Smart Specialisation Platform for Industrial Modernisation

Thematic S3 Partnership

Bioeconomy
Interregional cooperation on innovative use of non-food biomass

Start Date 2014

MONITORING PROGRESS REPORT

Reporting Period: *from* ***January 2019*** *to* ***June 2019***

This Report is presented to the relevant Working/Steering Committee.
It contains two main parts:

I. Management Report *prepared by the Lead Region(s)*
II. Progress Report *prepared by the Lead Region(s)*

The report is updated every six months.

Confidentiality: this document (part I) will be made available to the public via your Partnership's web page except for chapter *II.E. Self evaluation*.

Based on the monitoring results, the European Commission will decide on the following term's support.

Executive summary (max. 250 words):

The Vanguard Initiative Bioeconomy Pilot aims at setting up trans-regional value chains in the area of the innovative and sustainable use of renewable resources. The Bioeconomy Pilot also promotes the development of new biobased value chains in Europe by performing pilot and demonstration activities, from regional to higher interregional level, thereby creating more critical mass through complementary assets' exploitation and technological developments' acceleration.

*I. **Management Report** prepared by the Thematic Platform/Lead Region(s)*

I.A. Partnership Action Fact Sheet

- **Partnership:** *Bioeconomy Pilot - Interregional cooperation on innovative use of non-food biomass*

- **Partnership's web-page:** *https://www.s3vanguardinitiative.eu/cooperations/bio-economy-interregional-cooperation-innovative-use-non-food-biomass*

- **S3 Thematic Platform:** *Industrial Modernisation*

- **Objectives:**

The Bioeconomy Pilot concerns the implementation of synergies in new biobased value chains crosses regions based on their smart specialisations. Its main objective is to develop new integral Biobased value chains and new connections between sectors as chemistry, agro, wood & paper, manufacturing and energy, leading to new interregional business opportunities and co-investment through interregional cooperation and partnerships. This partnership was born out of the Vanguard Initiative; therefore partners bring their experience on S3 cooperation within the TSSP Industrial Modernisation and aim to strengthen the Demo Cases with the network and the new opportunities the TSSP Industrial Modernisation might offer.

- **Lead Region(s):** *list of regions/countries leading this partnership*

Lombardy, Italy
Randstad, The Netherlands

- **Official partner regions:** *list of regions/countries that have officially committed to follow this partnership and have been active in the last six months.*

Asturia (ES)	*Lombardy (IT)*	*Randstad (NL)*
Basque Country (ES)	*Lower Austria (AT)*	*Scotland (UK)*
Dalarna (SE)	*Malopolska (PL)*	*Skane (SE)*
Eastern Netherlands (NL)	*Navarra (ES)*	*Slovenia*
Emilia-Romagna (IT)	*Nort-Rhein Westfalia (DE)*	*South Netherlands (NL)*
Flanders (BE)	*Piedmont (IT)*	*Upper Austria (AT)*
Wales (UK)	*Wallonia (BE)*	

- **Other regions:** *list of regions/countries that have expressed their interest in this partnership but have not signed a commitment letter).*

Please enter here...		
Any other comments		

- **Intentions to join:** *list any regional/national authorities*
(Please list here all other regions that have expressed their interest to join the partnership)

- **Other participants (other than national/regional authorities):**
(Please list here all other (non-region) participants (clusters, institutes, RTOs, etc.))

Please enter here...		
Any other comments		

Representative of Lead Region 1: *(name, institution, address, phone, e-mail)* *Roberta Negriolli, Lombardy Region, Italy* *Presidency - Delegation to the EU - Responsible for Research and Innovation* *roberta_negriolli@regione.lombardia.it* *+32 (0) 2.518.7604*	**Representative of Lead Region 2** (if applicable)**:** *(name, institution, address, phone, e-mail)* *Wijnand.Van Smaalen, Province of Zuid-Holland, part of Randstad Region, Netherlands, Senior Policy Advisor on Bioeconomy* *w.van.smaalen@pzh.nl* *+31 (70) 441 7518*
European Commission Coordinator: *(name, e-mail)* *Fatime Barbara Hegyi* *Phone: +34 95488753* *Email: fatimebarbara.hegyi@ec.europa.eu*	*Any other relevant information*: *Technical Coordinator* *Lombardy Green Chemistry Association* *Ilaria Re* *E-mail: ilaria.re@italbiotec.it* *Phone: +39 02 5060191*

