t)
  - field vegetables (491 thousand t), including cabbage (138 thousand t), cauliflowers (26 thousand t), onions (58 thousand t), carrots (74 thousand t), beets (53 thousand t), cucumbers (37 thousand t), tomatoes (27 thousand t)
  - fruits (1,7 million t) including apples (50,9 thousand t), strawberries (50,9 thousand t)
  - livestock slaughter (1,1 million t)
  - milk (2,8 billion l)
  - co-products, side streams, and residues from the agriculture, including animal manure and from the agro-food industries, including residues from food processing plants
- From the forest-based industries
  - feedstock originating from the forest and forest-based industries, e.g. forest fruits (357 t), berries (210 t), mushrooms (105 t), game animals carcass (173 t)
  - timber harvest (2,4 million m<sup>3</sup>)
  - co-products, side streams, and residues from the forest and forest-based industries, including the wood industry, saw mills, paper and pulp
- Bio-waste and CO<sub>2</sub>
  - biodegradable garden and park waste
  - food and kitchen waste from households, restaurants, caterers and retail premises (the mass of municipal waste generated per capita: 311 kg)
  - waste water and sludge (sludge from industrial wastewater treatment plants: 45 thousand t; industrial wastewater discharged: 2,4 million dam<sup>3</sup>)
  - CO<sub>2</sub> from processing operations (24 million t)

### 4. Financial and other incentives

- Mazowieckie self-government is responsible for implementing regional smart specialisation strategy (Regional Innovation Strategy for Mazovia until 2020). One of the main aims is development of business and science cooperation environment, leading to the emergence of new initiatives and fields of R&D activity. The activities include networking meetings, working groups, workshops, training, study visits, conferences, competitions promoting researchers and innovative enterprises, promotion of businesses and their participation in international fairs.
- Regional smart specialisation is also the key to distribute ESIF allocated for R&D and innovations, which means greater chances of support for operations compatible with the areas of specialisation.

### 5. Web site: [www.mazovia.pl](http://www.mazovia.pl)

### 6. Key contact

- *Department of Regional Development and European Funds; Mazowieckie Voivodship in Warsaw*
- [dsrr@mazovia.pl](mailto:dsrr@mazovia.pl)
- (22) 597 97 51

## 1. Short description of the Region

- Country: **POLAND**
- Region's Capital: **RZESZÓW**
- Location (Figure)
- Population: **2 126 824**
- GDP: **67,4 mld PLN**



## 2. Importance for the biobased industries

- **Strategic sectors important for bioeconomy for Podkarpackie Region:** food production and processing, especially ecological, regional and traditional; energy-efficient building (passive, zero-energy and plus-energy); renewable energy and distributed energy; environmentally friendly tourism, eco-tourism. **Major companies in ecological food production and processing:** OSM Jasienica Rosielna, Jasiołka Butcher's
- **Research organizations engaged on "bioeconomy related topics":** Department of Entrepreneurship, Management and Eco-innovativeness, Eco-innovation Laboratory, Laboratory of instrumental analysis of food quality, biotechnology fields of study - Rzeszow University of Technology, University of Rzeszow
- **Presence of bioeconomy clusters:** Podkarpackie Country Life Quality Cluster, Union of Associations "Podkarpackie Chamber of Ecological Agriculture
- **Collaborations with other regions in the area of the bioeconomy:** University of Life Sciences in Lublin (Lubelskie Region), University of Agriculture in Krakow (Malopolskie Region) - in the areas: food production and processing, natural environment; Kielce University of Technology - in the areas: renewable energy.
- **GMO free region.** Activities taken to agriculture biologization, the use of probiotics.

### 3. Available feedstocks

Agricultural holdings (in thousands): 140

Agricultural land area (in thousands ha): 574,2

Yields per 1 ha in dt: basic cereals (32,5), potatoes (225), rape and agrimony (24)

Cattle, pigs, sheep and horses in terms of large heads bd per 100 ha of agricultural land: 19,9

Production of cows' milk per 1 ha: 401,2

Detail report about renewable energy sources is available at:

[www.rolnictwo.wrotapodkarpackie.pl/](http://www.rolnictwo.wrotapodkarpackie.pl/)

### 4. Financial and other incentives

Regional Operation Program which funds also activities in the areas of food economy, green buildings, green energy, renaturation of agricultural environment and rivers. What is more, some activities within the thematic goals of RIS3 strategy concern bioeconomy areas.

### 5. Web site: [www.podkarpackie.pl](http://www.podkarpackie.pl)

### 6. Key contact

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Rzeszow University of Technology

[lwozniak@prz.edu.pl](mailto:lwozniak@prz.edu.pl)

+48 603 950 947

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## 1. Short description of the Region

- Country POLAND
- Region's Capital GDAŃSK
- Location (Figure) North Central Poland
- Population 2 311 469 /2016
- GDP 97833 MLN PLN, 42558 per capita /2014



## 2. Importance for the biobased industries

The Pomorskie Region is one of the above-average developed regions in Poland. GDP of Pomorskie is 5,7% (2014) of the total GDP in Poland. The agricultural sector - even though the food industry is traditionally one of the key branches of the region's economy - is of marginal importance and generates only 2% of the gross added value.



Pomorskie has enormous potential in biomass production due to the fact that arable land constitutes 38,5% (2014) of the area, and 36% (2014) is forested (the 3<sup>rd</sup> largest forest cover in Poland). Pomorskie has deposits of sand, gravel, loam, lake chalk and peat. The deposits of sand, gravel and loam are commonly found in most areas of the region.

	POMORSKIE Region	ranking in Poland
GDP	97 883 mln PLN (2014)	7th
GDP per capita	42 580 PLN (2014)	5th
GDP growth rate	3% (2014)	13th
Investments	6936,2 mln PLN (2015)	7th
Investments per capita	6 574 PLN (2014)	3rd
Gross Added Value	84 365 mln PLN (2013)	7th
Gross Added Value per working person	112 219 PLN (2013)	4th
R&D Expenditures	933,7 mln PLN (2013)	6th
R&D Human Resources	2 300 (2016)	

The woodworking and furniture sector employs more than 2% (2013) of the working population in various enterprises in the Pomorskie Region. There are 5476 (2013) companies of woodworking sector registered in Pomorskie.

