

D.T1.1.1 Inventory of policy instruments

Regional reports about state-of-the-art strategies, policies and clusters related to Bioeconomy – Lombardy Region

Lombardy Green Chemistry Association – LGCA (PP10)

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Disclaimer

Within WP 1 of the project, an inventory is made of bio-based economy strategies and policies instruments in the Lombardy Region. The inventory of policies, clusters and actors provides an overview of the framework conditions, key actors and infrastructure affecting the ecosystem for the development of a bio-based and circular economy in Lombardy Region.

The information is provided without assuming any legal responsibility for correctness or completeness. The data presented in the report are based on publicly available studies and databases, the current knowledge on regional strategies, policy instruments, clusters and cluster initiatives.

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1. Introduction

Bioeconomy encompasses the production of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy (European Commission, 2016¹). The bioeconomy therefore intends to promote the transition to a sustainable socio-economic system based on a more rational use of biological resources. There are numerous advantages that can be generated through the development of the bioeconomy, including the reduction of dependence on fossil fuels, the mitigation of the environmental impact of primary production and along the supply chains, the increase in international competitiveness, the creation new jobs and new business opportunities.

Lombardy Region through its “**Smart Specialization Strategy**” (S3)², aims to design an “integrated path” for the development of the territory, with the identification of resources and innovation potential, selection of priorities, in terms of productive sectors and technological fields on which to concentrate investments. The challenge presented by the Lombardy Region is therefore to support the production system to intercept new market opportunities through the evolution of the traditional industries in emerging industries. The bioeconomy in the **Lombardy Region** embraces two main areas of specialization considered main relevant pillars of the regional development strategy, the **Eco-Industry** and the **Agri-food** sectors.

In the **Eco-industry** specialization area more than 40,000 companies are involved with about 190,000 employees, consisting of a complex system of skills composed of the following sub-sectors:

- **energy & cleantech**, power generation, renewable energy, water management and purification. In Lombardy, 50% of Italian plants are located and about 40% of Italian companies are operating in the renewable energy sector.
- **smart grids, energy efficiency & sustainable building**. The production system in the energy sector has about 28,700 employees and a turnover of 9 billion euro.
- **green chemistry, production of chemicals and energy from renewable sources (biomass and / or organic waste)**, processes that reduce or eliminate the use of hazardous substances. Green chemistry represents an interesting opportunity for the manufacturing sector, as it is at the crossroads of almost all macro trends identified by the European Union: efficiency in the use of resources, increase in the use of renewable raw materials, fight against climate change, development of a knowledge-based economy, reduction of the environmental impact of the economy.

The **agri-food** specialization area is the most important in Italy and one of the most relevant in the European context. The priority research themes that have a direct inclusion in the bioeconomy sector are the following:

- **agricultural production, related activities and food processing activities**.
- **sustainable and competitive agri-food supply chain** which includes the enabling technologies related to biotechnologies, advanced materials and advanced production systems.
- **food safety and security**, including enabling technologies such as photonics, nanotechnologies and micro and nano electronics.

The relevance of the bioeconomy as drivers of regional innovation, is expressed in a less prominent way also in the area of specialization of **Advanced manufacturing** and **Sustainable mobility** aimed at supporting actions for waste management, reuse, recycling, enhancement of bio-based products.

¹ Bioeconomy Report 2016 JRC Science for Policy Report. EUR 28468 EN, 2017

<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/bioeconomy-report-2016>

² Smart Specialisation Strategy S3 of the Lombardy Region <http://www.s3.regione.lombardia.it>

2. Current situation in the Lombardy Region

Fundamental economic figures

Located in the north of Italy, at the heart of the most economically advanced European area, Lombardy is a bridge to the Mediterranean Sea. Its strategic location places it geographically on the principal east-west axis of Europe too. With a surface area of nearly 24,000 square kilometres and 10 million inhabitants, the regional dimension is similar to that of a nation.

In **2017 Lombardy's GDP is €368 bn**, about 22% of Italy's GDP. In terms of economic performance, Lombardy's GDP is higher than the one of many EU Member States.

The **Lombard production system** is one of the most developed in Italy and in Europe: in 2017 there were more than **815,956 companies**, about 8.2 companies per 100 inhabitants³.

The economy of Lombardy is characterised by a wide variety of industries ranging from traditional sectors, such as agriculture and livestock to heavy and light industries. The service industry has also had a strong development in the recent decades.