I.B. Thematic Working Areas (WA)

- **Thematic Working Areas** *(if any, please list of WAs, region(s) in charge of it, names and affiliations of involved regional/national authorities, and other actors)*

Working Area	*Region in Charge*	*Involved regions*	*Other actors*
Bio-Aromatics. *Creating interregional value chains to produce biobased aromatic molecules and innovative sustainable materials*	*Flanders (BE), South Netherlands (NL), North Rhine Westphalia (DE)*	*Flanders, Randstad, North Rhein Westfalia, Slovenia, Piedmont, Upper Austria, Lower Austria, Wales, Basque Country, Wallonia, Värmland, Navarra, Lombardy, Emilia-Romagna, Scotland.*	
Lignocellulosic Biorefinery. *Lignocellulosic biomass fraction conversion into intermediates and building blocks for biofuels and chemicals production*	*South Netherlands (NL)*	*South Netherlands (NL), Randstad (NL), Flanders (BE), Scotland (UK), Wales (UK)*	*Slovenia*
Liquified Bio-methane *LNG as a bio-based alternative for public transport and related value chains.*	*Emilia-Romagna (IT), Lombardy (IT)*	*Emilia-Romagna, Lombardy, Randstad, Upper Austria, North Rhine Westphalia, Northern Netherland*	
Any other comments			

I.C. Overview of activities

a. Overview of past activities (past six months, the 1st half of 2019)

Past Meetings

Title	*Date*	*Place*
Steering Committee Meeting	*26 March 2019*	*Lombardy Region Delegation Brussels*
Bilateral meeting EC TSSP Bioeconomy partnership	*2 April 2019*	*Building Conscience, Koning Albert II laan, Brussels*
Steering Committee Meeting	*27 May 2019*	*House of Dutch Provinces, Brussels*
Lignocellulose biorefinery stakeholder meeting	*27 May 2019*	*House of Dutch Provinces, Brussels*

Past Workshops

Title	*Date*	*Place*
Bioeconomy Dialogues Matchmaking event.	*7 February 2019*	*Istituto Spallanzani Rivolta d'Adda, Cremona, Italy*
Bioeconomy Dialogues. Matchmaking event.	*20 March 2019*	*University of Brescia, Brescia, Italy*
Boosting Innovation for EU Industry: Industrail Infrastructures & Open Innovation Ecosystems	*3 April 2019*	*Ljubljana, Slovenia*
Biobased Barcamp	*12 April Potsdam*	*Germany*
Challenges and opportunities for the establishment of bio-based value chains. The national Bioeconomy Day	*23 May 2019*	*Milan, Italy*

Past Dissemination Activities

Title	*Date*	*Place*
IDEA- Innovation Dream Engineering Awards	*19 February 2019*	*Politecnico di Milano, Milan, Italy*
Social network promotional campaigns		

b. Overview of future activities (the next 6 months – the 2nd half of 2019)

Future Meetings

Title	*Date*	*Place*
Steering Committee meeting	*July 2019*	*Brussels*
Steering Committee meeting	*October 2019*	*Brussels*

Future Workshops

Title	*Date*	*Place*
IFIB - International Forum on Industrial Biotecnology and Bioeconomy	*2 October 2019*	*Congress Center of the University of Naples Federico II, Naples, Italy*
Bioeconomy Pilot annual workshop	*December*	*Brussels*
Bioeconomy Pilot workshop	*27 November 2019*	*Antwerp*

Future Dissemination Activities

Title	*Date*	*Place*

II. Progress Report *prepared by the Lead Region(s) of the partnership, describing* ***results achieved during this period****, in no more than 3 pages (the report is "cumulative"). All items listed in Sections A, B, and C, below, must be addressed.*

Additional documentation such as extended technical reports and/or proceedings of workshops may be provided separately as an annex to this report (and should be referenced in the report).

II.A. Innovative results

- Innovative results and achievements that could be attributed to the Partnership. *(Specific examples of Results vs. Objectives).*

Bioaromatics demo-case.