### The main bio-based companies in the Pomorskie Region:

[International Paper Kwidzyn sp. z o.o.](#) (paper industry and related operations)

[Polpharma SA](#) (pharmaceutical industry)

[Iglotex](#) (modern business services, ICT, electronics, logistics, biotechnology, maritime industry, food processing (with particular reference to fish processing))

[ZIAJA Ltd.](#) (pharmaceuticals and high-quality cosmetics based on natural ingredients for face, body and hair care)

[Glencore Polska](#) (supply of grains and oilseed rape. Import/export services related to the storage and throughput of grains and meals and the production of rapeseed oils and meals)

[Steico](#) (main shareholder: STEICO SE. producer of the wide range of insulation materials from wood fiber, extremely strong and yet light beams for the construction of walls, roofs and ceilings, initiator of the cluster Pomorski Klaster Drzewny Czarna Woda)

[FAMOS Sp. z o.o.](#), (standard furniture sets and special custom-made furniture, soft furniture, wall & ceiling panels, interior doors and door segments, sanitary cabins, metal beds and wardrobes)

[MEBLOMAK Sp. z o.o.](#), (a manufacturer of upholstered furniture)

[Poldanor S.A.](#) (one of the biggest pig producers in Poland, Poldanor farms more than 13 thousand ha of land, growing mainly wheat, triticale, rape, rye and maize, which is used both as a component in

the feed production and a substrate in biogas production. They produce modern feed production plant)

As for attracting of new investments the bio-based sectors of high chance include: biotechnology, maritime industry, food processing (with particular reference to fish processing).

- Research organisations engaged on “bioeconomy related topics“ (report of any known “bioeconomy related relevant recent and/or on-going projects”): [Gdańsk University of Technology](#); [Medical University of Gdańsk](#); [University of Gdańsk](#)
- Presence of bioeconomy clusters: [Pomorski Klaster BioEcoChemiczny](#); [Bałtycki Klaster Ekoenergetyczny](#) ; [Pomorski Klaster Morza i Zlewiska Wisty](#) ; [Nadwiślański Klaster Energii Odnawialnej](#) ; [Pomorski Klaster Horeca](#); [Klaster Biotechnologiczny BIOPARK](#) ; [Polski Klaster Morski](#); [Pomorski Klaster Rzeczny](#); [Pomorski Klaster Drzewny Czarna Woda](#)
- Regional bioeconomy strategy or ongoing bioeconomy regional projects / policies:
  - The Pomorskie Voivodeship Development Strategy 2020 concentrates on the elements of the bioeconomy.
  - Pomorskie has 4 regional Intelligent Specialisations, 3 of which focus on the elements of bioeconomy:
    - Off-shore, port and logistics technologies
    - Eco-effective technologies in the generation, transmission, distribution and consumption of energy and fuels, and in construction
    - Medical technologies in the area of civilization and ageing-associated diseases
  - Collaborations with other regions in the area of the bioeconomy
    - Member of FORUM BIOREGIONÓW EUROPY ŚRODKOWEJ I WSCHODNIEJ (BIOREGIONS PLATFORM governed by the Lodzkie Region)

### 3. Available feedstocks

- Procurement of agricultural products per 1 ha of agricultural land - Basic cereal grains: 944,2 kg; Potatoes: 304,3 kg; Sugar beets: 711,8 kg
- Forest land: 683,5 thous. ha - Wood acquisition: 130 244m<sup>3</sup> in 2015
- Sea fishing incl. sea organisms in 2015 in Poland (not only Pomorskie): 187,0 thous. t and were 9,7% higher than a year before. From the Baltic fishery: 134,7 thous. t of fish. Deep sea fishery: 52,3 thous. t in 2015.
- Water withdrawal (in % of total withdrawal) for purposes of:
  - Production (excl. agriculture, forestry and fishing): 43,1%
  - Exploitation of water supply network: 52,9%
- The water intake for the national economy purposes is oscillating around 200 hm<sup>3</sup>/year
- Overall amount of sewage and industrial wastes that need treatment (mainly biological) in Pomorskie has decreased and now its volume is about 125 hm<sup>3</sup>/year
- Waste from the sectors: agriculture, fruitgrowing, hydroponic farming, fishery, forestry and food processing in 2014 (from the communal waste) - 206 908,4 Mg
- In 2013 there was 36 662 Mg of sewage sludge. It was used in agriculture (7 545 Mg), land reclamation (480 Mg), plant farming for compost production (734 Mg), thermal transformation (7 883 Mg), deposited or temporally deposited (2 350 Mg)

### 4. Financial and other incentives

Pomorskie is eager to promote activity in demo & flagships projects among regional stakeholders.. Pomorskie, as agreed in the Bioregions Platform agreement, is willing to undertake various promotional actions to connect global industry members to local stakeholders/value chains.

### 5. Web site [www.pomorskie.eu](http://www.pomorskie.eu); [www.pomorskieregion.eu](http://www.pomorskieregion.eu)

### 6. Key contact(s)

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## 1. Short description of the Košice Region

- Slovakia



- Region's Capital: Košice city - 2<sup>nd</sup> largest city of Slovakia, population 240,000
- Košice Region - 2<sup>nd</sup> most populated Region in Slovakia, regional population of 796,000
- GDP €8.69M; €10,930 per capita (2014)
- Agricultural land 50% of the total surface area

## 2. Importance for the biobased industries

- Strong strategic sectors - steel, automotive, IT, chemical, agrifood, and plastics industry
- Strategic Clusters: IT Valley, AT+R (robotics & automation), Cassovia Life Science
- major companies are mainly concentrated in Košice city, Michalovce, Spišská Nová Ves
  - US Steel Košice; GetragFord; T-systems Slovakia; Faurecia Slovakia; U-Shin Slovakia; SCA Hygiene Products; Chemko; ANTIK; Siemens; Ness; GlobalLogic Slovakia; Magnetti Marelli; Celltex Hygiene; Gemtex; Carmeuse; Agrotradegroup; SHP Slavošovce; Embraco Slovakia; SEZ Kropachy; YazakiWiring Technologies Slovakia; BSH Drives&Pumps; Unomedical; Syrárėň Bel; Electroconnect; ChocoSuc Partner
- Strong knowledge potential concentrated at
  - at the Technical University of Košice (TUKE)
  - in Promatech Centre of Excellence of the Slovak Academy of Sciences (advanced materials and composites, process engineering and automation, circular economy)
  - at Pavol Jozef Šafárik University (biochemistry/biochemicals)
- Ongoing bioeconomy regional projects
  - Regional bio-economy projects → ChemREG, MDR, BIOSKOH
  - € 21 million BIC/BBI grant → BIOSKOH project (ENERGOCHEMICA)
  - Plans to build a largest 2G Bio-refinery Central Europe to:
    - use innovative unique technology at European scale
    - demonstrate a new regional bio-based value chain