In 2017, the employed workforce in Lombardy amounted to 4,29m: 66.8% was employed in services, 32% in the industrial field and the remaining 1.2% in agriculture.

Micro and small enterprises are the building block of the region's productive industry, representing more than 99% of Lombard companies.

In 2017, almost the 40% of the total firms of the region are based in Milan and its province, and the main sectors are: mechanical, electronics, metallurgy, textiles, chemicals and petrochemicals, pharmaceuticals, food, publishing, footwear and furniture. The service sector is also very well developed and mostly related to international trade and financial services. The Italian Stock Exchange, one of the main European stock markets, is based in Milan, and the Milan Trade Fair is the largest exhibition space in Europe. In the recent past, also the touristic industry highly increased its share on contribution to the regional GDP.

Lombardy is a national leader for the presence of infrastructure to support innovation. In particular, 18% of laboratories and 26% of certified national incubators are concentrated in the region. The availability of capital, specifically dedicated to supporting innovation also confirms the absolute national record of Lombardy. In 2016, 45% of the total Italian venture capital and private equity operations were carried out in the region, for an amount equal to 70% of the total resources invested in Italy.

Italy is the European leader in the **bioeconomy** sector with a turnover of 251 billion euro and 1.65 million employed⁴. And it is **Lombardy that drives the innovation sector**. In 2016, activities related to the Italian bioeconomy (including the management and recovery of biodegradable waste) generated an output of approximately 260 billion euro, 8.3% of the total Italian economy. Adding to this value the estimates on the water cycle, the bioeconomy sector in Italy exceeds 270 billion euro, 8.6% of total national production. According to these estimates, the production value of the sectors related to the bioeconomy has been growing, albeit at modest rates that also include any inflationary effects.

Lombardy has 26,000 companies in the biochemical sector, over one fifth of the Italian total (21.6%), 42% in the pharmaceutical sector and 31% in the chemical sector. Milan with over 13 thousand businesses, confirms its national leadership in the chemical sector with almost one thousand companies out of 6 thousand national, and pharmaceuticals with 245 out of 764. Lombard companies spend more than 3 billion euro on research and development per year at national level with 33 thousand employees out of 50 thousand total.

³ Four Motors of Europe <http://www.4motors.eu/lombardy-3/>

⁴ <http://www.lombardiaspeciale.regione.lombardia.it/wps/portal/LS/Home/News/Dettaglio-News/2017/05-maggio/bioeconomia-lombardia-leader-in-italia>

Bioeconomy in Lombardy Region: main development drivers

Lombard economy is characterized by a huge variety of bioeconomic specializations (both in the traditional and high-tech sectors) and it is supported by an innovative system, rich in skills and know-how with effects on the start-ups activity.

- **Agri-food sector⁵**

The Lombardy agri-food industry weights about 15% on the Italian total sector; accounts for 8.3 billion euro. People employed in agri-food in Lombardy are more than 124.000, 9.2% of Italian agri-food employees. The region is characterized by the high quality of its production.

Also in 2016, the Lombard agro-food system is the most important in Italy and one of the most relevant in the European context, though the value of Lombard agricultural production, shows a further decrease of -1.5% compared to 2015, which results from the contraction of origin prices. In particular, in 2016, the value of Lombard plant production (+ 1.4%), with the exception of wine products, continued to grow, following substantial price stability; on the other hand, the zootechnical products fell by 3.4%, with a reduction of all products except for pork meats (+ 1.8%), substantially for a price reduction of --5.4%, considering that the quantitative increase in livestock production is + 2.1%, driven in particular by milk production (+ 3.3%). Related services continue the long-term growth trend (+ 2.7% compared to 2015 and + 6.6% compared to 2014). Collapse in the use of fertilizers.

- **Biomass sector (wood, paper, biomass)⁶**

The Lombard industry of wood and paper represents about 20% of Italian wood and paper industry in terms of turnover and employment. In Lombardy the wood industry is particularly flourishing including the Brianza furniture district, the Casalasco Viadanese wood district and the Alta Lombardia Wood consortium. The last one gather together 17 sawmills in Valtellina producing 13% of the wood processed in Italy, 147.000 tonnes in 2014, mostly red spruces trunks coming from nearby Switzerland.

This activity produces 138.000q saw and 65.000 q bark.

Advanced attitude of Lombardy to certification in the wood processing sector. The certification of the chain of custody (COC) by wood and paper processing companies are indeed high and growing.