The growing attention and demand for bio-aromatics on a worldwide basis, but especially in Europe, has been prompting many universities, research centres and innovative industrial players to develop processing steps from biomass feedstock to bio-aromatics. The demo-case seeks to identify alternatives to fossil-based aromatics to assist the chemical industry towards a sustainable future and safer and better performing aromatics for new, innovative products and applications.

The partnership selects to pursue for this TSSP pilot a business case to contain two paths towards applications in the building and construction market:

1) the thermal treatment path with the Catlignin technology as the centre piece

2) the depolymerisation path with the LignoValue pilot plant as the centre piece

The two paths deliver lignin, but at different molecular weight. They can lead to materials for similar end-use application in the building and construction sector (e.g. in adhesives, insulation materials, coatings, plastic composites, flame retardants, etc.). The required performance for specific applications and the associated economics will dictate which lignin type is best to use. Also, these conditions could dictate a mixture of the lignin types as the best basis.

Lignocellulosic biorefinery demo-case.

The ligncocellulosic biorefinery demo-case is the one applying the "Close to market" principle and it is a TRL 7-8 technology. This case does consider the production of ethanol from hemicellulos sugars (C5/C6), and using a fairly pure C6 sugar stream for the production of chemicals such as lactic acid by fermentation. The remaining lignin can go to bio-energy for production of steam and electricity, but other higher value applications are preferred, see below.

The demo-case selects three promising use-cases:

1) Large-scale biorefinery, the "Redefinery project" led by Biosabed Delta focused on the production of sustainable bio-asphalt from lignin (stemming from hard wood chip/pellets as feedstock).

2) Wood based biorefineriy, focused on production of panel form lignin (soft wood feedstock)

3) Local4Local biorefiniery, led by Slovenia region based on small-medium biorefinery of wood, with cellulose to fiber and syngas production from the hemicellulose/lignin fraction.

Lignocellulose is typically considered as one of the most promising feedstocks to produce a variety of renewable fuels and value-added chemicals. Lignin goes to biobitumen (asphalt) with a value of around 300€/t. Road builders have been involved by Biobased Delta and pilot tests have already been made on stretches of roads. Lignocellulosic biomass has a great potential to produce bioethanol in significant quantities. Lignocellulosic waste from crop residues and feedstock can produce 442 GL/ year of bioethanol and this production can replace 351 GL/year of gasoline if it is used in E85 vehicles. Hence, the research interest for using bioethanol as a source of renewable fuel is huge.

Liquified Bio-methane demo-case.

The LBM market has more than tripled in the period from 1995 to 2011. After a few years of stalled growth, the total trade reached a maximum in 2015 with 245 MT. Global outlook for this energy carrier anticipates further growth. To the European Union, LBM represents a mean to make the EU's gas system more flexible and diverse, thus contributing to a more secure, resilient and competitive gas supply. In the transportation sector, the energy carrier is especially attractive as fuel to heavy-duty vehicles and ships: the product comes close to the energy density of diesel while it produces far less air emissions and noise nuisance.

The demo-case could provide valuable information on the present-day state of the art and the opportunities for economizing the value chain. Trucks, buses and coaches are responsible for about a quarter of CO2 emissions from road transport in the EU and some 5% of the EU's total greenhouse gas emissions. Looking at the public bus transport system, shifting towards greener fuels is the best way to lower emissions. While city centers will very likely be served by electric-powered vehicles in the near future, the only clean solution for substituting existing diesel-powered heavy-duty vehicles (HDV) on extra-urban areas is the natural gas in its liquid form (LNG).

- Tangible short- and medium-term socio-economic impacts achieved or expected. *(Specific examples).*

  As reported by the European Commission in the update of 2018, the European Bioeconomy represents a central element for the EU economy with an annual turnover of around 2 trillion euro and employing about 18 million people (the 8.2% of the EU's workforce). The creation of a sustainable bioeconomy would lead to the creation of jobs, in particular in coastal and rural areas through the participation of primary producers in developing local bioeconomies, basing on the identified specialization areas (according to the S3 Strategy).