- valorise side streams from cellulosic fractions
- create estimated 160 direct and 500 indirect green jobs

### 3. Available feedstock

- Forest wood and non-wood residues, potential of „white fields“
- High potential of Municipal Solid Waste as feedstock:
  - 67% of waste landfilled
  - 11 % incinerated
  - 5% of total waste in Slovakia is recycled and composted

### 4. Financial and other incentives

- Big investors can leverage on SARIO agency: <http://www.sario.sk/en/invest-slovakia/regional-overview/kosice-region>
- Investment incentives from SARIO agency: <http://www.sario.sk/sites/default/files/content/files/sario-investment-aid-2017.pdf>
- Incentives are allocated according to districts:
  - Strážske (seat of 2G bio-refinery) in the district of Michalovce (MI)
- Other districts in the Košice Region where investors can gain the maximum incentives offered by the Government of the Slovak Republic:
  - Rožňava (RV), Trebišov (TV), Vranov (VT), Sobrance (SO), Gelnica (GL), Košice - surrounding (KS)
- What can the region do to connect BIC industry members to local stakeholders/ value chains
  - Facilitate active cooperation of BIC industry members with University R&D Centres, Centres of Excellence in Košice, in Miskolc (Hungary), and Uzghorod (Ukraine)
  - Prepare 2018 International Innovation Conference on circular economy in East Slovakia
  - Support development of technological platform for bio-economy and creation of bio-economic startups via TUKE Startup Centre

### 5. Web site: [www.vucke.sk](http://www.vucke.sk)

### 6. Key contact:

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*Head of Regional Development Unit*

*Tel: +421 55 6196 658*

[peter.tapak@vucke.sk](mailto:peter.tapak@vucke.sk)

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## 1. Short description of the Region

- Country: Spain
- Region's Capital: Seville
- Location (Figure)
- Population: 8.402 Million
- GDP: 143.843 Million €



## 2. Importance for the biobased industries

- **Importance of some strategic sectors**

Andalusia features a large agricultural sector. Over 44.3% of its surface and 8.4% of its work-force are dedicated to this sector, and Andalusia's agro-food industry is one of the main economic drivers. Biomass resources mainly come from olive groves, as well as the fruits and vegetables sector.

Andalusia has a strong Bio-energy sector with 11 operative biofuel plants with a capacity of 1,281 ktoe/year. The region is the national leader in bio-fuels production. It has 18 biomass facilities with a total installed capacity of 257 MW and with a biomass consumption of almost 724 ktoe/year, most of which comes from the olive sector. In addition to that, there are 17 biogas facilities with almost 30 MW capacity sourcing their gas from landfills and wastewater treatment plants.

The chemical sector and other related sectors (e.g. pharma) are also well represented in the region. There are two chemical poles, Campo de Gibraltar and Bahía de Huelva, that cover the electric generation (including biomass as a raw material), the manufacturing of basic organic (phenol, cumene, acetone, biofuel) and inorganic products (fertilisers, raw material for detergents, chlorine and by-products, mineral gases...), the metallurgy of the copper and the production of paper pulp. Some innovative companies producing high value bioproducts have emerged recently and are now developing.

- **Research organisations engaged on “bioeconomy related topics“**

The Agrifood Campus of International Excellence comprising the universities of Jaén, Córdoba, Huelva, Cádiz and Almería has projects in the field of the valorisation of agriculture by-products, biorefineries and algae (e.g. the FP7 MIRACLE project - a multi-product integrated algae refinery).

Other important institutions for academic training relevant to Bioeconomy are the Andalusian Institute for Research and Training in Agriculture, Fisheries, Foods and Organic Production (whose Spanish acronym is IFAPA) and the Spanish National Research Council (whose Spanish acronym is CSIC). Finally, there are Innovation and Development Centres devoted to Functional Food (whose Spanish acronym is CIDAF) and Renewable Energy (whose Spanish acronym is CTAER).

- **Presence of bioeconomy clusters**

There are no bioeconomy clusters since bioeconomy has not been a traditional sector but there are many emergent initiatives and previous structures associated to traditional sectors.

The agrifood sector is strongly structured and articulated and has many relevant associations. The Andalusian Strategy for Bioeconomy led by the Regional Ministry for Agriculture, Fisheries and Rural Development of Andalusia is contributing to the development of bioeconomy networking.

European projects as *Sustainable Chemicals Model Demonstration Region* (EASME) or *Superbio* and *Agriforvalor* (H2020) are also contributing to this process.

- **Regional bioeconomy strategy or ongoing bioeconomy regional projects / policies**

The Andalusian Government, strongly committed to the trends in bio-economy, has recently approved (July 12, 2016) the formulation of the Andalusian Strategy for Bioeconomy, which is going to be developed in the coming months, with the participation of the most representative economic and social actors and society in general. The main objective of the regional Strategy for Bioeconomy is to highlight agriculture biomass and become the roadmap for the following years.

Andalusia has also been selected by the EU as a model demonstrator region in sustainable chemicals and is working in this area. Based on a diagnosis of regional strengths, a roadmap has been defined in order to promote the emergence of investment poles around the bioeconomy of the chemical sector in Andalusia which will be in force .

- **Collaborations with other regions in the area of the bioeconomy**

The EC has selected 6 *model demonstrator regions* in Europe to lead the way towards a sustainable chemical production in Europe. The selected regions are Andalusia (Spain), Groningen-Drenthe (The Netherlands), Kosice (Slovakia), Scotland (United Kingdom), South and Eastern Ireland, and Wallonia (Belgium). *Agriforvalor*, is aiming at the development of three bioeconomy hubs in three European regions: Andalusia, Hungary and Ireland. Exchange of experiences and knowledge is considered. *Superbio* partners come from Belgium, Poland, France, Germany and UK.