Both for FSC and PEFC it is a leadership position in Lombardy compared to other regions, being first region by COC number according to the FSC scheme and third, after Veneto and Trentino Alto Adige, for PEFC.

Even if the large wood-furniture industry in Lombardy supplies of raw materials largely from abroad, there is actually a divergence of practices between the regional sector of the natural resource and the industrial sector of its use, which shows a more advanced demand of sustainability tools.

- **Food waste**

The regional activities concerning food waste is oriented both toward the food waste prevention and the valorization of food waste for food security. Concerning waste prevention, the Regional Waste Prevention Plan is an integral part of “Regional Waste Management Program of the Lombardy Region” (P.R.G.R)⁷. It sets specific prevention and reduction targets and identifies organic waste (including food waste) as waste streams on which to focus on, reaching reduction

⁵ The agri-food system in Lombardy. Report 2017

<http://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioRedazionale/servizi-e-informazioni/Imprese/Imprese-agricole/ricerca-e-statistiche-in-agricoltura/rapporto-agroalimentare-2017/rapporto-agroalimentare-2017>

⁶ Lombardy Report 2017, <http://www.polis.lombardia.it/wps/portal/site/polis/DettaglioRedazionale/pubblicazioni/studi-e-documenti/studi-e-documenti-eupolis-lombardia/2017/rapporto-lombardia-2017>

⁷ Regional plan for waste management and remediation 2014-2020

<http://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioRedazionale/istituzione/direzioni-general/direzione-generale-ambiente-e-clima/piano-regionale-rifiuti-e-bonifiche>

targets for waste production. Lombardy Region fixes as a long-term goal of reducing 50 % of food waste by 2025 by adoption the logic of integrated intervention between policy areas (socio-welfare, health, training, productive, agricultural, territorial, landscape, environmental, trade, economic, rural development) and between Region, Local Authorities and Private Entities.

- **Textile and leather sectors**

The Lombard industry of textiles and leather weights in terms of employment about 30% on Italian sector (22% in terms of turnover). Lombardia has an important tradition on textile industry, with a specialization in natural fibres as showed by the presence of 3 important economic districts specialized in natural textiles: Silk of Como, Textiles of Val Seriana and Textiles of Gallarate.

- **Chemical and Pharma sectors**

Lombardia is specialized in pharmaceutical industry, in particular in the province of Milano, Monza, Varese, Pavia, where multinationals are present. The presence of big players helps the development of new products and fields of research as biotech pharmaceuticals. Lombardia is the first region at national level for number of firms and R&D Centers of biotech pharmaceuticals.

- **Bioenergy⁸**

Lombardy is the second region in Italy for bioenergy.

There is a good management and recovery of biodegradable waste and a high level of recycling and recovery in the management of sewage sludge, supported by high skills.

In the development of renewables, which responds to the European strategies for climate-energy and the TARGET 7.2 of the SDG ("considerably increase the share of renewable energies in total energy consumption by 2030"), Lombardy has been showing a positive trend for some time, albeit with some limitations.

Lombardy already reached in 2013 a share of gross final consumption of energy covered by renewables equal to 12.5%. Among the results achieved on consumption covered by renewables (in absolute terms), the primacy of Lombardy should be highlighted in some sectors such as biogas, solid biomass, heat pumps and derived heat, and a position in solar that is second only to Puglia among the Italian regions.

The significant role of bioenergy for electricity production should be highlighted, which in Lombardy cover around 6% of regional final consumption, a share higher than the Italian one and aligned with the Northern regions. Lombardy has the largest production of solid biomass energy (excluding waste) among Italian regions (657 ktep in 2014) and a high production of other renewable energy with a territorial base, such as hydroelectric and biogas, for which it occupies quotas on the total Italy largely superior to its territory share.

- **Plastic⁹**

In 2017, 52% of the urban separate collection of plastic packaging in Italy comes from Northern Regions. The quantities collected have grown throughout Italy; between 2007 and 2017 the quantities collected in the North grew by 11%. The amount of plastic collected from urban areas in Lombardy in 2017 is 17.9% and per inhabitant of 19.2.