  According to the EuropaBio Report of 2016, the bio-based industries could contribute to creating one million new jobs by 2030. Consistent with the Climate objectives of the Paris Agreement, the growth of a sustainable European bioeconomy is necessary to achieve the so-called carbon neutrality, with the aim of zero carbon dioxide emissions.

  The energy derived from biomass represents a pivotal factor in reducing greenhouse gas emissions. For instance, the production process of bioethanol uses energy only from renewable energy sources. In this way, bioethanol represents an environmentally beneficial energy source. Furthermore, bioethanol from lignocellulosic waste can increase employment opportunities in rural areas, creating a positive socio-economic impact.

  In this context, wood represents a source in the construction sector because it brings great environmental benefits as well as great economic opportunities.

  Different studies reported that the average impact of building with 1 ton of wood instead of 1 ton of concrete could lead to an average reduction of 2.1 tons of carbon dioxide emissions over the complete life cycle of the product (including use and disposal).

  Also, the production of liquified bio-methane could contribute to give a greener alternative to the fossil fuels by using it in the transportation field, primarily if biomethane is produced by recycling feedstocks such as agricultural wastes, urban green waste and industrial residues.

  The use of agricultural and industrial waste for the creation of new added-value products contributes to the growth of an EU circular Bioeconomy, allowing the cooperation between companies and the creation of new promising value chains.

  For instance, the promotion of a sustainable Bioeconomy supports the modernisation and strengthening of the EU industrial realities through the creation of new value chains and more cost-effective industrial processes.

II.B. Inter-regional and inter-partnership collaborative results

- Additional results obtained from working *with other partnerships* under the thematic S3 Platforms. *(Specific examples).*

  Please enter here...

- Evaluation of the involvement of relevant business sector (clusters, SMEs, business associations, chambers of commerce, Digital Innovation Hubs (DIHs), etcetera) in the Partnership activities. *(Specific examples)*

  The Bioeconomy Pilot addresses prominent social challenges for the next future concerning energy supply and environmental preservation. The valorization of lignocellulosic value product streams will direct the development and application of industrial biotechnology to produce high-value products such as fine and speciality chemicals.

  Since the start of the Bioeconomy Pilot, the Bio-aromatics demo-case was seen as the fastest growing demo case. This was due to the strategic decisions in the directly involved region and the strong core business (BIG-Cluster) with the approval of many research and demonstration projects. At the moment, more than 20 companies are involved in ongoing projects.

In supporting the cooperation among alpine space, a stakeholders database has been implemented reporting more than 130 lombard companies accounting for four value chains (chemicals, agro, wood, food and pharma packaging). This model could also be applied for Vanguard regions, identifying actors playing in the value chains and creating a cluster mapping of industrial realities who search for interregional cooperation.

- Evaluation of whether ***the level of inter-regional cooperation is sufficient*** to potentially provide *practical and relevant socio-economic impacts*. *(Specific examples)*

Interregional cooperation could contribute to the development of a new model of biorefinery. The sustainable processing of biomass into a large amount of marketable products (food, feed, materials, chemicals) and energy (fuels, power, heat), using a wide variety of conversion technologies in an integrated manner represent the possibility to create new value chains, in which different actors of Vanguard regions are asked to play.

As reported in the publication "Biorefineries distribution in the EU", 803 biorefineries have been identified in the EU, of which 507 produce bio-based chemicals, 363 liquid biofuels and 141 bio-based composites and fibres. Although the realization of the biomass potential according to REmap 2030, as reported by International Renewable Energy Agency-IRENA, it will require effective strategies and new policies from both the demand and supply sides.

These policies need to be formulated, encompassing the uncertainties in demand, supply and cost-related issues and considering the land and water resource needs, as well as the bioenergy life cycle's environmental impacts. The starting point for demand-side policymaking is creating knowledge around resource availability, prioritising food security and understanding the realistic potential of the extent to which resources can be transformed into a useful solid, liquid and gaseous bioenergy products. In the transport sector of most countries, there are already biofuel mandates for blending. If all REmap Options are implemented by 2030, the demand for advanced biofuels will reach 240 billion litres per year. Advanced biofuels from feedstocks grown sustainably on degraded/ abandoned land or from residues also have much higher life cycle GHG emissions savings compared to the performance of conventional biofuels, especially when land use change emissions are considered.