### 3. Available feedstocks

The [Andalusian Energy Agency](#) has quantified biomass in terms of energetic use:

Feedstock	t	ktep
<b>Agrobased</b>	<b>4,606,473</b>	<b>1,322</b>
Olive grove	2,524,419	803
Sunflower	524,533	152
Greenhouse	415,070	50
Cotton	721,353	217
<b>Livestock residues</b>	<b>4,342,525</b>	<b>77</b>
<b>Industrial residues</b>	<b>5,070,029</b>	<b>1,023</b>
Olive leaves	345,108	86
Olive bones	552,434	215
Pomace olive oil	3,011,462	422
<b>Fish industry residues</b>	<b>14,824</b>	<b>1</b>
<b>Forestry residues</b>	<b>1,345,840</b>	<b>322</b>
<b>Urban waste</b>	<b>2,929,782</b>	<b>591</b>
Used vegetable oils	57,916	52
Organic fraction of[ solid urban waste	735,697	276
Parks and gardens	208,000	56
Municipal sludge	547,775	163
<b>Waste water</b>	<b>(M3) 1,380,394</b>	<b>44</b>

### 4. Financial and other incentives

- **What can the region do to support/attract investments in demo & flagships projects**

Support cluster creation and stakeholders coordination for information & experience exchange to foster collaborations. Operational group experiences and bioeconomy strategy are key actions.

Promote innovation systems based on quadruple helix models, thus encouraging the participation of citizens and businesses. Identifying gaps or mismatches within the innovation, R & D value chain so as to bring innovation to the market.

Communicate the strengths and opportunities of bioeconomy, both within and outside region.

Monitor and identify opportunities for the participation in European projects (H2020, BBI-JU, Territorial cooperation, etc.)

- **What can the region do to connect BIC industry members to local stakeholders/value chains**

Play an active role in the definition of innovation policies in relation to the valorization of biomass, connecting the needs of the local or regional markets (clusters, value chains, companies, citizens) with policy makers and academia or researcher centres in the participatory process developed for the definition and evaluation of public policies.

Promote the advantages of belonging to BIC and exchange of information regularly inside the region and to potential company members.

Promote participation in BIC activities.

5. **Web site:** bioeconomy web site under development: <http://juntadeandalucia.es/index.html>

### 6. Key contact

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## 1. Short description of the Region

Asturias is a maritime region located in the North-West of Spain that has been traditionally an industrial leading region. Along with the traditional Asturian sectors, which include metals; food and agriculture; energy; wood/furniture; paper pulp; shipbuilding, maritime transport and logistics (ports of Gijón and Avilés), Asturias also present activities related to the development of new products and the **bioeconomy**. One of the key aspects of the region is the landscape, and the fertility and richness of its natural resources. In that way 40% of the territory is considered natural reserve, the highest percentage in any EU region.



- **Region's Capital:** Oviedo
- **Population:** 1.042.608 inhabitants (2016)
- **GDP:** 21.595M€ (2015)

## 2. Importance for the biobased industries

- **Importance of some strategic sectors**

Industry plays an important role in the economy of Asturias, 21%, percentage clearly above the Spanish average. The data of the Asturian industry reflect a clear sectorial specialization. 70% of the GAV is concentrated in three branches of activity: extractive activities, energy, water and waste, metallurgy and the manufacture of metal products and agro-food industries. In addition, Asturias' productivity is clearly higher than the Spanish average; and foreign trade indicators (import-export coverage, exports, and degree of openness) have witnessed a positive trend over the last few years.

One of the main challenges that Asturias is facing through its Smart Specialization Strategy is the recovery of its industrial leadership. To do so, Asturias counts on the new materials and advanced manufacturing sectors, the diversification of energy production, and the biotechnologies applied to agro-food and health industry. Some key numbers:

Diary Industrial Production (2013)	562.232 (000t)/151.791 T	
Meat Industrial Production (2013)	56437 T	
Industrial Production Indeces (2013)	Energy and water	100.7
	Basic industries	91.7

Major companies in sectors related to bioeconomy: Dairy Sector: CAPSA, ILAS; Meat sector: IGP Ternera Asturiana; Waste/recycling sector: COGERSA; Wood sector: ENCE, HUNOSA; Chemistry sector: Bayer, Dupont, Fertiberia, Industrial Química del Nalón, S.A., Industrias Roko, S.A., Eumedica Pharmaceuticals Industries, s.l.; Engineering sector: TSK, Duro Felguera, ISASTUR, SADIM

- **Research organisations engaged on “bioeconomy related topics“**

-Research Institutions: [Universidad de Oviedo](#), [SERIDA](#), [IPLA](#), [IEO Gijón](#), [CEP](#)

-Technological Centers: [ASINCAR](#), [CETEMAS](#); [ITMA](#)

-Ongoing Research Projects: [NOMORFIM](#) (H2020), [AQUAINVADED](#) (H2020) , [RECO2VERY](#) (MINECO), DIMASKIN (Eurostars), MICO2NACAR (CDTI), AsturSludge (PCTI)

- **Presence of bioeconomy clusters**

[ASINCAR](#) (Agrofood cluster); [CBMS](#) (Cluster of Biomedicine and Health, University of Oviedo); [CEMACC](#) (Cluster of Energy, Environment and Climate Change, University of Oviedo); [IQPA](#) (Chemical and Process Industries Cluster of Asturias); [AINER](#) (Energy Technology Consortium of Asturias)

- **Regional bioeconomy strategy or ongoing bioeconomy regional projects / policies**

Strategy/policies:

Asturias Industrial Strategy (2014); Regional Strategy for Sustainable Use of Forest Biomass in Asturias (2011); RIS3 Strategy (2014); Strategy for Competitiveness of the Primary Sector and Economic Development of the Rural Sector in Asturias (2015); Waste Management Strategic Plan of the Principality of Asturias (PERPA) (2016-2024)

Ongoing Regional research projects

-S3CHEM (Interreg); ERA-NETs: OCEANERA-NET, M-ERA.NET, MANUNET; [European Chemical Regions Network](#)

- Collaborations with other regions in the area of the bioeconomy

Asturias collaborates with regions all round Europe thanks to different networks and projects, such as [Vanguard Initiative](#), [S3Chem project](#), [ERRIN](#), etc.

### 3. Available feedstocks

- From the agro-based industries
  - Feedstock originating from the agriculture and agro-food industries
  - Co-products, side streams, and residues from the agriculture, including animal manure and from the agro-food industries, including residues from food processing plants. Biowaste of the agro-food sector: 93.000T (2011)
- From the forest-based industries
  - Feedstock originating from the forest and forest-based industries
  - Co-products, side streams, and residues from the forest and forest-based industries, including the wood industry, saw mills, Paper and Pulp
- From the aquatic-based industries
  - Feedstock originating from the aquatic and aquatic-based industries, including among other aquaculture, the fish and the fish processing industries
  - Co-products, side streams and residues from the aquatic and aquatic-based industries
- Bio-waste and CO<sub>2</sub>
  - Waste water and sludge: 195.000T of urban biowaste (2011)
  - CO<sub>2</sub> from processing operations

*waste plant*



### 4. Financial and other incentives

- What can the region do to support/attract investments in demo & flagships projects

The Economic Development Agency of the Principality of Asturias (IDEPA) is a Public Body, dependent on the Asturian Regional Government. IDEPA has over 30 years of experience in supporting companies and entrepreneurs as well as promoting Asturias as a location for investment.