- **Forestry¹⁰**

The regional wooded area at 31 December 2016 is estimated at 629,725 hectares, with an increase of 3.981 hectares (equal to 0.53% more) compared to the forest area surveyed in 2015 by the new map of Destination of Use of Agricultural and Forestry Soils recently published

⁸ Lombardy Report 2017

⁹ Il Futuro del riciclo della plastica nella circular economy. Corepla http://www.corepla.it/documenti/c7435d66-0f38-48b5-bca4-5ee21d1f572d/Report-COREPLA_singole.pdf

¹⁰ Rapporto sullo stato delle foreste in Lombardia 2016. Ersaf http://www.ersaf.lombardia.it/upload/ersaf/gestionedocumentale/RAPPORTO_STATO_FORESTE_2016_784_35200.pdf

(DUSAF). Today it covers 26.4% of Lombardy and in the last decade has seen an increase of 2.1%.

In 2016, the system recorded 18,59937 instances and 526 thousand cubic meters of timber reported at the cut distributed over 7,736 hectares. The decrease already recorded in the last three years continues. The number of companies registered in the Regional Register of Bosch Enterprises rises to 289 and at least 744 people work between owners, employees hired and in some cases even seasonal.

Lombardy Region has a "Rural Development Program 2014-2020", the Fund for green areas, the financing of green infrastructures with ecological relevance and an increase in naturalness, and the forest management plans.

- **Aquaculture¹¹**

Lombardy holds the European record of three of the most important freshwater fish markets: trout, eel, sturgeon. In Lombardy there are 68 sites with a production estimated at about 5600 tons in 2012, of which about 4000 tons of trout (iridea, fario), which are confirmed as the most important slice of regional agriculture.

Over 600 employees with a share of 26% occupied by women and a high level of specialization that has led, over the years, to numerous installations with a high use of innovative technologies - above all from the point of view of environmental sustainability - alongside smaller companies family management. The most up-to-date data come from the Italian Fishermen's Association and show a slight decrease in production (from 5680 tonnes in 2011 to 5340 in 2015) and the economic value (28.9 million euros in 2011 against 28.2 million euros in 2015) against a stable number of dedicated plants (68 in 2011 and 2015).

- **Waste¹²**

The share of urban waste in separate waste collection, which continues to grow, was 58.7% in 2015 (ISPRA, 2016e), in line with the Northern regions that have 'hooked', and in some cases exceeded, Lombardy in the last years, while the share of municipal waste in landfills has long been less than 10%, reaching 5% in 2015, a structurally lower figure than other northern regions and other regional groupings.

The Lombard urban waste management model also includes a significant energy enhancement component, established since the 1990s, which operates through the 13 energy production plants from waste located in the region. These plants produce about 44% of the total waste energy in Italy (GSE, 2016).

From the management point of view, over 79% of the 34 million / t of special waste handled in Lombardy is subject to recovery or recycling operations, for which the region covers over 27% of the Italian total. In particular, 71% of the special waste handled in Lombardy is subject to material recovery (recycling), a percentage higher than the national average. Approximately 484,000 tons are used as an energy source in 64 different types of plants, and the region also has the highest number of hazardous special waste incinerators (24 out of 85 in Italy).

These data suggest that for valuable industrial waste, just like a large part of urban waste, there is already a circular economy in Lombardy in which the waste and waste of many processes, from metallurgical to that of the food industry, fall into other production processes as inputs to replace primary materials extracted from natural resources.

Although poorly mapped and quantified, not only at the Lombard level, this circularity is structural and generally increasing, since many of the waste-based sub-supply chains have already been consolidated economically and technologically, even under the continuous drive of waste policies within large sectors and value chains, from metals to paper, from chemistry to wood.

¹¹ Programma triennale regionale per la pesca e l'acquacoltura 2017-2019

<http://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioPubblicazione/servizi-e-informazioni/cittadini/agricoltura/pesca/progr-trienn-regionale.pesca-acquicoltura>

¹² Lombardy Report 2017

Potential application fields

Food waste

- Wastewater: the aim of this opportunity is to further valorise food and beverage industry wastewaters. The food supply chains are large in volume terms, significant in economic and environmental terms and central to the management of many biological materials. These chains currently generate significant amounts of waste and they are associated with high environmental impacts. The waste streams are generated during harvesting, storage and transport prior to primary processing (primary stream), during primary processing within the agro-food industry (secondary stream) and during production or consumption by end users (tertiary stream).

Textile

- Increase the recover of waste clothes: the Lombardy Region produces 13-15 kg per year per person of wasted clothes, but only 2-3 kg are recovered. This opportunity can be exploited by reusing them or by inserting them into new clothes, thus reducing the amount of generated clothes waste and by creating new sustainable clothes made of recycled textiles.
- Reuse of waste textiles in other sectors: an alternative destination and application can be thought for the waste materials coming from the textile sector. In fact, it is important to understand that many opportunities can be created through a cross-sectorial approach: a fibre that is not suitable to be recycled and used in the textile sector, can have valuable qualities in other sectors. An important example is the reuse of wasted textiles as secondary raw materials in the built environment, becoming a material insulator to be used during the construction of buildings.