II.C. New activities

- Involvement of regions from EU13 Member States in the Partnership, in particular with respect to scoping, mapping and/or matchmaking. *In addition, justification should be provided if no EU13 regions are involved.*

*Thanks to the interregional cooperation activities promoted by the Bioeconomy Pilot, during the General meeting of November 13, **two new potential use-cases** were candidates as high TRL business models.*

*The **first** one is represented by the Local4Local biorefinery use-case led by Slovenia region, focused on the developing a renewable, domestic supply of affordable carbon and cellulosic fibers for use in, but not limited to clean energy applications.*

The Bioeconomy Pilot currently supports the implementation of this use-case by providing international exchange of knowledge in the field across the Vanguard regions and other interesting ones, define the most promising value-chains and selection of cutting-edge technologies. The workshop held on May 27 in Brussels was a very good step towards these objectives

*The **second** potential use-case led by Malopolska region aims to establish of facilities with up and downstream for the production of polyhydroxyalkanoates (PHAs), biopolymers of bacterial origin for construction of drug-functionalized wound patches, implants for cartilage and bone regeneration and biodegradable packaging solutions. The Bioeconomy Pilot currently supports the implementation of this use-case by providing of mapping of the most relevant industrial key players in PHA production across the Vanguard regions to create a critical mass around a sustainable business model. A report of this activity will be published on September 2019 and it also includes an assessment of the attractive new sustainable polymers, barriers and potential commercial impacts of PHA.*

- Involvement of regions/countries from outside of EU28 Countries. *(Number of participants from non-EU countries. Specify their contribution).*

Please enter here...

- Advancement and promotion of the Partnership through publications and other communication/outreach activities. *(Number of outreach activities that resulted from the Partnership. A complete list with references and web-links should be given in an annex).*

  The Bioeconomy Pilot designs matchmaking events to link up commercial, technological and research partners, by promoting demo-cases and supporting the creation of new integral bio-based value chains. It promotes new business opportunities through interregional cooperation and exchange of information and ideas and encourages projects at the demonstration and piloting stage towards their upgrading and business exploitation (beyond TRL 5).

  Since the beginning of 2019, the Bioeconomy Pilot organized two editions of the "Bioeconomy Dialogues", matchmaking events targeted at the business sector, researchers and bioeconomy developers. The event provides a platform to enhance new cooperation, find international partners, develop bioeconomy business and facilitate international exchange of knowledge in the field. It includes company cases, good practices and projects focusing on bioerefinery, biobased materials and biofuels, to discuss concrete challenges and enhance new cooperation and partnerships.

  During the National Bioeconomy Day, the Bioeconomy Pilot promoted the Vanguard international workshop titled: "Challenges and opportunities for the establishment of bio-based value chains" (Milan, 23rd of May http://www.chimicaverdelombardia.it/wp-content/uploads/2019/05/BIOECONOMY-DAY_23.5-programme_V14stampa.pdf). The workshop aims to raise public awareness and promote dialogue on bio-energy and bio-based products production across Europe, bringing together academics, researchers, stakeholders, policymakers and business representatives operating in the bio-based value chain.

  The objective of the workshop is to exchange ideas on how to support the interregional cooperation on the innovative use of non-food biomass, share experience and discuss bottlenecks in the final step from technical maturity to industrial and market implementation. More than one hundred participants and most relevant key players of the production of biomethane and bio-based material took part in the workshop.

  Finally, the Lignocellulose biorefinery stakeholder meeting was organized in Brussels on the 27th of May. The meeting gathered a critical mass of experts on gasification and biorefining and explored potential value chains to improve the business model implementation across the Vanguard and other interested regions.

  About the strategic actions to trigger the interregional cooperation on high-potential technologies, the Bieconomy Pilot is currently working on the mapping of the most promising business model and demo-plants for the production of bio-based materials on four value chains: agro-food, wood, food/pharma packaging and chemicals.

  In this contest, one relevant lombard use-case has been evaluated for the polyhydroxyalkanoates (PHAs) production from dairy industries' wastes, in particular, milk whey.