The Regional Innovation Strategy ([AsturiasRIS3](#)) sets the innovation priorities for the period 2014-2020 as basis for the spending of ERDF funds following the smart specialisation strategy approach. Asturias have got an specific programme to support innovative projects in the field of Sustainability, Bioeconomy and Agro-markets, Grants helping firms to recruit researchers, Grants to Technology transfer, Grants for scientific and technological start-ups and Grants for Technological Centres and University Research Groups.

-Infrastructures/demo sites: CO<sub>2</sub> capture pilot plant, microalgae production pilot plant

- What can the region do to connect BIC industry members to local stakeholders/value chains

Organization of events, sharing of contacts, platforms of collaboration

5. Web site: <http://s3vanguardinitiative.eu/partners/asturias>

### 6. Key contact(s)

- |   |  |
|---|--|
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| • <i>Phone: +34 985 10 39 94/+34 669 19 93 67</i>   | • <i>Phone: +34 T. 985 98 00 20</i>                                |

### 1. Short description of the Region

Navarra is located in northern Spain at the western end of the Pyrenees and has a 163-kilometer border with France. Its population is 640,356 in an area covering 10,391 square kilometers. The main population center is the capital, Pamplona, with 340,000 inhabitants.



	NAVARRA	SPAIN	NA/SP
👤 POPULATION (inhabitants)	644.790	46.771.341	1,4%
📏 SURFACE AREA (km <sup>2</sup> )	10.391	504.782	2,1%
🏠 POPULATION DENSITY (inhabit/km <sup>2</sup> )	62	93,3	

### 2. Importance for the biobased industries

In 2016, Standard & Poor’s holds Navarra’s rating to ‘A’, two levels above Spain’s rating (BBB+) in view of the expected improvement in the economy and the budgets approved. The rating agency considers that Navarra will resist the pressure on sovereign debt better thanks to its financial autonomy.

Growth forecasts for the region’s Gross Domestic Product (GDP) for 2016 are 2.6% . Navarra, with a per capita GDP of € 30,682 in 2015, is in third place among the Spanish regions. Navarra’s industrial activity represents the 25.7% of the country’s GDP in this sector, almost 13 points above the Spanish average. Most of the region’s industrial companies, characterized by their high levels of technology and strong export vocation, belong to the two most important activity sub-sectors in its economy, Automotive and Machinery & Equipment. These sub-sectors and a third - the agrifood sector - account for more than half of the industrial GAV of Navarra.

AUTOMOTIVE	<ul style="list-style-type: none"> <li>• VW produces 300,000 cars of the Polo model per year, and employs 4,000 people directly.</li> <li>• The sector now has <b>112 companies representing revenues of 5.1 billion euros</b> and direct jobs for <b>12,000 people, 4.3% of the region’s total employment</b>.</li> <li>• <b>Exports</b> from the automotive sector were <b>3.3 billion euros in 2013</b>, i.e. 43% of total exports of goods from Navarra.</li> <li>• 5.4% of component manufacturers for Spanish cars are located in Navarra. Most of them are working at full capacity.</li> </ul>
AGRIFOOD	<ul style="list-style-type: none"> <li>• Located in the heart of the Ebro valley, it earns revenues of <b>3 billion euros a year</b> and another 900 million in the primary sector.</li> <li>• It is one of the most important sectors in our region, with a long tradition, made up of more than <b>1,270 companies and 25,000 employees</b>.</li> <li>• Great variety of companies in the sector: <b>frozen vegetables</b>, with the largest business group in the country located in Navarra and national leader in <b>processed fruit and vegetables</b>.</li> </ul>
CLEANTECH	<ul style="list-style-type: none"> <li>• 41 wind farms with 1,164 turbines and an installed capacity of 972 MW. 20% of overall energy demand in the region has been covered by renewables since 2009 (1 of 3 EU objectives for 2020). <b>81.1% of electricity consumption covered by renewables</b>.</li> <li>• Leading world companies in both the development of wind farms (<b>Gamesa, Acciona</b>) and the manufacture of wind turbines and their components (<b>Gamesa, Acciona, Alstom, Ingeteam...</b>).</li> <li>• An industrial fabric of around <b>100 companies, 5,000 jobs</b>.</li> </ul>
BIOMEDICINE	<ul style="list-style-type: none"> <li>• Located in the heart of the Ebro valley, it earns revenues of <b>3 billion euros a year</b> and another 900 million in the primary sector.</li> <li>• It is one of the most important sectors in our region, with a long tradition, made up of more than <b>1,270 companies and 25,000 employees</b>.</li> <li>• Great variety of companies in the sector: frozen vegetables, leaders in the production of processed vegetables, with the largest business group in the country located in Navarra and national leader in processed fruit and vegetables.</li> </ul>

Navarra has a high level of self-government, and this means it has been able to maintain its own, differentiated taxation system:

- Low tax rates for companies
- Good tax breaks to encourage investment in productive systems
- Navarra offers lower tax rates than the Spanish average
- In relation to GDP, taxes are lower than in the European Union

### Biorefinery project in Navarra

Navarra possesses a solid infrastructure of technological centers and companies carrying out projects in the fields of agriculture, renewable energies and industrial biotechnologies. This is why a technological partnership worked during 2014 and 2015 to shape a biorefinery concept that integrates the knowledge gained in the past by its members to achieve the maximum exploitation of the autochthonous herbaceous biomass in an efficient and sustainable way. Summary chart of the main characteristics of the project:

#### Biorefinery in Navarra

Main objective: Development of the preliminary project of a biorefinery located in Navarra.

Leader: CENER.

Partners: AIN, CNTA, INTIA and UPNA.

Workpackages:

- WP1. Feedstocks.
- WP2. Conversion processes.
- WP3. Biorefinery concept design.

Funding: Government of Navarre (50% co-financed by European Union FEDER funds).

Implementation period: 2014 - 2015.

### 3. Available feedstocks

There is a herbaceous biomass availability in Navarra from crops (straw of different cereals, cauliflower and broccoli residues, alfalfa, triticale and sorghum) and agroalimentary industries wastes (tomato, sweet corn, cruciferous, pepper, cardoon and artichoke). Such assessment considered the quantity, the seasonality and the location of the feedstocks.