Plastics

- Incentives for biodegradable plastics production: biodegradable plastics can be a solution to the great amount of plastics that pollutes our environment; by giving money incentives for the production of more sustainable and biodegradable plastics, Lombardy can limit the plastics pollution in the region.

3. Regional Bio-Economy Strategy

Regional Green Chemistry Cluster for the bioeconomy support

Lombardy Region promotes the ecosystem of innovation through the Lombardy Technological Cluster, encouraging the creation and implementation of aggregations between the various subjects active in the field of Research and Innovation: companies, universities, research centers, public and private institutions and others also financial subjects.

These aggregations, equipped with a model of coordination and management governance, as well as focused on a specific technological and application field, are called to actively participate in the implementation of innovative processes that contribute to the competitiveness of Lombardy in Italy and internationally. The Clusters are the protagonists of the change in strategy of development between past and future, from traditional industrial sectors to systems of expertise, they are also the point of re-launch of policies for innovation.

The Region promoted and supports a **Regional Green Chemistry Cluster** managed through the **Lombardy Green Chemistry Association-LGCA**¹³. The goal of the cluster is to create at regional level “the best framework conditions for the setting up of a bioeconomy based on the use of biomass from agriculture, forest and waste, following the principles of sustainability and cascading use and through the active involvement of the whole value chains”. The association has currently 40 members, mostly companies and research institutions.

Lombardy Smart Specialization Strategy – RIS3

The Lombardy “**Smart Specialization Strategy**” (RIS3)¹⁴ identifies the competitive advantages and the technological areas more coherent with the innovation potential of its territory. Its purpose is to:

- identify the policies and range of public support that is available at regional level to help businesses invest in innovation, and why and how specific priorities (Specialisation Areas - SAs) for investment have been made.
- mark a territorial development path through support to the Research and Innovation: help the regional enterprises and research bodies to benefit from and to identify opportunities to collaborate with other places across Italy and beyond with similar investment priorities for innovation.
- fulfill the requirements of EC ERDF ex-ante conditionality, transforming this requirement into an opportunity: to experiment de facto the new territorial development path: concentration of the investments on SAs with high social return of investments
- inform and to involve the territorial stakeholder in policy-making process regarding Research and Innovation.

The Lombardy Region supports actions that have direct or indirect repercussions on Lombard players who develop industrial research and innovation activities, especially on micro, small and medium-sized enterprises, since they represent the majority of the production context.

Lombardy Region has identified **7 Areas of Specialization (AdS)**, which represent the majority of the economic and scientific subjects present in the area and contribute to increasing their leadership in the issue. The Areas of Specialization identified to date are: 1) Aerospace, 2) Agribusiness, 3) Eco-industry, 4) Creative and Cultural Industries, 5) Health Industry, 6) Advanced Manufacturing, 7) Sustainable Mobility.

¹³ For more information <http://www.chimicaverdelombardia.it/en/>

¹⁴ Smart Specialisation Strategy S3 of the Lombardy Region <http://www.s3.regione.lombardia.it>

The Areas of Specialization have been defined in "**Research and Innovation**" **Work Programms**, a synthesis of the challenges and priorities and point of reference for regional calls for proposals.

Within the Regional Work Programs, the "Technology Readiness Level" model adopted by the European Commission in the Horizon 2020 Workprograms, was introduced to make the level of expected industrial competitiveness more explicit.

The seven Work Programs have been developed in collaboration with Lombardy Technology Clusters that have identified the development themes and supported a public consultation launched in September 2014 and 2017, with the participation of the regional productive and scientific system (Associations, Research Centres, Universities, SMEs, Large Enterprises).

Bioeconomy and Circular Economy in RIS3

Circular Economy and Bioeconomy play an important role within the "Smart Specialization Strategy" of the Lombardy Region, as drivers for the development of the territory, stimulate the transformation of traditional and mature industries into Emerging Industries and increase the competitiveness of the economic system. Transition to a more circular economy is at the center of the resource efficiency agenda established under the Europe 2020 strategy for smart, sustainable and inclusive growth.