  The obtainment of these biopolymers has been achieved through the implementation of bioprocesses (fermentation and anaerobic digestion), in order to reduce the use of toxic solvents and to give a green footprint to the industrial processes. Milk whey represents a disposal cost for the productors, and therefore, the use of this abundant agro-industrial waste could contribute to creating a new value chain, perfectly in line with the Bioeconomy strategy.

  The final report of the project will be available in September 2019 and will also provide a mapping of the regional stakeholders operating in the dairy sector. PHAs will be produced through the anaerobic digestion process; therefore the use of this widespread technology makes this value chain easily integrated into already existing biogas plants. The integration of this value chain represents a great opportunity in term of diversification of activities and removal of disposal costs for the manufacturers, making possible a sustainable model of interregional cooperation.

- Activities and projects with partnerships working under <u>other</u> S3 Thematic Platforms *(Agri-Food, Energy and Industrial Modernisation).*

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III.A Your Partnership and the UN 2030 Sustainable Development Goals (SDGs)

The EU has a strong position when it comes to sustainable development and is also fully committed to be a frontrunner in implementing the UN's 2030 Agenda[1], together with its member countries and regions. Many interregional partnerships under the thematic S3 Platforms contribute strongly to the attainment of these 17 goals.

Please indicate to which Sustainable Development Goals and to what extent your thematic Partnership contributes?

Your Partnership and Sustainable Development Goals

Goals to which your partnership (can) contribute:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	*Not applicable*
Goal 1. **End poverty** in all its forms everywhere	☐	☐	☐	☐	☐	☒
Goal 2. **End hunger**, achieve **food security** and improved **nutrition** & promote **sustainable** agriculture	☐	☐	☐	☐	☐	☒
Goal 3. Ensure **healthy lives** & promote **well-being** for all at all ages	☐	☐	☐	☐	☐	☒
Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	☐	☐	☐	☐	☐	☒
Goal 5. Achieve **gender equality** & empower all women and girls	☐	☒	☐	☐	☐	☐
Goal 6. Ensure availability and sustainable management of **water and sanitation** for all	☐	☐	☐	☐	☐	☒
Goal 7. Ensure access to **affordable, reliable, sustainable and modern energy for all**	☒	☐	☐	☐	☐	☐
Goal 8. Promote sustained, inclusive and sustainable **economic growth**, full and productive **employment** & decent **work for all**	☒	☐	☐	☐	☐	☐
Goal 9. Build resilient **infrastructure**, promote inclusive and sustainable **industrialisation** & foster **innovation**	☒	☐	☐	☐	☐	☐
Goal 10. Reduce **inequality** within and among countries	☐	☐	☐	☐	☐	☒
Goal 11. Make **cities** & human settlements inclusive, safe, resilient and sustainable	☐	☒	☐	☐	☐	☐
Goal 12. Ensure sustainable **consumption** & **production patterns**	☐	☒	☐	☐	☐	☐
Goal 13. Take urgent action to combat **climate change** and its **impacts**	☒	☐	☐	☐	☐	☐
Goal 14. Conserve and sustainably use the **oceans**, **seas** & **marine** resources for sustainable development	☒	☐	☐	☐	☐	☐
Goal 15. Protect, restore and promote sustainable use of **terrestrial ecosystems**, sustainably manage **forests**, combat **desertification**, halt and reverse land degradation and halt biodiversity loss	☒	☐	☐	☐	☐	☐
Goal 16. Promote **peaceful & inclusive societies** for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	☐	☒	☐	☐	☐	☐
Goal 17. Strengthen the means of implementation and revitalise the **Global Partnership for Sustainable Development**	☒	☐	☐	☐	☐	☐

[1] The 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs), adopted by the United Nations (UN) in September 2015, gave a new impetus to efforts to achieve sustainable development.

III.B Your Partnership and the UN 2030 Sustainable Development Goals (SDGs)

The S3 Platform is currently considering carrying out a study which would feature how selected thematic S3 Partnerships are contributing to the Sustainable Development Goals.

Would you be interested to have your partnership considered to be included in this study? (Please feel free to put us in touch with a different region/colleague.)

Lombardy Regions - Lombardy Green Chemistry Association - ilaria.re@italbiotec.it