### 4. Web sites

[www.navarra.es](http://www.navarra.es)

<http://investinnavarra.com/en>

### 5. Key contact

Mikel Irujo

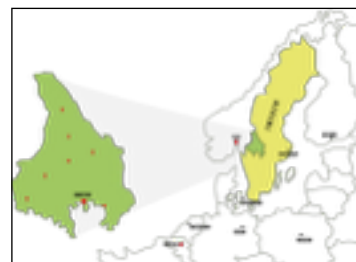
Government of Navarra - Delegation in Brussels

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## 1. Short description of the Region

- Country: Sweden
- Region's Capital: Karlstad
- Population: 273 000 inhabitants



## 2. Importance for the biobased industries

Region Värmland has a unique combination of assets within the forest bioeconomy in terms of world leaders and global business networks, industrial infrastructure, technical know-how, research and development and a whole ecosystem of people, organizations and relationships within the forest bioeconomy.

Our fundamental strength is a sustainable forest industry and high-quality raw materials. Forest industry processes and products are the spearhead of our industries. They include cellulose fibre-based packaging materials, tissue paper technology and a knowledge-supporting consulting sector which, together, have the expertise and capacity for industrialising and automating processes for value creation from wood.

The advances in packaging, coatings and barriers, printing technology, energy efficiency, purification technology, pulp technology, cellulose derivatives, separation and processing technologies, regional development and service research are our main areas of strength within academic research linked to bioeconomy. This provides a good base for achieving alternative fibre-based products and increased value-added from both existing products and processes from secondary streams.

This is possible due to the fact that Värmland has a world-leading cluster within pulp and paper technology - Paper Province - which gathers business, research, education and the community for value creation with a forest-based bioeconomy as a common ground. Paper Province is a European world class cluster with member companies represented in the entire value chain from forest to finished product, including hardware vendors and technical consultants, etc., and a quarter of Sweden's paper and pulp mills demanding customers.

The combination of industrial environment and research and development sets us apart from some areas that are strong research and innovation environments, but that lack the proximity to industry. It means that we have an environment that is well suited for start-ups and industrialisation. To complement this, we have for over a decade and a half systematically built an innovation support system that we are constantly developing with among others the following elements:

- Incubator with the profile of forest bioeconomy.
- An Innovation Park with profiles in service innovation and forest bio-economy.
- A highly qualified research at Karlstad University in the forest bioeconomy applying internally to become a so-called strong environment (5 million / year in additional funding) and have the ambition and are deserving of a becoming a so-called excellent environment.
- A well-developed research collaboration between the region and instructive way, including joint investment in ten new professorships.
- A Brussels office that monitors and lobbies for forest bioeconomy.
- A research and innovation strategy with a strong mandate where the forest bioeconomy is the highest priority strategy.

### 3. Available feedstocks



70 per cent of the Region Värmland's land area is covered by forests. Every year, over 6 million <sup>3</sup> m of wood is harvested in Värmland. The annual growth, however, is close to 7 million <sup>3</sup> m and the total forest volume in Värmland has doubled during the last century.

We see the forest industry as a crucial key sector for the completion of a circular economy and we promote research and development of new uses for by-products, such as black liquor and tall oil from the production of cellulose pulp. Roughly 35% of the biomass of a cut tree is left in the forest as roots, tops and branches after harvesting. The energy content of the roots, tops and branches is usually not enough to motivate the process of drying, chipping and transporting it out of the forest. The potential is however huge in making use of the estimated 1 million ton of roots, tops and branches that are harvested in Värmland every year.

Both sawmills and pulpmills also create a significant amount of byproducts. The sawmills of Värmland alone create over 500 000 tons of byproducts in the form of bark, saw dust, chips and shavings that are transported to be burnt for energy. The pulp mills also create large amounts of byproducts, but in contrast to the saw mills the integrated pulp- and paper mills use the energy in the internal processes to create electricity and steam for the board production and for recovering the pulping chemicals. As the production becomes more and more energy efficient, there are increased opportunities for making use of by-products for higher value added products. It is estimated that 20% of the black liquor could be used for other purposes without destroying the energy balance of the mill and interfering significantly in the process. In Värmland, close to 1 million ton of black liquor, containing lignin and hemicellulose, and 250 000 tons of bark is produced in the pulp- and paper mills.

Furthermore, we see the importance of developing value chains and industrial symbiosis between the forest, petrol and chemical industry with forest raw materials as a base, also linking to other sectors in the further development of products and services. This could for example entail the possibility of using wood fibres in the construction of cars, as long as the principle of "cost-effective material cycles" is promoted.

Region Värmland would like to become a large-scale demonstrator of what can be achieved when the local society, industry, academia and citizens join forces to achieve a common vision of sustainable development - a vision based on the region's most important strength area and identity - A forest- based bioeconomy.

### 5. Web site

[www.regionvarmland.se](http://www.regionvarmland.se) <http://paperprovince.com>

### 6. Key contact(s)

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Maria Hollander, CEO, Paper Province [m.hollander@paperprovince.com](mailto:m.hollander@paperprovince.com)

## 1. Short description of the Region

- Country: United Kingdom
- Region's Capital: Belfast
- Location (Figure)
- Population: 1.87 million
- GDP: Total €41 billion



## 2. Importance for the biobased industries

- **Importance of some strategic sectors**

Northern Ireland has strong agriculture and food manufacturing sectors, employing nearly 12% of the total workforce in food processing, farming and support services. The agri-food sector is a significant contributor to the regional economy, generating annually €3.7bn in exports. Approximately 76% of the total Northern Ireland land area of 1.35 million hectares is used for agriculture. An additional 8.3% (112,000 Ha) is used for forestry - one of the lowest proportions in Europe. Most farmland is under permanent grassland for livestock and dairy production; only 14% of farms have arable or horticultural crops. Aerospace and shipbuilding, along with other heavy manufacturing sectors have declined, although advanced manufacturing remains a small but specialized sector. Services an important part of the economy, and digital technology and ICT are growing areas with major inward investment. The bioenergy sector in Northern Ireland has grown rapidly since 2009 when support measures were introduced. At least 25 biogas plants with more than 15MW capacity are operational, treating 480,000 tonnes per annum of food wastes, animal slurries and energy crops.