In order to move towards a more circular economy, changes must be made to the whole of the value chains, from product design to market and company models, from methods of transforming waste into resources and consumption methods: this implies a real systemic change and a strong innovative drive, not only in terms of technology, but also in terms of organization, society, financing methods and policies.

Different development themes have been put into common use in the "**Research and Innovation**" **Work Programs** according to a reading based on the broad concept of Circular Economy declined by the Ellen McArthur Foundation¹⁵. In order to frame the issues of development with a view to Circular Economy, the RESOLVE framework was adopted, which identifies 6 areas of action addressed to companies and policymakers to accelerate the transition to the circular economy.

Here are the six action areas: EC1 Regenerate, EC2 Share, EC3 Optimize, EC4 Loop, EC5 Virtualise, EC6 Exchange. The regional support to the bioeconomy in RIS3 and in the "Research and Innovation" Work Programs, is declined in the Eco-Industry and Agri-food Areas of Specialization (AdS). For each of them, Thematic priorities are associated, as follow:

Eco-Industry AdS	Agri-food AdS
<ul style="list-style-type: none"> • Sustainable catalytic processes for industrial applications (sustainable chemistry) • Creation of biorefineries for the integrated production of value products added from no food crops and waste biomass (bioeconomics) • Bioeconomy of the future 	<ul style="list-style-type: none"> • Safe foods for sustainable consumption • High nutritional efficiency foods
Advanced manufacturing AdS	Sustainable mobility AdS
<ul style="list-style-type: none"> • High efficiency production systems • Manufacturing for customized products • Manufacturing systems for environmental sustainability 	<ul style="list-style-type: none"> • Energy efficiency and reduce environmental impact in transport

¹⁵ Ellen MacArthur Foundation <https://www.ellenmacarthurfoundation.org/circular-economy/concept>

The role played by Regional Government and Clusters

Regional Government overtakes the vertical sectors logic, evaluating the excellencies of the own territory by systems of competencies, points out the “show influences” between competencies of various sectors and boosts cross-fertilization phenomena.

The main tool is “Cluster Initiative” Programme and Collaborative Platform of Open Innovation; activates specific Call for Proposals with the aim to encourage the collaborations within knowledge triangle. Participates at the policy- making process through Lombardy Technological Clusters as “soft governance”, the regional “Economic Partnership”, different public consultations, and indirectly through thematic communities created on the Collaborative Platform of Open Innovation etc.

Smart Specialization Strategy: a continuous updating process

The inward and outward looking process is aimed at the continuous comparison of the regional policies defined in the Lombardy Region S3 in the field of Research and Innovation with national and European policies. The incorporation and monitoring of new elements in economic systems other than those of Lombardy is essential to increase the competitiveness of companies and of the territory in general.

In addition to updating the Strategy with national and European directives, the process provides for an international dialogue to identify joint development actions, synergies and opportunities to implement the inward and outward looking process, the Lombardy Region carries out the following actions:

- participation in the comparison and work tables promoted and organized by the S3 Platform in Seville;
- benchmark among the Intelligent Specialization Strategies of different Italian and European regions: developed, in transition and less developed;
- sharing with stakeholders on Research and Innovation;
- experimental initiatives of collaboration between companies and Lombard research organizations;
- supervision of related national and European initiatives for comparison;
- collaboration with the various national and European authorities involved in the management of the S3.

Other policy instruments

Lombardy, the first region in Italy, has adopted the **law "Lombardy is Research and Innovation"**¹⁶ (No. 29 of 23 November 2016) created to enhance investment in research and innovation and promote the competitiveness of the economic-productive system, well-being and the quality of services provided to citizens and businesses.

The law organized the governance of regional interventions by introducing new coordination mechanisms and identifying strategic instruments to support innovation.

The main new features introduced are:

- **Forum for Research and Innovation** with consultative, proactive and informative functions.
- **Governing body** that draws up a three-year “*Strategic Work program for research, innovation and technology transfer*”.

¹⁶ Legge Regionale 23 novembre 2016 , n. 29 - Lombardia è ricerca e innovazione

<http://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioRedazionale/istituzione/direzioni-general/direzione-generale-ricerca-innovazione-universita-export-e-internazionalizzazione/legge-lombardia-ricerca-innovazione>

4. Strategy implementation

Lombard Technological Clusters¹⁷ are intermediate governance bodies between the local administration and the territory, enhancing the enabling sectors for regional development and competitiveness. Clusters aggregate businesses, universities, research centers and others public or private entities and focused on a specific technological field, able to contribute to the support of research, the innovation of the economic system of reference at local, national and international level. Lombardy Region has recognized 9 clusters, each of which is governed by an autonomous organization, has legal personality (recognized association or foundation), a model of governance and defined roles (assembly, president, board of directors, cluster manager).

Lombardy Region promoted and supports a **local Bioeconomy** through the **Lombardy Green Chemistry Association-LGCA**¹⁸. The goal of the cluster is to create at regional level *“the best framework conditions for the setting up of a bioeconomy based on the use of biomass from agriculture, forest and waste, following the principles of sustainability and cascading use and through the active involvement of the whole value chains”*.

The Cluster actions are focused on main pillar:

- Sharing best practices to support research and innovation activities focused on: use renewable resources as raw materials, creation of integrated biorefineries, promotion of biobased products;
- Stimulate research and investments in new technologies in the bioeconomy sector;
- Promote dialogue with the stakeholders in the local areas in order to stimulate bioeconomy at national and regional level.

European initiatives for bioeconomy sector

Lombardy Region is active in 4 European initiatives to support innovation and research processes, where the bioeconomy and the circular economy play a primary role:

- **EUSALP**¹⁹

The Macroregional Strategy for the Alpine area launched in 2015, represents an opportunity to improve cooperation between the countries of the Alpine region and to identify common challenges that can be addressed. The Strategy focuses on three areas thematic: (1) innovation and economic growth, (2) mobility and connectivity and (3) environment and energy.

Lombardy Region (Brussels Delegation) coordinates the Working Group *“Development of an effective ecosystem for research and innovation”*, with the aim of promoting innovative investments in strategic sectors of the Alpine area (including bioeconomy, health and tourism), wood, high tech, etc.) through the networking of resources and the involvement of policy makers.

- **VANGUARD INITIATIVE**²⁰

Vanguard represents a political commitment by the regions to use their smart specialization strategy to promote growth through a process of entrepreneurial discovery and industrial renewal in areas recognized as priorities at European level. Vanguard promotes activities on interregional cooperation between Cluster along European value chains. Five pilot actions were activated, having a Technology Readiness Level equal to or greater than 5 close to market and with a high commercial potential:

¹⁷ Smart Specialisation Strategy S3 of the Lombardy Region [i](#)

¹⁸ For more information Lombardy Green Chemistry Association <http://www.chimicaverdelombardia.it/en/>

¹⁹ Alpin Space <https://www.alpine-region.eu/>

²⁰ Vanguard initiative <https://www.s3vanguardinitiative.eu/>

(1) Bio-Economy - Interregional cooperation on innovative use of non-food Biomass, (2) Efficient and Sustainable Manufacturing (ESM), (3) High Performance Production through 3D-Printing, (4) Making EU the global leader in components for marine renewables and offshore energy applications, (5) Vanguard Initiative pilot project on New nano-enabled Products.

The Lombardy Clusters are directly involved in the pilot initiatives. In particular, the pilots on the **Efficient and Sustainable Manufacturing** (coordinated by the AFIL-Lombardy Cluster for the Advanced Manufacturing²¹ and EURECAT/Catalunya) and on the **Bioeconomy** (coordinated by the LGCA-Lombardy Green Chemistry Association and South Holland/Ranstad) are led by Lombard Clusters. Starting from July 2017 the Lombardy Region has assumed the presidency semester of the initiative and working groups and in-depth meetings will be activated.

• **SMART SPECIALIZATION PLATFORMS**

The European thematic platforms activated as part of the regional smart specialization strategies aims at strengthening regional cooperation in their respective priority areas.

The platforms in which it participates Lombardy Region and that in some cases co-ordinates are:

- **Industrial modernization Platform:** Advanced manufacturing for energy applications, Bioeconomy - Interregional cooperation on innovative use of non-food Biomass, Efficient and Sustainable Manufacturing, High Performance Production through 3D-Printing, Medical Technology, Smart Regional Investments in Textile Innovation (Regiotex).
- **Agri-food Platform:** Bioeconomy, Smart sensor systems 4 agri-food.
- **Energy Platform:** Marine Renewable Energy.

• **BIOECONOMY AND CIRCULAR ECONOMY EUROPEAN PROJECTS**

The relevance of the bioeconomy at the regional level is demonstrated by the participation by the Lombardy Region in projects supporting the circular economy policies. The development of these policies and their implementation represent a real strategic driver, on which to invest for the development of new business and new and more sustainable consumption models.