- **Research organisations engaged on “bioeconomy related topics“**

Queen's University of Belfast (QUB), the Agri-food and Biosciences Institute (AFBI), and Ulster University (UU) are all active in bioeconomy research. QUB's Institute for Global Food Security has an international reputation for food traceability and is a partner in the EIT FoodConnects KIC; expertise in green chemistry is addressing biomass transformation and chemical production and supporting the local biogas sector with research (ATWARM, FP7) and a [regional action plan](#). UU is engaged in microbial biosurfactant production research (BIOSURFING and KILLSPILL, FP7; MARISURF, H2020). AFBI's research farm supports sustainable livestock production as well as nutrient management and recovery. It is also engaged in research on biomass production, biowaste valorization and biostimulants (BIOFECTOR, FP7).

- **Presence of bioeconomy clusters**

There are no dedicated bioeconomy clusters, however by-products and sustainability are addressed within the [Agri-Food Quest Competence Centre](#), which brings together the major agri-food companies in the region to collaborate with the research expertise of QUB, AFBI and UU. These institutions also collaborate with industry in the 'Energy from Biomass' sub-cluster within the [Centre for Advanced Sustainable Energy](#) (CASE; energy competence centre).

- **Regional bioeconomy strategy & bioeconomy regional projects/policies**

Through the Northern Ireland Competence Centre Programme, Invest NI has established two relevant competence centres (Agri-Food Quest and CASE) each with funding of €5.8M. Ongoing support through the regional development agency Invest NI also helps companies of all sizes to engage in innovation and R&D activities. The Department of Agriculture Environment and Rural Affairs (DAERA) supports industry-led research collaborations under a Research Challenge Fund and a Biomass Processing Challenge Fund.

“Going for Growth” is a strategic action plan developed by the industry-led Agri-Food Strategy Board to support the growth of the region's agri-food sector. This sets out the needs of the sector under a “food-first” policy, and details support and action needed from the regional government. This has resulted, for example, the development of a



Sustainable Agricultural Land Management Strategy which sets out initiatives addressing environmental protection, including ecosystem services to underpin growth of the sector.

- **Collaborations with other regions in the area of the bioeconomy**

There are well established cross-border partnerships with Republic of Ireland and development of the relevant sectors on an all-island basis. Collaboration and exchange of experiences with other regions occurs through many European level projects (H2020, Interreg, ERA-NETS)

### 3. Available feedstocks

Biomass feedstocks have been quantified by a number of studies:

Feedstocks	Tonnes per annum
<b>Agro-based residues</b>	
Food processing	26,000
Slaughterhouse wastes	178,230
Dairy processing	13,200
Animal manures	11,800,000
Drinks and Distilleries	12,000
<b>Forest-based residues</b>	
SRC Willow	10,000
Forest residues (recoverable)	35,000
Saw mill residues	300,000
<b>Urban Bio-wastes</b>	
Households (food and garden wastes)	218,898
Food waste (caterers and retail premises)	39,840
Waste water and sludge	39,000

#### Financial and other incentives

- **What can the region do to support/attract investments in demo & flagships projects**

Support and encourage the ongoing development of collaborations between stakeholder and actors of all types (triple or quadruple helix); support investment by regional municipalities and promote the advantages of the region for cooperation within the bioeconomy.

- **What can the region do to connect BIC industry members to local stakeholders/ value chains**

Ensure awareness of EU level bioeconomy strategy and develop regional policies for innovation support that meet local needs; support interregional cooperation to develop value chains and scale up biowaste valorisation and biomass utilisation. Encourage regional participation in the BIC through raising awareness of opportunities for collaboration and calls for proposals; encourage registration in the BBI Partnering Platform.

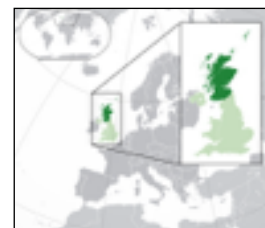
5. Web site: <https://www.daera-ni.gov.uk/>

#### 6. Key contact(s)

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## 1. Short description of the Region

Region	Scotland	Population	5,373,000
Capital	Edinburgh	GDP	£156.4 billion



## 2. Importance for the biobased industries

Scotland has less than 10% of the UK population and over 30% of the land mass giving it considerable capacity for growing biomass as feedstock for the bioeconomy. Scotland has great research capabilities, a strong base of SMEs looking to develop its bio-capabilities and the joined up support of the government with all its agencies in developing this opportunity.

The bioeconomy is a key economic force in Scotland with, for example, the whisky industry contributing nearly £5bn a year to the UK economy and 40,000 jobs of which 7,000 are in rural areas. Agriculture underpins both whisky and other food and drink supply and value chains and these have an annual turnover of £16.5bn. Beyond this there is the Scottish forestry sector which is worth £1 billion GVA to Scotland's economy every year. Increasingly, there is significant growth in the blue bioeconomy, specifically (macro) algae (40-50 ktonnes), that has grown largely with industry at the forefront to deliver advanced chemicals, biopolymers, new agrichemicals and bio-stimulants etc.

[Scottish Enterprise \(SE\)](#) and [Highlands and Islands Enterprise \(HIE\)](#) are Scotland's economic development agencies and both are in a position to support a more sophisticated approach to innovation (wider and deeper); to support work across traditional silos and encourage new partnerships and to develop new supply chains with collaboration on novel products and services between SME suppliers and key players in global supply chains.

**Key research and innovation centres and organisations engaged in the bioeconomy include:**

- The [James Hutton Institute](#) combines strengths in crops, soils and land use and environmental research, and makes a major contribution to the understanding of key global issues, such as food, energy and environmental security, and developing and promoting effective technological and management solutions to these. With a strong basis in crops and their transit through the supply and value chains they have been key partners in multiple national, EU and global projects focusing on crop component valorisation and more recently adopting a circular economy approach to these chains.
- [Industrial Biotechnology Innovation Centre \(IBioIC\)](#) was set up to help stimulate the growth and success of the IB industry in Scotland by connecting the dots between industry, academia and government. IBioIC represents all four colours of IB, facilitating collaborations and guiding organisations from a concept or idea, through to industry adoption. The IBioIC has invested £2.8m in two unique Equipment Centres for rapid bio-process prototyping and flexible downstream processing.
- The [UK Centre for Mammalian Synthetic Biology](#) is based at the University of Edinburgh.
- The [European Policies Research Centre](#) at the University of Strathclyde is a partner in the BioSTEP project, funded through Horizon 2020. The project promotes stakeholder engagement in and public awareness of the European bioeconomy.