The main projects are reported below:

– **SCREEN - Synergic Circular Economy Across European Regions²²**

European project funded by Horizon 2020, involves 18 partners representing 17 regions belonging to 12 European Countries, aims to develop a replicable systemic approach towards the transition to circular economy in EU regions within the context of their Smart Specialization Strategies, through the identification and implementation of operational synergies between R&I investments from H2020 ESIF, thus contributing to novel future eco-innovative and horizontal business models across different value chains.

– **CircE – European Regions towards Circular Economy²³**

European project funded by Interreg Programme, involves 8 partners both at regional and local scale and representatives of different European social and economic scenarios: Lombardy Region, Government of Catalonia, Marshal's Office of Lower Silesia, Province of Gelderland, London Waste and Recycling Board (LWARB), Creation Development EcoEnterprises (CD2E) Sofia Municipality, Association of Municipalities and Towns of Slovenia (SOS).

The project aims at strengthening the diffusion of Circular Economy (CE) in Europe, consistently with the European Commission's Circular Economy Package (2015). In particular the project aims at helping the Partners involved to increase the capability of their Policy instruments to steer economy towards a circular model. The project carries out this task by aiming at modifying or readdressing the selected policy instruments through an exchange of knowledge/experiences among Partners, through a continuous involvement of Stakeholders and through a deeper analysis of economic system.

²¹ Lombardy Intelligent Factory Association <https://www.afil.it/?lang=en>

²² Synergic Circular Economy across European regions <http://www.screen-lab.eu>

²³ European regions toward Circular Economy <https://www.interregeurope.eu/circe/>

5. Future outlook

The “**Regional Strategy for Bioeconomy**” is one of the objectives of territorial governance that is being implemented. This Action Plan will allow Lombardy to have a programming system to enhance services and technologies to support the industrial sector and make the regional context attractive for national and foreign investors.

The main pillars for this purpose are:

- creation of integrated biorefineries in the territory to obtain high added value products (biochemicals, biomaterials);
- development and optimization of innovative technologies and efficient processes through R&D and scale-up activities to pilot plants and demonstrators construction;
- development of new biobased products (obtained partially or totally from materials of renewable origin), with low environmental impact and with benefits from a social and economic point of view, able to develop new functionalities or guarantee superior performance compared to traditional products;
- development of new markets for biobased products, through specific measures aimed at boosting productivity and resource efficiency;
- stimulate the development of innovative technologies and the promotion of intra-sectoral collaboration along the actors of the value chain;
- facilitating the exchange of knowledge between different stakeholders (agricultural, research, industrial, institutional), and creating an environment conducive to investment and facilitating access to finance.

The Bioeconomy plays a central role also in the **new regional “Research and Innovation” Work Program**, currently being implemented. The main guidelines of the plan will contribute to strengthening the bioeconomy are:

- Advanced Agriculture and Nutrition: new technologies to reduce food waste, ensure greater transparency in the agro-food supply chain. Adoption of advanced sensors and instruments to analyze soil, meteorological and irrigation conditions to reduce the use of fertilizers and optimize the management of water resources.
- Environmental sustainability: Big data use to ensure the development of predictive models; smart sensor networks connected to cloud databases for monitoring the use of water resources in urban and industrial areas; use of innovative technologies for the reduction of atmospheric pollution and for the realization of autonomous factories from an energy point of view.
- Advanced Manufacturing and Intelligent Factory: in this context, preventive maintenance interventions are planned, as well as the reorganization of the supply and distribution chain, with the aim of making the Lombard manufacturing model even more competitive, attractive and efficient. The development of advanced manufacturing will focus in particular on the implementation of mechatronics, nanotechnologies and nanomaterials, artificial intelligence and the improvement of effectiveness in the management of human resources.
- Transfer of Technologist and Knowledge: a lively context of technological exchange, made up of a network of relationships between universities, businesses, associations, research centers, incubators and citizens and supported by the availability of capital, is essential to boost private investments in start-up and make Lombardy even more attractive.

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AlpLinkBioEco Partners



AlpLinkBioEco will develop

1. Cross-regional database to map existing resources, actors and relevant policies
2. Methodology to match actors demand-oriented in new value chain enabling new cluster activities
3. Coherent data driven policies for stimulating the Alpine circular bio-based economy
4. Masterplan on circular bio-based economy is delivered to establish common framework conditions on innovation policies

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