**Scotland has adopted a number of bioeconomy-related strategies:**

- [Scotland's National Plan for Industrial Biotechnology](#) aims to transform the competitiveness and sustainability of multiple industries through the development and application of IB within the emerging bioeconomy. The principal sector for this is chemical sciences, although other sectors are relevant e.g. life sciences, oil & gas and food & drink. Scotland's ambitions is to increase the turnover of chemical products manufactured using at least one biological step from £189m in 2012 to over £900m by 2025. Alongside this we aim to increase the number of companies involved from 43 to over 200 and double the number of FTEs employed.
- The opportunity for biorefinery/biochemical facilities in Scotland has been articulated through the publication of a [Biorefinery Roadmap for Scotland](#). Three feedstock opportunities were identified: wood and forestry products, waste, and macro-algae.
- [Making Things Last - A Circular Economy Strategy for Scotland](#) - Scotland was one of the first countries in Europe to present its own ambitious and comprehensive strategy for the circular economy.

In terms of **inter-regional collaboration**, Scotland is engaged in multiple fora for the purpose of policy learning and collaborative project development, such as the European Regions Research & Innovation Network (ERRIN), the European Chemical Regions Network (ECRN) as well as a founding member of the Vanguard Initiative and the development of a Bioeconomy Pilot which is exploring ways to collaboratively build biorefinery capacity. Scotland sits on the Steering Group of this Pilot. Scotland is also recognised as [one of six Model Demonstrator Regions](#) selected by the European Commission for sustainable chemicals manufacturing.

### 3. Available feedstocks

- **Wood & forestry products** are an immediate opportunity with significant feedstock available. Scotland's geography and landmass affords significant opportunities for inclusive growth to support investment in the rural economy and subsequent job generation. Arboricultural arisings were 0.7M tonnes (Mt) in 2011<sup>4</sup> whilst waste wood was estimated at ~0.6 Mt generated.<sup>5</sup>
- **Waste** - Scotland's geography and population concentration make the availability of municipal solid waste a potential feedstock in the medium term. Sewage sludge has emerged as a potential opportunity following the launch of our National IB Plan. A recent report<sup>6</sup> assessed the organic waste in detail down to the level of local authorities and attributed useful compositional data to the waste: dry matter content, gross calorific value, protein, fat, carbohydrate, carbon/hydrogen/nitrogen/sulphur content, total dietary fibre, mineral contents (Ca, Fe, Mg, P & K). Scotland has 27 Mt of bio-resource arisings that can be used for valorisation and value upscaling.
- **Macro-algae** - Scotland's large continental shelf area and expertise in marine research provide a fairly unique opportunity to consider the use of macro-algae as a biorefinery feedstock in the longer term. Industry consultation has identified that there is 40-50 Mt of kelp available around Scottish coastal water with 8-10 Mt of harvestable kelp available per annum.
- **Fish Processing** - A recent examination of the fish processing industry<sup>7</sup> identified that there is ~£0.2 Mt of biobased wastes and by-products.
- The **brewing and distilling** industries are also rich sources of biobased wastes and by-products with brewing producing 54 ktonnes and whisky 4.37 Mt of biobased wastes and by-products.
- At the broader sectoral level there is still significant bio-resource arising from **by-products** to be valorised. Animal agriculture generates 6.8 Mt, 3.0 Mt and 0.36 Mt of slurry from the beef, dairy and pig sectors respectively. Crop-based agriculture generates
- 1.5 Mt of straw per annum. Further analysis pulls out more compositionally distinct co-products such as 136 ktonnes of carrot, 4 ktonnes of strawberry and 36 ktonnes of brassica tops co-products. Sludge generated from water purification and sewage system processing is identified as ~0.115 Mt in 2016. Estimates for household, and commercial & industrial wastes are resp. 0.456 Mt and 0.56 Mt.

### 4. Financial and other incentives

The [Scottish Investment Bank](#) (SIB), operates across Scotland in partnership with HIE and works with Scottish SMEs, UK and international investors and is lead partner in the ESIF SME Holding Fund intervention. SIB's co-investment approach - in particular the **Scottish Co-Investment Fund** - encourages more investors into the market and allows investors to do more and larger deals, attracting capital from larger international investors. The Scottish Government is working with public sector partners to simplify and promote the incentives available to investors.

[Circular Economy Investment Fund](#) - Zero Waste Scotland (ZWS) are investing £18 million, which includes ERDF funding, as grant funding to SMEs who are helping to create a more circular economy.

**Bioeconomy Accelerator** - [Zero Waste Scotland](#) (ZWS) and [IBioIC](#) are providing funding for Scottish businesses and organisations that are working within the industrial biotechnology, food and drink and bioeconomy industries. The partners identified are well linked to and embedded in the biorefining roadmap exercise and can bring together the actors required for success. In addition, national funding and industry in kind (and/or investment) can be leveraged against BBI inputs.

**Model Demonstrator Region** - This status allows Scotland the benefit of receiving advisory support from the European Sustainable Chemicals Support Service.<sup>8</sup> The aim is to encourage investment in sustainable chemicals production in Europe that will contribute to the development of the circular economy by taking advantage of Scotland's domestically available feedstock.

### 5. Key contacts

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<sup>4</sup> [www.usewoodfuel.co.uk/.../arboricultural-arisings-scotland-executive-summary.pdf](http://www.usewoodfuel.co.uk/.../arboricultural-arisings-scotland-executive-summary.pdf)

<sup>5</sup> [www.remade.org.uk/reports/materials/wood/wood-waste-from-the-scottish-waste-managment-sector-\(may-2009\).aspx](http://www.remade.org.uk/reports/materials/wood/wood-waste-from-the-scottish-waste-managment-sector-(may-2009).aspx)

<sup>6</sup> Biorefining Potential for Scotland - Mapping Bioresource arisings across local authorities in Scotland (In Press)

<sup>7</sup> ZWS, (2016), Sector study on beer, whiskey and fish 2015 <http://www.zerowastescotland.org.uk/BeerWhiskyFish>

<sup>8</sup> [https://www.ibioic.com/files/media/.Bioeconomy\\_Accelerator\\_Outline\\_Pro.pdf](https://www.ibioic.com/files/media/.Bioeconomy_Accelerator_Outline_Pro.pdf)



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### **About the Bio-based Industries Consortium**

The Bio-based Industries Consortium (BIC) is the private partner in the Bio-based Industries Joint Undertaking (BBI JU), a Public-Private Partnership with the European Commission. BIC represents a unique mix of sectors, including agriculture/aquaculture, agri-food, biotechnology/technology providers, forestry/pulp and paper, chemicals, energy and end-users.

[www.biconsortium.eu](http://www.biconsortium.eu)

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